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Учебно-методическое пособие

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Учебно-методическое пособие содержит теоретический материал, комплексы упражнений по базовым аспектам грамматики и морфологии уровня Pre-Intermediate, контрольные работы и задания для самостоятельного тренинга, аутентичные тексты, раскрывающие предмет, понятийную область и актуальные вопросы современной агрономии. Обширная текстовая база поможет сформировать компетенцию владения английским языком на уровне профессионального общения. Пособие может быть использовано в качестве основной или дополнительной литературы для курса «Профильный иностранный язык", курса повышения квалификации «Профессиональный иностранный язык" в сфере агрономии.

Учебно-методическое пособие предназначено для студентов всех форм обучения по направлениям подготовки 35.03.04 – Агрономия (уровень бакалавриата), 35.04.04 – Агрономия (уровень магистратуры), 35.03.03 – Агрохимия и агропочвоведение (уровень бакалавриата), 35.04.03 – Агрохимия и агропочвоведение (уровень магистратуры).

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ВВЕДЕНИЕ

Данное учебно-методическое пособие предназначено для студентов, магистрантов и аспирантов различных направлений подготовки, связанных с агрономией, лесным делом, защитой растений, ландшафтным дизайном.

Пособие может быть использовано в качестве основной и дополнительной литературы на аудиторных занятиях по дисциплинам «Иностранный язык (английский)" и «Профильный иностранный язык (английский)". Пособие содержит большое количество тренировочных упражнений и тестовых заданий, которые могут быть использованы для формирования контрольных и самостоятельных работ. Издание может быть использовано в научно-исследовательской работе магистрантов и при подготовке к сдаче кандидатского экзамена по английскому языку.

В разделах учебно-методического пособия представлены: 1) краткий грамматический справочник с комплексом тренировочных упражнений и тестовых заданий; 2) справочный материал по словообразованию с комплексом тренировочных упражнений и тестовых заданий; 3) тесты и практикум на использование общеупотребительной лексики; 4) текстовая база общекультурной и страноведческой направленности; 5) тексты профессиональной направленности с комплексом практических заданий; 6) обширная текстовая база профессиональной направленности; 7) основные положения теории перевода, знание которых необходимо студенту для грамотной переводческой работы с текстами по специальности.

Логика построения учебного пособия связана с последовательностью формирования лингвистических компетенций по дисциплинам «Иностранный язык", «Профильный иностранный язык": разделы с 1-го по 3-й направлены на освоение английского языка во всей совокупности грамматических, морфологических, лексических особенностей уровня Pre-Intermediate; 4-й раздел предоставляет возможность работы с текстовым материалом сначала общекультурной, а затем и специальной тематики на уровне Pre-Intermediate/ Intermediate.

Таким образом, каждый блок через тексты и систему упражнений стимулирует интерес обучающихся к научной коммуникации на иностранном языке, повышает мотивацию к процессу обучения,

способствует формированию основных и профессиональных компетенций:

– владение иностранным языком как средством коммуникации в рамках терминологии профессионального международного общения;

– способность применять иностранный язык в сфере профессиональной деятельности;

– способность к письменной и устной коммуникации на иностранном языке;

– способность использовать знание иностранного языка для получения профессиональной информации из иностранных источников.

Учебно-методическое пособие включает обширный текстовый банк по самым разным направлениям агрономической науки, а также справочный материал для подготовки докладов и презентаций.

В целом пособие ставит своей целью развить коммуникативные умения, необходимые в сфере профессиональной деятельности агрономов. Особое внимание уделяется формированию ведущего коммуникативного умения – чтения литературы по специальности с разной глубиной осмысления содержания. Материалы и задания развивают диалогическую и монологическую речь, навыки реферирования и комментирования, стимулируют интерес к иноязычной информации о научных открытиях и проблемах.

Учебно-методическое пособие может быть использовано в разнообразных условиях учебного процесса для развития базовой коммуникативной компетенции – умения получать, перерабатывать и передавать информацию на иностранном языке.

1. ГРАММАТИКА

1.1. КРАТКИЙ ГРАММАТИЧЕСКИЙ СПРАВОЧНИК

THE ARTICLE (АРТИКЛЬ)

1. Артикль – это служебное слово, самый распространённый определитель существительного.

2. В традиционной английской грамматике имеется два артикля: неопределенный – **a** (**an** – перед гласными: an apple) и определенный – **the**.

3. Неопределённый артикль **a, an** произошел от числительного и обозначает любой предмет из класса; определенный артикль произошёл от указательного местоимения и обозначает конкретный предмет из ряда подобных. Правила употребления артиклей представлены в табл. 1.

Таблица 1

Правила употребления артиклей

The Indefinite Article (неопределённый артикль)	The Definite Article (определённый артикль)
1	2
1. Употребляем перед нарицательными существительными: I have a pencil	1. Употребляем перед нарицательными существительными: The pencil is red
2. НЕ употребляем перед именами собственными	2. Употребляем перед именами собственными: The Greens (семья целиком). The Pacific Ocean (океаны). The Black Sea (моря). The Don (реки). The Urals (горные цепи). The South (стороны света). The USA, the UK, the Netherlands, the Ukraine, the Crimea, the Congo (некоторые страны и местности). The Pobeda (суда). The Hilton (гостиницы). The Morning Star (английские газеты)
3. Употребляем только с исчисляемыми существительными в единственном числе: a dog, a friend	—

Продолжение табл. 1

1	2
4. Упоминаем предмет впервые: This is a star	4. Упоминаем предмет вторично: This is a star. The star is beautiful
5. There is a… There is a book on the table	5. Where is the… Where is the book?
6. Употребляем в структурах: I am a… I am a student. He is a… He is a teacher. This is a… This is a boy. That is a… That is a girl. It is a… It is a picture. I see a… I see a dog	6. Употребляем: С порядковыми числительными: Today is the first of May. Перед прилагательными в превосходной степени: He is the best student
7. What a ……! What a fine day!	7. What's the use?
8. В устойчивых словосочетаниях: To have a good time To have a rest To go for a walk For a short time In a loud voice As a tourist	8. В устойчивых словосочетаниях: To the right To the left In the middle In the corner In the morning In the evening In the afternoon

No Article (нулевой артикль)

Если перед существительным стоит:
Притяжательное местоимение – It is my dictionary.
Указательное местоимение – This dictionary is mine.
Существительное в притяжательном падеже – This is my sister's dictionary.
Отрицание NO – I have no dictionary.
Количественное числительное – Those are two dictionaries.
Перед названием месяцев и дней недели – on Sunday, in May.
Перед названиями наук, учебных предметов и языков (если после названия языка не стоит слова language) – English is not difficult. We study chemistry

В устойчивых словосочетаниях:

At home	Before breakfast	In town
At work	Before dinner	To town
At school	Before supper	From place to place
To go home	For breakfast	By bus
To go to work	For dinner	By train
To go to school	For supper	By car
To go to bed		By tram
After work	At breakfast	On horseback
After school	At dinner	On foot
From work	At supper	On board a ship
From school		

Окончание табл. 1

1	2	3
After breakfast After dinner After supper At sunrise At sunset From morning till night All day long	Have breakfast Have dinner Have supper	In winter In spring In summer In autumn
С существительным во множественном числе, которое является частью именного сказуемого: They are friends		
Перед названием месяцев и дней недели: on Sunday, in May		
Перед названиями наук, учебных предметов и языков (если после названия языка не стоит слово language): English is not difficult. Но! The poem is written in the English language		
Перед существительными в газетных заголовках: Arrival of British Prime Minister		
Если существительное является обращением: Children, go to bed		
Перед существительными breakfast, dinner, lunch, supper		
Перед существительными в высказываниях членов семьи: Is Granny in?		
Перед именами и фамилиями: Mary Smith		
Перед званием: Professor Grey		
Перед названием отдельных гор: Snowdon, островов: Tasmania		
Перед названиями стран, состоящих из одного слова – Russia, городов – London, континентов – Australia. Но! The Ukraine, the Crimea, the Caucasus, the Netherlands, the Hague, the Congo		

Существительные school, college, university, bed, town, home, church, hospital, prison, jail, work могут выражать абстрактные понятия и употребляться без артикля: at school. Также они могут быть исчисляемыми и употребляться с определённым и неопределённым артиклем. This is a school, not a church. This is the town where their parents live.

The Noun (имя существительное)

1. Все существительные английского языка делятся на имена собственные (Ann, Novosibirsk) и имена нарицательные (dog), которые в свою очередь подразделяются на исчисляемые (table, chair) и неисчисляемые (water, air), вещественные (wood) и отвлеченные (impression). Имеется также класс собирательных существительных, таких как team, group, army, party.

2. Существительные могут иметь при себе слова-определители: артикли, местоимения, прилагательные, другие существительные.

3. В английском языке существительные имеют грамматические категории рода, числа, падежа (табл. 2). За редким исключением (an actor – an actress, a waiter – a waitress) род определяется по контексту.

Таблица 2

Имя существительное

Род	Число		Падеж	
	единственное	множественное	общий	притяжательный
A girl-friend A boy-friend An actor – an actress	a worker a class a hero a wife a country	workers classes heroes wives countries	The boy reads a book. The book of the boy was open	The sun's rays. The boy's book was open
	a valley a man a woman a child a foot a tooth a goose a sheep a fish a deer – – family –	valleys men women children feet teeth geese sheep fish deer police cattle families family (все члены)	The books of the boys were open. She showed the boy her pen. She showed her pen to the boy. We have seen the boy. It is written by the boy. They speak about the boy	The boys' books were open
	Греческие и латинские слова			
	a formula a datum a radius a crisis a criterion	formulae data radii crises criteria		

The Adverb (наречие)

1. Наречие – часть речи, указывающая на обстоятельство, при котором (как, где, когда) совершается действие.

2. По своему составу наречия делятся на простые (here), производные (badly**,** forwards), сложные (somewhere) и составные (till now, for ever).

3. Многие наречия (в основном образа действия) могут иметь степени сравнения, которые образуются так же, как и степени сравнения прилагательных (табл. 3).

4. Для усиления сравнительной степени наречий употребляются слова much, far, a great deal, превосходной – by far, far much в значении намного, гораздо, значительнее.

Таблица 3

Степени сравнения наречий

Виды наречий	Степень сравнения		
	положительная	сравнительная	превосходная
Односложные	fast late early	fast**er** late**r** earli**er**	fast**est** late**st** earli**est**
Многосложные	slowly beautifully	**more** slowly **more** beautifully	**most** slowly **most** beautifully
Исключения	well badly little much far	better worse less more farther further	best worst least most farthest furthest

The Adjective (имя прилагательное)

1. Прилагательные обозначают признаки, качества или свойства предмета.

2. По своему составу они делятся на простые (fine, sharp), производные (homeless, unhappy) и сложные (first-class, good-looking).

3. По значению они делятся на качественные (big, heavy) и относительные (wooden, square). Качественные прилагательные образуют степени сравнения (табл. 4), относительные – нет.

4. Некоторые английские прилагательные могут употребляться в значении существительных. В таких случаях они употребляются с определенным артиклем the и обозначают группу лиц, обладающих данным признаком: the rich (богачи, богатые), the poor (бедняки, бедные), the sick (больные), the Russians (русские), the English (англичане).

5. Функции прилагательных:

а) определение: This is a very difficult question.

Если в предложении есть несколько определений, выраженных прилагательными, то порядок их следования такой: качество, размер, возраст, цвет, происхождение, материал. A beautiful old red arm-chair.

б) часть составного именного сказуемого: This question is very difficult.

6. Сравнительные конструкции: as good as – такой же хороший, как; not so good as – не такой хороший, как; more than – более чем; less than – менее чем; the more the better – чем больше, тем лучше; the less the worse – чем меньше, тем хуже.

Таблица 4

Степени сравнения прилагательных

Виды прилагательных	Степень сравнения		
	положительная	сравнительная	превосходная
1	2	3	4
Односложные: к односложным прилагательным прибавляется: **-er** – сравнительная степень, **the**… **-est** – превосходная степень	old nice thin gay big lazy clever	old**er** nice**r** thinn**er** gay**er** bigg**er** lazi**er** clever**er**	**the** old**est** **the** nice**st** **the** thinn**est** **the** gay**est** **the** bigg**est** **the** lazi**est** **the** clever**est**
Многосложные: к многосложным прилагательным прибавляется: **more (less)** – сравнительная, **the most (the least)** – превосходная степень	beautiful important famous	**more (less)** beautiful **more (less)** important **more (less)** famous	**the most (least)** beautiful **the most (least)** important **the most (least)** famous
Составные: к составным прилагательным прибавляется: **more** – сравнительная, **the most** – превосходная степень	good-natured sweet-tempered absent-minded snow-white	**more** good-natured **more** sweet-tempered **more** absent-minded **more** snow-white	**the most** good-natured **the most** sweet-tempered **the most** absent-minded **the most** snow-white
Прилагательные, образующие степени сравнения от разных основ	good bad many much little far	better worse more more less farther further	the best the worst the most the most the least the farthest the furthest
Прилагательные, имеющие две формы, отличающиеся по своему значению	old late	older elder later latter	the oldest (старейший) the eldest (старший) the latest (более поздний) the last (последний)

Окончание табл. 4

1	2	3	4
Attention!			
left single absent wooden	no degrees of comparison (нет степеней сравнения)		

The Numeral (числительное)

1. Числительное – часть речи, обозначающая количество или порядок предметов при счете.

2. Числительные делятся на количественные (Cardinal) и порядковые (Ordinal) – табл. 5. По своему составу различают простые (four), производные (forty) и составные (forty-two) числительные.

3. Функции числительных:

а) подлежащее – Two played a game of chess;

б) дополнение – How many books did you buy? I bought two;

в) определение – the second class;

г) именная часть составного сказуемого – Three times two is six.

4. Составные числительные следует читать так: 2,345,678 – two million three hundred and forty-five thousand six hundred and seventy-eight.

5. Телефонный номер следует читать так: 3435688 – three four three five six double eight. Цифра 0 читается [ou] (Br.E.).

Но! 3455672 – three four five five six seven two.

6. Перед порядковым числительным ставится определённый артикль. The first class.

7. Хронологические даты следует читать так: 2000 – twenty hundred, 1945 – nineteen forty five.

16th November, 1961 – the sixteenth of November, nineteen sixty-one.

November 16, 1961 – November the sixteenth, nineteen sixty-one.

8. Проценты следует читать так: 5 % – five per cent (p.c.).

9. Британские деньги: £ 1.35 – one pound thirty five (pence) или one thirty five. € 5.80 – five euro eighty pence.

Американские деньги: $20.75 – twenty dollars seventy five cents или twenty seventy-five.

Таблица 5

Числительные

Количественные		
1 one	11 eleven	21 twenty one
2 two	12 twelve	22 twenty two
3 three	13 thirteen	30 thirty
4 four	14 fourteen	40 forty
5 five	15 fifteen	50 fifty
6 six	16 sixteen	60 sixty
7 seven	17 seventeen	70 seventy
8 eight	18 eighteen	80 eighty
9 nine	19 nineteen	90 ninety
10 ten	20 twenty	100 a (one) hundred
101 a (one) hundred and one	1,000 a thousand	100,000 a (one) hundred thousand
200 two hundred	2,000 two thousand	1,000,000 a (one) million

Порядковые					
1st	first	11th	eleventh	21st	twenty-first
2nd	second	12th	twelfth	30th	thirtieth
3rd	third	13th	thirteenth	40th	fortieth
4th	fourth	14th	fourteenth	50th	fiftieth
5th	fifth	15th	fifteenth	60th	sixtieth
6th	sixth	16th	sixteenth	70th	seventieth
7th	seventh	17th	seventeenth	80th	eightieth
8th	eighth	18th	eighteenth	90th	ninetieth
9th	ninth	19th	nineteenth	100th	(one) hundredth
10th	tenth	20th	twentieth		

Дроби		
Простые	½ a (one) half	⅔ two thirds
	⅓ one third	2 ⅜ two and three eighths
Десятичные	nought (zero) point three (point three)	
	2.35 two point three five (thirty five)	
	32.305 three two (thirty two) point three nought (zero) five	

The Pronoun (местоимение)

1. Местоимение – часть речи, употребляемая вместо существительного или прилагательного (табл. 6).

2. Функции:

а) подлежащее: I am a pupil;

б) именная часть сказуемого: It’s me;

в) дополнение: Tell me, please;

г) определение: My life.

Таблица 6

Местоимения

Местоимения		
1. Личные	им. п.	I, you, he, she, it, we, you, they
	объектный п.	me, you, him, her, it, us, you, them
2. Притяжательные	I форма	my, your, his, her, its, our, your, their
	II форма	mine, yours, his, hers, its, ours, yours, theirs
3. Возвратные и усилительные		myself, yourself, himself, herself, itself, ourselves, yourselves, themselves
4. Взаимные		each other, one another
5. Указательные		this (these), that (those), such, the same
6. Вопросительные		who, whom, whose, what, which
7. Относительные и соединительные		who, whom, whose, what, which, that
8. Неопределенные		some, somebody, something, someone, any, anybody, anything, anyone, all, each, every, everybody, everything, everyone, other, another, both, many, much, few, a few, little, a little, either, no, nobody, nothing, none, neither

The Preposition (предлог)

1. Предлог – служебное слово, показывающее отношение существительного к другим словам в предложении (табл. 7).

2. По своему составу предлоги делятся на простые (on), производные (below), сложные (without – with + out), составные (instead of).

3. Предлоги обычно ставятся перед существительным – to the shop, to whom did he go? Но могут стоять и после него – reason for, example of, reaction to, research into.

4. С помощью предлогов выражаются падежные отношения:

A pair of gloves – родительный (пара чего? перчаток).

A letter to my friend – дательный (письмо кому? другу).

By this scientist – творительный (кем? этим ученым).

With a fork – творительный (чем? вилкой).

About my friend – предложный (о ком? – о моём друге).

Таблица 7

Предлоги

The Prepositions of Space (предлоги места и направления)		
up – вверх	**opposite** – напротив	**to** (куда?) – в, на, к
down – вниз	**among** – среди	**out of** – из
over – выше, над	**between** – между	**into** (куда?) – в
below – ниже, под	**in the middle of** – по-	**through** – через
on – на	среди	**along** – вдоль
under – под	**at** – около, у	**across** – поперек, через
behind – за	**beside** – рядом	
in front of – перед	**in** – в	
The Prepositions of Time (предлоги времени)		
at	**on**	**by**
указывает на точное время:	*употребляется с более общим обозначением времени, дат, с названиями дней недели:*	*употребляется для обозначения самого позднего момента, к которому произойдет действие:*
at 6 o'clock – в 6 часов	on Tuesday – во вторник	by the end of the week –
at this moment – в это время	on my birthday	к концу недели
	on April 9th	
in		**for**
а) *указывает период времени, по окончании которого произойдет действие:*	**from** (с) … **to**, **till** (до):	*употребляется для обозначения периода, в течение которого длится действие:*
in two years – через два года;	He lived in Moscow from 1965 till 1970.	for ages – очень долго, целую вечность
б) *употребляется с названиями времен года, обозначениями лет, месяцев, частей суток:*	Он жил в Москве с 1965 до 1970.	
	since (с)	**during** the week – в течение недели
in 2000 – в 2000 году	*действие началось в прошлом и длится:*	**before** – до
in April – в апреле	I have lived in Rostov since childhood.	**after** – после
in the morning – утром	Я живу в Ростове с детства	**till (untill)** – до
		between – между

The Verb (глагол)

1. Глагол – часть речи, обозначающая действие или состояние, представленное в виде действия.

2. По своему составу глаголы делятся на простые (to go), производные (to organize), сложные (to whitewash), составные (to come in).

3. Формы глагола делятся на личные (Finite Forms) и неличные (Non-Finite Forms или Verbals).

4. По способу образования прошедшего простого времени и причастия прошедшего времени глаголы делятся на правильные (Regular – to play) и неправильные (Irregular – to go).

5. Основные формы глагола: инфинитив (to go, to play), прошедшее простое время (went, played), причастие прошедшего времени (gone, played). См. таблицу неправильных глаголов.

6. По значению и функции в предложении глаголы делятся на смысловые (Notional Verbs), вспомогательные (Auxiliary Verbs – to be, to do, shall, should, will, would) и служебные (Semi-Auxiliary Verbs). К ним относятся модальные глаголы (Modal Verbs) и глаголы-связки (Link Verbs – to be, to become, to grow, to get, to turn, to look).

7. Грамматическая категория – залог (Voice) – представлена действительным (Active) и страдательным (Passive) залогами.

8. Английский глагол имеет четыре группы времён (Tenses): простые (Simple или Indefinite), длительные (Continuous или Progressive), совершённые (Perfect), совершённо-длительные (Perfect Continuous или Perfect Progressive) – (табл. 8–10).

Таблица 8

Видовременные формы глаголов to be, to have и оборота there be в действительном залоге

Tense	To be – быть	To have – иметь	Оборот there is/are – есть, имеется
The Present Indefinite	I am/I'**m not** He, she, it **is/isn't** You, we, they **are/ aren't**	I, you, we, they **have/ haven't** He, she, it **has/hasn't**	There **is/isn't** There **are/aren't**
The Past Indefinite	I, he, she, it **was/ wasn't** You, we, they **were/ weren't**	I, we, you, he, she, it, they **had/hadn't**	There **was/wasn't** There **were/weren't**
The Future Indefinite	I, we, you, he, she, it, they **will be/won't be**	I, we, you, he, she, it, they **will have/won't have**	There **will/won't be**

Таблица 9

Видовременные формы глаголов в действительном залоге

Tense	Present	Past	Future	Future-in-the-past	Для выражения какого действия употребляется
1	2	3	4	5	6
Simple	write writes do does don't doesn't *usually* *sometimes* *every day* *often*	wrote did didn't *yesterday* *last year* *3 years ago*	will write will won't *tomorrow* *next month* *in 3 years*	should write would write should would shouldn't wouldn't *the other day*	Обычное, повторяемое действие, констатация факта
Continuous	am writing is writing are writing 'm not isn't aren't *now* *at present*	was writing were writing wasn't weren't *yesterday* *from 5 to 6* *while*	will be writing won't *tomorrow* *from 5 to 6* *while*	should be writing would be writing shouldn't wouldn't *at that time*	Действие, которое происходит в определённый момент, в ближайшем будущем
Perfect	have written has written haven't hasn't *just* *yet* *already* *never* *since* *recently*	had written hadn't *by 3* *o'clock* *yesterday* *before*	will have written won't *by* *tomorrow* *before* *until* *till*	should have written would have written shouldn't wouldn't *by that time*	Действие, законченное до определенного момента

Окончание табл. 9

1	2	3	4	5	6
Perfect Continuous	have been working has been working haven't hasn't *for* *since*	had been working hadn't *for* *since*	will have been working won't *by next day for 2 hours*	should have been working would have been working shouldn't wouldn't *for 3 hours* *by 11*	Указывает на то, как долго длится действие, начатое некоторое время назад

Таблица 10

Видовременные формы глаголов в страдательном залоге

Tenses	Simple	Continuous	Perfect
Present	Schools **are constructed** here (regularly, day by day, weekly)	The school **is being constructed** in our street (now)	The school **has been constructed** in our street this year (by this month)
Past	Schools **were constructed** here (usually, regularly, yesterday, in the past)	The school **was being constructed** in our street (in May last year, from May to August last year)	The school **had been constructed** (by that moment in the past)
Future	Schools **will be constructed** here (in future, in a day, in a year, tomorrow)	–	The school **will have been built** by May next year

The Mood (наклонение)

1. Наклонение – категория, свойственная только личным формам глагола.

2. Грамматическая категория наклонение (The Mood) представлена изъявительным (Indicative), повелительным (Imperative), сослагательным (Subjunctive) наклонением (табл. 11).

3. Изъявительное наклонение показывает, что действие рассматривается как реальный факт, сослагательное – как предполагаемый, желательный, возможный, повелительное наклонение выражает приказание, просьбу, совет, запрещение.

4. Сослагательное наклонение переводится с частицей бы.

5. Глагол to be в сослагательном наклонении принимает форму were (в Am.E. was).

Таблица 11

Наклонение

Изъявительное наклонение	Повелительное наклонение	Сослагательное наклонение
He **likes** coffee	**Go on** reading! **Don`t open** the window! Please, **sit down**. **Will** you **give** me that book, please?	I **should write** a letter to him if I **knew** his address. He **would have written** a letter to him if I **had known** his address. If I **were** you, I **should write** him a letter. **It is necessary** that he **should come**. He **suggests (proposes, demands, orders, requests, insists)** that I **(should)** take a leave. I **wish** I **knew** her address

Modal Verbs (модальные глаголы)

1. Модальные глаголы can (could), may (might), must, ought, should, need, dare не употребляются самостоятельно (табл. 12).

2. После модальных глаголов инфинитив употребляется без частицы to. Исключением является ought: You ought to close the window.

3. В 3-м лице единственного числа настоящего времени модальные глаголы не имеют окончания – s.

4. Модальные глаголы образуют вопросительную и отрицательную формы без помощи других глаголов.

5. Модальные глаголы не имеют формы инфинитива, причастия и герундия.

Таблица 12

Модальные глаголы

Глагол	Значение	Примеры
1	2	3
Can/ could	Способность, умение. Просьба. Сильное сомнение. Be able to (эквивалент can в будущем времени)	You **can/could** do it. **Can/could** you do it now? (Не могли бы вы…?) **Can/could** he have done it? (Неужели он это сделал?) He **will be able to** explain everything
Must	Твердая необходимость. Приказ. Запрещение. Уверенное предположение о настоящем (прошлом).	I **must** do it. (Надо, должен.) You **must** do it. (Должен.) You **must not** do it. (Нельзя, не должен.)

Окончание табл. 12

1	2	3
	Have to (эквивалент must в будущем). Вынужденная необходимость. Be to (эквивалент must) долженствование в силу договоренности, плана, расписания	He **must** know her. He **must** have done it. (Должно быть, вероятно.) I **had to** do it. **I'll have to** stay at home. (Мне придётся остаться…) The train **is to** come at 6 p.m.
May (might)	Разрешение (в вопросах). Запрещение. Сомнение: might выражает более сильное сомнение, чем may. Be allowed to (эквивалент may в будущем времени)	**May** I come in? (Можно… ?) You **may** not go there. (Не смей!) It **may (might)** snow. (Возможно, может быть.) They **are allowed to** leave their luggage in this area. We **will be allowed to** go to the sports ground
Ought to	Настоятельный совет. Моральный долг	You **ought to** be more careful. You **ought to** visit your old father (должен, следует)
Should	Совет, рекомендация. Упрек, сожаление	You **should** read a lot (следует, нужно бы). You **should not** smoke so much. He **should have told** her the truth. We all **should have tried** harder before the exam
Need	Отсутствие необходимости (have to) в настоящем и прошлом. Критика действия в прошлом, которое можно было и не совершать	You **needn't** do it. You **don't have to** do it (можно не…). He **doesn't need to/ doesn't have to/ needn't** get a taxi. I'll give him a lift. He **didn't need to** do it. Ему не нужно было … делать этого (а он и не делал). He **didn't need to** get a taxi because I gave him a lift. He **needn't have done** it. Ему не нужно было этого делать (а он сделал). He **needn't have got** a taxi. You **needn't have bought** me a gift
Dare	Посметь (в вопросах и отрицаниях), дерзнуть, осмелиться	How **dare** you speak to me?

The Verbals (неличные глагольные формы)

1. Неличные формы глагола: инфинитив (The Infinitive), причастие (The Participle), герундий (The Gerund) не изменяются по лицам, числам, не имеют наклонения, но имеют форму залога и временной отнесенности (табл. 13).

2. Инфинитив и герундий имеют свойства существительного, причастие – свойства прилагательного и наречия.

3. После модальных глаголов can, may, must, глаголов to make, to let, выражений had better, would rather, would sooner, глаголов to see, to hear, to watch, to feel частица to перед инфинитивом не ставится.

4. Глаголы to believe, to consider, to hold, to think, to assume, to suppose, употребляемые в Complex Subject в страдательном залоге переводятся глаголами «считать, полагать, думать".

5. Функции неличных глагольных форм приведены в табл. 14–16, примеры конструкций с неличными глагольными формами рассмотрены в табл. 17.

Таблица 13

Неличные глагольные формы

	Инфинитив (to)		Герундий (-ing)		Причастие I (-ing)	
Времена	Действ. залог	Страд. залог	Действ. залог	Страд. залог	Действ. залог	Страд. залог
Simple (Неопр.)	to ask	to be asked	asking	being asked	asking	being asked
Continuous (Длител.)	to be asking	–	–	–	–	–
Perfect (Соверш.)	to have asked	to have been asked	having asked	having been asked	having asked	having been asked
Perfect Continuous (Соверш. длит.)	to have been asking	–	–	–	–	–
Причастие II, V3, e.g. asked – является частью перфектной формы глагола: [have + причастие II] и частью глагола в пассивном залоге: [be + причастие II]						

Таблица 14

Функции инфинитива

Функции	Примеры
Подлежащее	**To walk** is useful. Полезно ходить пешком
Часть сказуемого	Our aim is **to master** English. Наша цель – овладеть английским языком
Дополнение	She likes **to sing**. Она любит петь
Определение	The method **to be used** is not new. Используемый метод не нов
Обстоятельство	He went there **to study**. Он пошел туда учиться

Таблица 15

Функции герундия

Функции	Употребление	Примеры
1	2	3
Подлежащее	–	**Swimming** is my favourite sport. Плавание – мой любимый вид спорта
Часть составного сказуемого	После глаголов: to stop – прекращать to finish – заканчивать to continue, to go on, to keep – продолжать to begin, to start – начинать	Stop **talking**! Прекратите разговаривать! He kept on **asking** her about the details. Он продолжал спрашивать ее о подробностях
Дополнение: а) прямое	После глаголов: to like – нравиться to need – нуждаться to prefer – предпочитать to remember – помнить to enjoy – получать to mind – возражать to excuse – извинять to be busy – быть занятым to be worth – стоить	Your suggestion needs **discussing**. Ваше предложение нужно обсудить. I prefer **reading** classical novels. Я предпочитаю читать классические романы. I don't mind **going** there. Я не возражаю (не против) пойти туда. She is busy **preparing** for the exam. Она занята подготовкой к экзамену.
б) предложное	После глаголов с предлогами: to depend on – зависеть от… to rely on – полагаться на… to be fond of – любить to object to – возражать против… to blame… for – винить кого-то за… to thank for – благодарить за… to be responsible for – отвечать за… to be tired of – устать от… to be afraid of – бояться … to look forward to – ожидать с нетерпением to feel like – быть склонным и т. д.	He thanked his friend for **helping** him. Он поблагодарил своего друга за помощь. He is fond of **collecting** stamps. Он любит собирать марки. I am tired of **arguing** with you. Я устал спорить с вами. I am afraid of **making** a mistake. Я боюсь, как бы не сделать ошибку
Определение	После абстрактных существительных с предлогами: way (of) – способ opportunity (of) – возможность hope (of) – надежда experience (in) – опыт reason (for) – причина, основание; interest (in) – интерес importance – значение и т. д.	You have no reason for **saying** that. У вас нет оснований говорить это. I understand the importance of **learning** English. Я понимаю важность изучения английского языка

Окончание табл. 15

1	2	3
Обстоятельство: а) времени	Употребляется всегда с предлогами: after, before, on	After **returning** home he resumed his work. После того как он вернулся домой (после возвращения), он возобновил работу.
б) образа действия	by, without, instead of, besides	She left the room without **looking** at me. Она ушла из комнаты, не взглянув на меня
После глаголов to like, to begin, to start, to continue, to stop, to intend и словосочетаний: it is no good, it is (of) no use, it is useless употребляется как герундий, так и инфинитив		

Таблица 16

Функции причастия

Функции	Примеры
Подлежащее	–
Часть сказуемого	He is **writing** a paper. Он пишет научную работу
Дополнение	–
Определение	The **rising** sun – восходящее солнце A **broken** cup – разбитая чашка
Обстоятельство	(While) **reading** he made notes. Читая, он делал заметки

Таблица 17

Конструкции с неличными глагольными формами

The Participial Constructions (причастные конструкции)		
Конструкция	Пример	Перевод
The Objective Participial Construction (Объектный причастный оборот) Сущ. (общ. п.) или мест. (объект. п.) + прич. I или II	We heard **him playing** the piano. I considered **the work done**. I had **my hair cut**	Мы слышали, **как он играл** на пианино. Я считал, **что работа выполнена**. Я **подстригся**. (Кто-то подстриг меня.)
The Subjective Participial Construction (Субъектный причастный оборот) Сущ. (общ. п.) или мест. (им. п.) + прич. I или II	**He** was seen **crossing** the street. **She** was heard **talking** about it. **He** was seen **looking for** something	Видели, **как он переходил** улицу. Слышали, **как она** об этом **говорила**. Видели, **как он** что-то **искал**

The Absolute Participial Construction Независимый причастный оборот Сущ. (общ. п.) или мест. (им. п.) + прич. I или II	**It being warm**, we went for a walk. Radio was invented in 1895, **the inventor being** the Russian scientist	**Так как было тепло**, мы пошли гулять. Радио было изобретено в 1895г., **причем изобретатель был** русским ученым
The Infinitive Constructions (инфинитивные конструкции)		
Конструкция	Пример	Перевод
Сложное подлежащее (Complex Subject) Сущ. (общ. п.) или мест. (им. п.) + инф. гл.	**They** are said **to have travelled** a lot. **The data** proved **to be wrong**	Говорят, **что они много путешествовали.** **Данные** оказались **неверными**
Сложное дополнение (Complex Object) Сущ. (общ. п.) или мест. (объект. п.)+ инф. гл.	We believe **her to be** in Moscow. She wanted **me to return** soon. We expect **him to come** here	Мы полагаем, **что она сейчас в Москве.** Она хотела, **чтобы я скорее вернулся.** Мы ожидаем, **что он придет сюда**
For + сущ. (мест.) + инф. гл.	Everybody waited **for the meeting to start.** He waited **for her to speak**	Все ждали, **когда начнется собрание.** Он ждал, **чтобы она заговорила**
The Gerundial Constructions (герундиальные конструкции)		
Конструкция	Пример	Перевод
Предлог + сущ. (прит. п.) или прит. мест. + герундий	I thought sometimes that Mindy was afraid **of her father knowing** the truth. Just before dinner he was told **of her not being** able to visit	Я иногда думал, что Минди боится **того, что ее отец узнает правду**. Как раз перед ужином ему сообщили **о том, что она не сможет приехать**

Sequence of Tenses (согласование времен)

Правила согласования времен в английском языке приведены в следующей ниже табл. 18.

1. Если сказуемое главного предложения выражено глаголом в настоящем или будущем времени, то сказуемое придаточного предложения может стоять в любом времени, которое требуется по смыслу.

2. Если сказуемое главного предложения стоит в прошедшем времени, то сказуемое придаточного предложения должно стоять в одном из прошедших времен. Выбор конкретной видовременной формы определяется тем, происходит ли действие в придаточном

предложении одновременно с главным, предшествует ему, либо будет происходить в будущем.

3. В ряде случаев правило согласования времен не соблюдается:

а) в придаточных дополнительных предложениях, которые выражают общеизвестный факт или истину;

б) в придаточных дополнительных предложениях, сказуемое которых выражено глаголом в сослагательном наклонении;

в) с модальными глаголами must, should и ought, которые употребляются в придаточном предложении независимо от того, в каком времени стоит глагол-сказуемое главного предложения.

Таблица 18

Правила согласования времен

1	He **says** (that)	he **studies** English. he **studied** English. he **will study** English	Он говорит, что изучает английский. Он говорит, что изучал английский. Он говорит, что будет изучать английский
2	He **said** (that)	he **studied** English. he **had studied** English. he **would study** English	Он сказал, что изучает английский. Он сказал, что изучал английский. Он сказал, что будет изучать английский
3	a) He **said** (that) b) He **demanded** (that) c) The teacher **says (said)** that	the 9th of May **is** Victory Day. the work **should be done**. the pupil **must correct** his mistakes	Он сказал, что 9 мая – День Победы. Он потребовал, чтобы работа была сделана. Учитель говорит (сказал), что ученик должен исправить свои ошибки

В косвенной речи также соблюдается правило согласования времен (табл. 19). При обращении утвердительных предложений из прямой речи в косвенную производятся следующие изменения.

Косвенная речь вводится союзом that, который часто опускается.

Глагол to say, после которого следует дополнение, заменяется глаголом to tell.

Личные и притяжательные местоимения заменяются по смыслу.

Времена глаголов в придаточном предложении изменяются согласно правилам согласования времен.

Указательные местоимения и наречия времени и места заменяются другими словами:

This → that

These → those

Now → then
Today → that day
Tomorrow → the next day
The day after tomorrow → two days later
Yesterday → the day before
Ago → before
Next day → the following day
Here → there

Общие вопросы вводятся союзами if, whether, имеющими значение частицы «ли”. В придаточных предложениях соблюдается порядок слов утвердительного предложения.

Таблица 19

Прямая и косвенная речь

Direct speech	Indirect speech
He said: Ann, you are pretty	He told Ann that she was pretty
He asked: Is he a student?	He asked if he was a student
He asked: Who is absent?	He asked who was absent
He asked: Where do you work?	He asked where I worked
He ordered: Tom, open the door!	He told Tom to open the door
He ordered: Tom, don’t open the door!	He told Tom not to open the door

1.2. ГРАММАТИЧЕСКИЙ ПРАКТИКУМ. ВАРИАНТЫ КОНТРОЛЬНЫХ РАБОТ

Методические рекомендации

Прежде чем выполнять грамматические упражнения и тесты, внимательно изучите соответствующие грамматические таблицы (табл. 1–19).

Вариант 1

Ex. 1. Раскройте скобки и употребите данные личные местоимения в притяжательном падеже.

1. (He) … composition is very interesting. 2. (We) … son goes to primary school. 3. (You) … sister is young. 4. (They) … knowledge of the subject is very poor. 5. (He) … name is John. 6. (I) … family lives in Novosibirsk. 7. (She) … friends often visit her.

Ex. 2. Употребите нужную форму личных местоимений.

1. I often see (they, them) in the bus. 2. She lives near (we, us). 3. (We, us) always walk to school together. 4. He teaches (we, us) English. 5. She sits near (I, me) during the lesson. 6. I always speak to (he, him) in English. 7. What is the matter with (he, him) today? 8. He explains the lesson to (they, them) each morning. 9. There are some letters here for you and (I, me). 10. I know (she, her) and her sister very well.

Ex. 3. Вставьте вместо точек нужное по смыслу местоимение.

1. I have lost … pen, may I take …? 2. If you've left … dictionary at home, you may take …. 3. These pencils are …, take … if you want. 4. Help …, please. 5. He always makes dinner …. 6. We have very many relatives in … native town. 7. They can do it …. 8. … of you knows his address? 9. There is … butter on the table, but there isn't … milk.

Ex. 4. Прочтите и переведите предложения.

1. William Shakespeare was born in 1564 and died in 1616 in Stratford-on-Avon. 2. Shakespeare wrote 37 plays. 3. Jack London was born on the 12th of January 1876 and died in 1916. 4. On April 12, 1961 the whole world learned about Gagarin's flight into space.

Ex. 5. Скажите по-английски:

1 сентября 1984 года	11 марта 1951 года	9 октября 1947 года
7 ноября 1990 года	5 июля 1945 года	

Ex. 6. Ответьте на вопросы.

1. When do we celebrate the first day of spring (Victory Day, New Year's Day, Christmas, Women's Day, May Day, Cosmonautics Day, Independence Day)?

2. When were you born?

3. When was your father (your mother, your sister, your friend, your cousin) born?

Вариант 2

Ex. 1. Прочтите вслух существительные, запишите форму их множественного числа.

Carpet, glass, photo, box, lady, wife, valley, thief, man, woman, child, foot, tooth, life, handkerchief, tomato, scarf, sheep, deer, information, fish, coat.

Ex. 2. Перепишите предложения, вставляя данные в скобках существительные в единственном или множественном числе.

1. Ann's father told some funny circus … . The funniest … was about a giant clown. (story, stories) 2. A lot of … live in an apartment house. Tom's … lives on the fourth floor. (family, families) 3. Do you know the name of this …? The travellers will see many … . (country, countries) 4. Ben's dog has five brown … . One little … has a flat nose. (puppy, puppies) 5. Small … laugh and play. Jack's … has a new toy. (baby, babies)

Ex. 3. Образуйте сравнительную и превосходную степени прилагательных.

Tall, long, short, hot, cold, nice, large, big, wide, strong, happy, warm, high, heavy, low hard, busy, easy, bright, interesting, comfortable, important, necessary, beautiful, famous, pleasant, popular, wonderful, active, careful.

Ex. 4. Употребите прилагательные и наречия, данные в скобках, в нужной степени сравнения.

1. My mother is much … than my father (young). 2. The Novosibirsk opera theatre is one of … buildings in the city center (beautiful). 3. The sound grew … and … (faint). 4. The party was not so … as I had expected (gay). 5. I have no one … than you (close). 6. What is the … news (late)? 7. Yesterday I came home … than usual (late). 8. Ann sings far … than Nina (well). 9. I like this picture … of all (well). 10. My car is … than yours (expensive). 11. He swims … than you do (fast). 12. My sister drives … of us all (carelessly). 13. My uncle gives … to the poor than my Dad does. 14. Jill works … of all (bad).

Ex. 5. Заполните пропуски глаголом to be, употребляя соответствующую форму в Present Indefinite.

1. He … a good student. 2. They … old friends. 3. I … a teacher. 4. John … absent from class today. 5. The weather … good today. 6. The sky … clear. 7. We … both students. 8. Mr. Smith … sick today. 9. She and I … cousins.

Ex. 6. Напишите следующие предложения в вопросительной и отрицательной формах.

1. They are in Europe now. 2. She is a smart girl. 3. It is cold today. 4. He is in his office now. 5. They are members of the fitness club. 6. Both

sisters are tall. 7. John is angry with you. 8. She is a good tennis player. 9. The laptop is on my desk. 10. She is a good dancer.

Вариант 3

Ex. 1. Заполните пропуски глаголом to have, употребляя соответствующую форму в Present Indefinite.

1. She … one sister and two brothers. 2. We … a large library at school. 3. They … a new car. 4. She … green eyes. 5. Mary … a headache. 6. The secretary … a new computer. 7. Mr. Smith's office … three large windows. 8. We … a lot of friends in Moscow. 9. Both brothers … red hair. 10. Harry's dog … a long tail. 11. He and I … a lot in common.

Ex. 2. Употребите глаголы to be или to have в нужной форме.

1. There is no school in this village and the children go to the school which … two miles away. 2. How old … you? I … 17. 3. … you English lessons twice a week? – Yes, we …. 4. I … no time to help you yesterday. 5. I … very sorry about it. 6. We … a conference tomorrow. 7. I … busy with my report today. 8. My sister … a second-year student of the Veterinary Medicine Faculty. 9. What … you fond of? 10. My hobby … growing vegetables. 11. Will you … any lectures tomorrow? 12. Chemistry … my favorite subject at school. 13. He … a lot of trouble with his car yesterday. 14. My grandfather … short grey hair but my grandmother's hair … long and thick. 15. Our mobile phones … on the table.

Ex. 3. Преобразуйте предложения, употребляя оборот there is/are.

1. This city has a lot of monuments. 2. Our town has no theatres. 3. This family has two children. 4. Our group has many good pupils. 5. Every week has seven days and every year has twelve months. 6. She has a lot of English books in her library. 7. The dog is in the room. 8. The children are in the yard. 9. The students are in the laboratory. 10. The car is near the house. 11. The bench was under the tree. 12. A lot of people will be at the stadium tomorrow.

Ex. 4. Употребите оборот there is / are в следующих предложениях:

1. … a new moon tonight. 2. … someone at the door. 3. … a lot of students absent today. 4. … three lamps in the room. 5. … two large windows in the room. 6. But … only one door. 7. … a lot of English classes in our school. 8. … nobody in the classroom now. 9. … no one at home.

10. … two semesters in an academic year at our university. 11. … a memo for you on the table. 12. … several beautiful parks in this city.

Ex. 5. Употребите глаголы, данные в скобках, в Present Indefinite.

1. We (read) texts in English in class every day. 2. He always (prepare) his homework carefully. 3. We always (play) tennis on Saturdays. 4. She (speak) several foreign languages. 5. The children (go) cycling in the park every afternoon. 6. Helen (work) very hard. 7. They (take) a lot of trips together. 8. We always (travel) by car. 9. I (eat) lunch in the university cafeteria every day. 10. The moon (move) round the earth. 11. The bus (leave) in ten minutes.

Ex. 6. Употребите глаголы, данные в скобках, в Past Indefinite.

1. We (work) in our garden all day yesterday. 2. I (listen) music until twelve o'clock last night. 3. He always (want) to learn English. 4. Ann and I (talk) over the telephone yesterday. 5. I (forget) to bring my notebook to class yesterday. 6. The telephone (ring) twice but no one answered it. 7. George (think) about his troubles continuously. 8. Last year Professor Johnes (teach) us both English and Biology. 9. I (lose) my English book yesterday but (find) it later. 10. They (graduate) four years ago. 11. He often (play) football with his dad when he was a five. 12. They (grow) various hybrid tomatoes in their greenhouse last season. 13. All the students (pass) their exams successfully.

Ex. 7. Употребите глаголы, данные в скобках, в Future Indefinite.

1. Carol (find) the book which you need. 2. They (see) us tomorrow at the seminar. 3. I (finish) my graduate work in April. 4. The shops (close) at noon today. 5. We (arrive) at three o'clock. 6. She (tell) you all about her work placement. 7. We (spend) two months in Germany taking our internship. 8. The plant (die) because of lack of sunshine. 9. The lecture about promising tomato varieties (begin) at eight o'clock. 10. The conference on the latest gene-editing techniques (last) from 2 to 4 p.m. 11. I (help) you with your homework. 12. They (pick) a lot of apples in their garden.

Вариант 4

Ex. 1. Поставьте глагол в the Past и the Future Indefinite, употребляя соответствующие индикаторы времени.

1. This vegetable seeds company invites agronomists to its trial fields twice a week. 2. She learns English and German in order to have a train-

ing course abroad. 3. We keep our harvest in the vegetable storehouse. 4. They have trials of new varieties from Holland every year. 5. I help my mother in our greenhouse in the morning. 6. They do their shopping every day. 7. We go to University by metro. 8. The classes begin at 8 a.m. 9. I stay at university till 2 o'clock. 10. It often rains in October. 11. Tom gets excellent marks in Landscape Gardening.

Ex. 2. Поставьте предложения в вопросительную и отрицательную формы.

1. Den studies at Novosibirsk State Agrarian University. 2. They usually buy seeds produced by reliable international companies. 3. The teacher asks a lot of questions in the Plant Protection Exam. 4. He entered the faculty of Agronomy in 2018. 5. My friend found an interesting article about eggplant varieties. 6. They got to the country by bus. 7. Nick will work as an open-field agronomist. 8. We shall make coffee for him. 9. Her cousin will go abroad to study grafting of tomatoes next week.

Ex. 3. Раскройте скобки, употребив Present Indefinite.

1. Protected crop agronomists (look) after plants in glasshouses. 2. Ann plays the piano, but she (not, play) it very well. 3. In Britain most shops (close) at 5.30 p.m. 4. At night when it (get) dark, they (switch) on the TV music channel and (listen) to music. 5. Mr. Brown often (go) to the cinema but his wife (not to go) very often. 6. She (prefer) to stay at home and to watch TV.

Ex. 4. Употребите глаголы, данные в скобках, в Present Continuous.

1. I see that you (wear) your new suit today. 2. Listen! Someone (knock) at the door. 3. The bus (stop) for us now. 4. Please, be quiet! The baby (sleep). 5. The leaves (begin) to fall from the trees.

Ex. 5. Употребите глаголы, данные в скобках, в Past Continuous.

1. When you telephoned, I (have) dinner. 2. She (water) the seedlings when I came into the nursery. 3. She (talk) with Professor Smith about the plant breeding when I saw her in the hall. 4. The accident happened while they (travel) in the South. 5. When I got up this morning, the sun (shine) brightly.

Ex. 6. Употребите глаголы, данные в скобках, в Future Continuous.

1. I (work) in our cabbage field this time tomorrow morning. 2. It (rain) when you get back. 3. If you come before six, I (prune) the shrub in my back garden. 4. At this time tomorrow afternoon I (take) my final English examination. 5. If we go there now, a German Professor (give) a lecture on Sustainable Agriculture and Rural Development. But if we go later, a Polish Professor (tell) about Non GMO Certificates.

Ex. 7. Поставьте глаголы в Past Continuous, употребив соответствующие индикаторы времени.

1. The child is sleeping now. 2. Nina is having a lecture on Forestry at the moment. 3. The family is sitting at the table and having dinner. 4. What are you doing tonight? 5. The girl is looking for her tablet computer. 6. The students are preparing for their exams. 7. It is snowing hard.

Вариант 5

Ex. 1. Употребите глаголы, данные в скобках, в Present Perfect.

1. I (speak) to him about it several times. 2. We (learn) a lot of new words in this course. 3. He (make) that same mistake in his research work about plant breeding several times. 4. I (hear) that story before. 5. I am afraid that I (lose) my car keys.

Ex. 2. Употребите глаголы, данные в скобках, в Past Perfect.

1. I was sure that I (see) this scientist before. 2. I asked him why he (leave) the conference so early. 3. It was clear that he (give) us the wrong research findings. 4. The scientific adviser corrected the academic paper which I (prepare). 5. He knew that he (make) a serious mistake.

Ex. 3. Употребите глаголы, данные в скобках, в Future Perfect.

1. I am sure they (complete) the crop variety testing by August. 2. He says that before he leaves, he (see) every show in town. 3. By the time you arrive, I (finish) reading your book. 4. I (be) in Germany two years next January. 5. A year from now he (take) his university examinations and (begin) to practice at a farm.

Ex. 4. Поставьте предложения в отрицательную и вопросительную формы.

1. They have received a new sample of a promising tomato variety this year. 2. She has been to the Netherlands at Wageningen University and

Research Centre. 3. They have already heard the news. 4. I have known his father. 5. He had worked at a farm before the army. 6. We had studied German before we began to study English. 7. She had written the internship report by 5 o'clock. 8. The children will have done their homework before their parents come home. 9. It will have stopped raining by noon.

Ex. 5. Поставьте глагол в главном предложении в Future Perfect, сделайте необходимые преобразования в придаточном предложении.

1. We were translating the text when you came. 2. They were writing a dictation when I entered the classroom. 3. The students were taking their exams from 9 till 12 o'clock. 4. He was having a shower when the telephone rang. 5. The boys were playing football when it began to rain.

Вариант 6

Ex. 1. Проанализируйте употребление модальных глаголов в следующих контекстах.

1. Nick can run very long distances. 2. He can speak several foreign languages. 3. You can join our group. 4. I must excuse myself. 5. You mustn't park the car here. 6. The boy must see a doctor. 7. You may keep my book for a week. 8. Drivers may go at 60 kilometers an hour here. 9. You may stay at your friends' over the weekend. 10. It may be cold. Take your coat. 11. Jack shouldn't have laughed at John. 12. John ought to be more careful in the future. 13. You needn't buy bread. We have some at home. 14. You needn't have done this. It was useless. 15. I have to take a taxi in order not to be late. 16. We had to wait as the manager was out. 17. Robert is to take his exams next month. 18. We are to meet at the café at 5 o'clock.

Ex. 2. Переведите предложения на русский язык, обращая внимание на модальный глагол must.

1. Her English is very poor, she must study very hard. 2. They must spend more time on their English. 3. You must help her in every way possible. 4. We must learn at least ten new words every day. 5. He must leave at once. 6. The students must do their homework regularly. 7. You must do this important work quickly.

Ex. 3. Напишите предложения в вопросительной и отрицательной формах.

1. We must tell her this news. 2. He may smoke here. 3. She can speak English perfectly. 4. The students must translate the text at home.

5. We can go to the theatre tonight. 6. We could help them. 7. They can use their dictionaries. 8. His friend could get this book at the bookshop. 9. You may take this test home. 10. I may go home now. 11. They must come at four.

Ex. 4. Заполните пропуски модальными глаголами или их эквивалентами.

1. She … play chess well. 2. … I take your pen? 3. … I ask you a question? 4. You … not talk at the lesson. 5. He … not speak English last year. 6. My sister … not play the piano two years ago, but now she … . 7. You … get this novel in our library. 8. I … go to the library today to prepare for my report at the conference. 9. … you do me a favour?

Вариант 7

Ex. 1. Замените действительный залог страдательным. Переведите предложения на русский язык.

1. The audience enjoyed the concert very much. 2. The little boy ate the cake. 3. The teacher corrects our exercises at home. 4. They started a dancing class last week. 5. Everybody will see this film soon. 6. The teacher returned our written work to us. 7. Mr. Sheldon will leave the tickets at the box-office. 8. The students translate texts during the lessons. 9. Mary took that book from the desk.

Ex. 2. Замените страдательный залог действительным. Переведите предложения на русский язык.

1. The entire city was destroyed by the fire. 2. The lecture was attended by a lot of people. 3. The book will be published in spring. 4. The class is taught by Mr. Anderson. 5. It was designed by a French engineer. 6. This book is always read by the students of the first course. 7. The letter was left on the table. 8. The house was struck by lightning. 9. The cries of the child were heard by everyone. 10. The garden fence is being repaired by Tim. 11. Who will the speech be made by tomorrow? 12. When grapes are ripe, they are harvested and crushed by winegrowers.

Ex. 3. Напишите предложения в вопросительной и отрицательной формах.

1. The first prize was won by Jeff. 2. Our exercises are corrected each night by the teacher. 3. The mail is delivered at ten o'clock. 4. The

construction of the bridge will be finished this year. 5. The contract will be signed tomorrow. 6. His report was listened with great interest. 7. The film is much spoken about. 8. All the email messages are looked through by the secretary. 9. All these books were published by this publishing house. 10. My car is being serviced now. 11. A garden pond has been made. 12. A lot of flowers will have been planted.

Ex. 4. Переведите предложения на русский язык, обращая внимание на Participle I и Participle II.

1. Finished with his breakfast, he remained for some time at the table, looking through the newspapers. 2. Before solving the problem, they had to consult the expert. 3. The leaves touched by the morning sun began to come out. 4. The flowers standing in the vase were brought by the pupils. 5. Writing a letter I heard a knock at the door. 6. I like pictures painted by this artist. 7. When asked about it, she couldn't give a definite answer. 8. Agronomists working at modern glasshouses in our country are trained at our university.

Вариант 8

Ex. 1. Переведите предложения на русский язык, обращая внимание на форму глагола придаточных предложений.

1. He said that he had read this book twice. 2. We thought that the results of your work would be much better. 3. The boy said that he was only eight years old. 4. I knew that he would refuse to help me. 5. He was sure that I should come in time. 6. She thought that the letter had been written by her friend. 7. They said that it had been raining from five till seven. 8. She said that she could not give me this book because she had promised to give it to her sister. 9. Julie told me that she needed me to help her with the pruning. 10. The professor said to the students that he was very happy with their results in the Chemistry exam.

Ex. 2. Поставьте глагол в главном предложении в Past Indefinite и сделайте необходимые преобразования в придаточном предложении.

1. He says that he knows them very well. 2. She says that she enjoys planting pot flowers. 3. He is sure that she is in Moscow now. 4. He says that she is in Moscow now. 5. He says that the classes begin at 2 o'clock. 6. I think that she is ill. 7. We know that she is ill. 8. He says that she went to the conference. 9. He said that she had gone to Ulan-Ude. 10. I know

that he lived in Krasnoyarsk. 11. Nick says that they met in Irkutsk. 12. I am sure that the students were in the library two minutes ago. 13. I hope that they knew about it. 14. I think that they were busy with the variety trial. 15. She says that she will go to the cinema. 16. She said that she would go to the cinema. 17. They say that they will leave for London next week. 18. She says that she will buy this coat. 19. We know that we will discuss this question tomorrow. 20. We hope that they will help us to do this work tonight. 21. We think that we will have our holidays in Mongolia next year.

Ex. 3. Употребите глаголы, данные в скобках, в нужной форме времени и залога, соблюдая правило согласования времен. Переведите предложения на русский язык.

1. She said that she (know) English very well. 2. We knew that they (come) to visit us next Sunday. 3. John said that he (go) away on Wednesday. 4. People were sure that soon a spaceship (fly) to other planets. 5. We were informed that a lot of scientists (work) at the problem.

Вариант 9 (для самостоятельной работы)

Ex. 1. Поставьте вопрос к подчеркнутому слову.

1. He has <u>just</u> left. 2. This pair of trousers costs <u>seven</u> dollars.

Ex. 2. Выберите правильную форму глагола.

1. This money (is, are, have been) enough to buy this book. 2. Nick (was examining, was being examined) for a whole hour. 3. We asked if he (wants, wanted, will want) to join us. 4. We expected the guests (come, to come, coming) at 3 pm. 5. They (didn't arrive, hadn't arrived, haven't arrived) yet. 6. Ann (has written, writes, has been writing) emails all day. 7. Everyone has to answer for his action, (hasn't he, has he, does he, doesn't he)? 8. Don't go out. It (rain, rains, had rained, is raining) hard.

Ex. 3. Выберите правильный вариант.

1. I'm afraid I have (few, little) money left. 2. He is interested (with, of, in) collecting stamps. 3. That's (a, the, –) good suggestion. 4. The businessmen arrived (in, to, at, for) the airport at 8.30 a.m. 5. Would you like (other, another, others, the others) sweet?

Ex. 4. Соотнесите глагол и существительное:

1) sign; 2) make; 3) become; 4) get; 5) post; 6) diagnose;

a) model; b) illness; c) job; d) appointment; e) contract; f) letter.

Ex. 5. Определите, какой частью речи являются подчеркнутые слова.

1. He will head our delegation at the Congress (существительное, прилагательное, глагол). 2. A lot of time has passed since that time (предлог, союз, наречие).

Ex. 6. Отметьте правильный вариант перевода.

1. We are used to taking coffee every morning. (Мы раньше пили кофе каждое утро. Мы пьем кофе каждое утро. Мы привыкли пить кофе каждое утро.) 2. The flowers are in the vase. (Цветы в вазе. В вазе цветы.) 3. I saw her working in the garden. (Я видела, что она работала в саду. Я видела ее работающей в саду. Я видела, как она работала в саду.)

Ex. 7. Раскройте скобки. Поставьте глаголы в правильную форму. Переведите текст.

Androclus

In ancient Rome there lived a poor slave who (call) Androclus. He had a very bad master and one day Androclus (run) away. For many days he (hide) in the forest without any food. He (be going) (die) as he (not eat) anything for a long time. He (find) a cave, (lie) on the ground and (fall) asleep. But soon he (wake up) by a loud noise. To his horror Androclus (see) a big lion (come) into the cave. The next moment Androclus (understand) that something (happen) to the lion's foot. He (can) hardly (move). The slave (raise) the lion's paw and (see) a big thorn in it. He (pull) it out and the lion Gump) with joy. They (become) good friends and lived in the cave for a long time.

But one day Androclus (catch). There was a law in Rome that every slave who (run) from his master (have to) fight with a hungry lion. So, Androclus (bring) to the arena where a lot of people (sit). Soon a hungry lion (let in). Androclus (give) a cry, but it was not a cry of fear, but of joy as he (recognize) his old friend, whom he (meet) in the cave. The lion jumped at Androclus and (begin) (lick) his face and hands. All the people (be surprised) and (want) the slave (explain) it. And after he (do) it they all (cry): "(Give) them freedom and (let) them (live) together again."

So, the two friends (get) their freedom and (live) happily together for many years to come.

Вариант 10 (для самостоятельной работы)

Ex. 1. Поставьте вопрос к подчеркнутому слову.

1. Babies have <u>five</u> meals a day. 2. They were at the <u>disco</u> last night.

Ex. 2. Выберите правильную форму глагола.

1. The news (is, are, have been) so shocking. 2. I'll (be seeing, being seen) you tomorrow. 3. I thought that you (will warn, had been warned, have been warned). 4. What makes you (think, to think, thinking) so? 5. The earth (goes, was going, will go, has gone) round the sun. 6. The car is running condition now. Tom (has repaired, repairs, has been repairing) it. 7. He (own, owned, has been owning, has owned) the farm since 1987. 8. The sun (sets, is setting, has set, sets) early.

Ex. 3. Выберите правильный вариант.

1. This time there are (less, fewer) mistakes in your dictation. 2. (It, there) is pleasant to work in the park. 3. They went (to, on, by) talking. 4. There weren't (some people, any people, no people) in the garden. 5. She thinks he's the (smart, smarter, smartest) man in the world.

Ex. 4. Составьте пары антонимов:

1) intelligent; 2) exciting; 3) costly; 4) complete; 5) beautiful; 6) interested; 7) excellent;

a) cheap; b) unfinished; c) poor; d) indifferent; e) stupid; f) plain; g) boring.

Ex. 5. Определите, какое слово нужно использовать при переводе на английский язык вместо подчеркнутого.

1. Он еще не <u>принял</u> никакого решения (make, take, accept). 2. Его <u>приняли</u> очень тепло (receive, admit, accept).

Ex. 6. Определите, какой частью речи являются подчеркнутые слова.

1. Where shall we <u>place</u> the sofa? (существительное, прилагательное, глагол). 2. We went to school together and I've never met her <u>since</u> (предлог, союз, наречие).

Ex. 7. Отметьте правильный вариант перевода.

1. I thought it was warmer outside. (Я думала, что на улице теплее. Я думала, что на улице было теплее.) 2. The more we learn the more

we know. (Мы много учим, много знаем. Мы больше изучаем, чем знаем. Чем больше мы учим, тем больше мы знаем.) 3. If I meet her today I shall give her your book. (Если я встречу ее сегодня, я отдам ей твою книгу. Если бы я встретила ее сегодня, я бы отдала ей твою книгу.)

Ex. 8. Раскройте скобки. Поставьте глаголы в правильную форму. Переведите текст.

A Philosopher

Once a philosopher traveled down a river in a small boat. While he (cross) the river he (ask) the boatman: "You ever (hear) about philosophy?" "No," (say) the boatman, "I never (hear) about it. What (be) it?" "I (be) sorry for you, indeed," replied the learned man, "you (lose) a quarter of your life as it's a very interesting science!" Several minutes later the Philosopher asked the boatman another question: "You (hear) about Astronomy, when you (be) at school?" "No, I (leave) school many years ago and I (forget) all about it," was the answer. To this the philosopher answered that he (be) really sorry for the man, and he (think) that the boatman (lose) a second quarter of his life.

Some minutes passed and the passenger again (wonder) if the man ever (hear) about Algebra. And the man (have to) admit that he never (know) about it. "In that case you certainly (lose) a third quarter of your life," said the scientist.

At that very moment the boat (strike) on a big stone. The boatman jumped and (cry): "You ever (learn) (swim)?" "No," was the answer. The boatman explained sadly to the philosopher that he (be) sure that he (lose) his whole life as the boat (sink).

Вариант 11 (для самостоятельной работы)

Ex. 1. Поставьте вопрос к подчеркнутому слову.

1. My mother runs the house <u>perfectly</u>. 2. <u>We</u> like <u>English tea</u>.

Ex. 2. Выберите правильную форму глагола.

1. The clock (is, have, has) just stopped. 2. A nice piece of music (is playing, is being played) now. 3. She said it (is raining, was raining, will be raining) hard. 4. I heard him (talk, to talk, talking) to somebody loudly. 5. I (ate, eat, have eaten, will eat) a lot of sweets when I was a child. 6. Tom's hands are dirty. He (has repaired, repairs, has been re-

pairing) his car. 7. A typist is someone who (types, type, is typing, are typing) letters. 8. If the child (are, has, does, is) no better, we shall have to take him to hospital.

Ex. 3. Выберите правильный вариант.

1. I have (a few, a little) interesting books. 2. The flowers are (so, such) beautiful! 3. She is fond (in, with, of) pop music. 4. (All, All pupils, All the pupils, Everyone) in my class knows him. 5. (A, The, An, –) Mississippi is one of the longest rivers in the world. 6. We have bought (much, many, a lot of) modern spray drippers for our new glasshouse. 7. Root grafting is (more, the most) common.

Ex. 4. Образуйте словосочетания из левого и правого столбцов:

1) make	a) care
2) take	b) an exercise
3) do	c) a mistake
4) make up	d) one's mind
5) have	e) one's promise
6) keep	f) a look

. 5. Укажите, какой из глаголов выражает сказанное в предложении.

1. Alan, meet Jim. (greet, welcome, introduce) 2. No, thanks. (accept, refuse, give up)

Ex. 6. Отметьте правильный вариант перевода.

1. I want you to invite him to the concert. (Я хочу пригласить его на концерт. Я хочу, чтобы ты пригласила его на концерт.) 2. What are you doing tonight? (Что ты хочешь делать сегодня вечером? Что ты делала сегодня вечером?) 3. We look forward to seeing this film. (Мы смотрели этот фильм. Мы посмотрели этот фильм. Мы с нетерпением ждем, когда посмотрим этот фильм.)

Ex. 7. Раскройте скобки. Поставьте глаголы в правильную форму. Переведите текст.

A Powerful King

Once there (rule) a powerful king over the island of Samos. He was rich and prosperous, and at last his prosperity (rise) to such a height that

he (begin) to be afraid that the gods (can) be jealous of his happiness. So, some messengers (send) to consult an oracle in another country. They (tell) to bring the answer as soon as they (get) it. When they (reach) the oracle they (receive) the answer: "(Tell) the King that if he (want) to escape the anger of the Gods, he (must) throw into the sea that which he (hold) to be the dearest of all his possessions."

The messengers returned and the King (tell) what the oracle (say). The King therefore (take) a boat and (go) out to sea, and (throw) away a ring which he (value) greatly because it (give) to him by his dead wife. That night he (think) over what he (do) that day and wondered if the gods (keep) him safe from harm. When he (wake) up in the morning he (sit) down to breakfast. Imagine his surprise when he (open) a fish that (prepare) for him and (see) the ring he (throw) away the day before!

A fisherman (catch) the fish that morning and (bring) it to the palace, not knowing what (be) inside it. The king then (understand) that the gods (refuse) his sacrifice. He soon (begin) to lose his power and (die) in great misery. This story is a warning to us not to flatter ourselves that our happiness (be) enduring, unless we (depend) more upon ourselves than upon what we (have).

1.3. ТЕСТЫ ПО ГРАММАТИКЕ ДЛЯ САМОКОНТРОЛЯ

Задания на выбор правильного варианта

Выберите правильный вариант ответа.

1. Warm clothes … of wool.

a) are made, b) make, c) made, d) is made, e) is make.

2. Some money … to you.

a) will be give, b) will give, c) will be given, d) shall given, e) shall be given.

3. You … to the party. Why didn't you come?

a) are invited, b) will be invited, c) were invited, d) was invited, e) invited.

4. This room … every day.

a) is cleaned, b) was cleaned, c) clean, d) are cleaned, e) cleaned.

5. The roof of the building … in a storm few days ago.
a) was damaged, b) were damaged, c) will damaged, d) damaged, e) damage.

6. When … the telephone …?
a) is … invented, b) was … invented, c) did … invent, d) are … invented, e) were … invented.

7. Many accidents … by dangerous driving.
a) cause, b) are caused, c) causes, d) is caused, e) caused.

8. A mystery is something that can't ….
a) be explained, b) is explained, c) explain, d) explained, e) will be explained.

9. The room … later.
a) will clean, b) will be cleaned, c) will clean.

10. The music was very loud and could … from a long way away.
a) is heard, b) was heard, c) be heard, d) will be heard, e) are heard.

11. You will … change the subject of your painting.
a) must, b) have to, c) may, d) can, e) might.

12. How … we write the date?
a) must, b) need, c) may, d) should, e) ought to.

13. You … not smoke here.
a) have to, b) are to, c) may, d) can, e) must.

14. He … to come and see us every Sunday.
a) was, b) could, c) may, d) must, e) can.

15. We … to meet last Friday.
a) can, b) were, c) might, d) must, e) should.

16. My sight is getting worse. Next year, I'm afraid, I … read without glasses.
a) cannot, b) may not, c) won't be able to, d) must not, e) should not.

17. … you like a cup of coffee?
a) should, b) have to, c) could, d) ought to, e) would.

Задания на установление соответствия

Выберите правильный вариант перевода.

1. The dinner was cooked by John yesterday.
a) Джон вчера приготовил обед;
b) вчера обед был приготовлен Джоном;
c) Джон готовит обед;
d) обед всегда готовит Джон.

2. Many new schools and kindergartens will be built in our city.
a) много новых школ и детских садов строится в нашем городе;
b) много школ и детских садов будет построено в нашем городе;
c) в нашем городе строят много школ и детских садов;
d) в нашем городе было построено много школ и детских садов.

3. Two thousand rubles were paid for this collection of books.
a) за эту коллекцию книг заплатили две тысячи рублей;
b) вам заплатят две тысячи рублей за эту коллекцию книг;
c) эта коллекция книг стоит две тысячи рублей;
d) за эту коллекцию книг заплатят две тысячи рублей.

4. The table was laid for two.
a) стол накрыт на двоих;
b) стол был накрыт на двоих;
c) стол накрывают на двоих;
d) стол накроют на двоих.

5. Her honesty can be relied on.
a) на ее честность можно положиться;
b) на нее всегда полагаются;
c) на ее честность всегда полагаются;
d) на нее всегда полагались.

6. Many tasty things will be made by our mother for dinner.
a) мама приготовит много вкусного к обеду;
b) мама приготовила много вкусного к обеду;
c) нашей мамой будет приготовлено много вкусных блюд к обеду;
d) наша мама приготовит много вкусных блюд к обеду.

Тесты на порядок слов в вопросительных и отрицательных предложениях

Ex. 1. Расположите слова в таком порядке, чтобы получилось вопросительное предложение.

1. _____
1: got
2: children
3: have
4: any
5: you

2. _____
1: want
2: here
3: you
4: what
5: to
6: work
7: do

3. _____
1: job
2: you
3: like
4: your
5: do

4. _____
1: how
2: you
3: languages
4: many
5: do
6: speak

5. _____
1: breakfast
2: did
3: for
4: have

5: you
6: what

6. _____
1: children
2: the
3: were
4: reading
5: the
6: newspaper

7. _____
1: had
2: been
3: he
4: 2000
5: the USA
6: before
7: to

8. _____
1: what
2: shall
3: I
4: you
5: phone
6: time

9. _____
1: will
2: the
3: shut
4: you
5: door

10. _____
1: the
2: was
3: when
4: computer
5: invented

11. _____
1: why
2: concert
3: the
4: was
5: cancelled

12. _____
1: been
2: long
3: have
4: married
5: how
6: you

13. _____
1: would
2: us
3: like
4: a
5: join
6: you
7: for
8: to
9: meal

14. _____
1: for
2: it
3: pay
4: must
5: you
6: yourself

15. _____
1: Rome
2: be
3: in
4: you
5: will

6: tonight

16. _____
1: we
2: at
3: shall
4: meet
5: Piccadilly Circus

17. _____
1: why
2: he
3: has
4: his
5: missed
6: train

Ex. 2. Опираясь на контекст, введите пропущенные слова в вопросах.

1. Where _____from? I am from London. 2. How often _____on holidays? I go on holidays once a year. 3. Where _____born? My mother was born in New York. 4. When _____back? She will be back in a week. 5. _____ me $50? No, I can't lend you $50. 6. What _____now? I am writing a short story. 7. _____a driving license? Yes, I have got a driving license. 8. What time _____? The bank opens at 9 o'clock. 9. When _____ them? I visited them a month ago. 10. _____here? Yes, she is here.

Ex. 3. Выберите верную вторую часть разделительного вопроса.

1. They were cleaning their shoes, _____
a) were they?
b) they were?
c) did not they?
d) weren't they?
e) they weren't?

2. She had to make a speech, _____
a) didn't she?
b) she didn't?
c) she did?

d) did she?
e) had not she?

3. They had not written to him, _____
a) hadn't they?
b) didn't they?
c) had they?
d) they had?
e) they hadn't?

4. She does not smoke, _____
a) she does?
b) isn't she?
c) she doesn't?
d) doesn't she?
e) does she?

5. Nobody liked the play, _____
a) didn't they?
b) they did?
c) did they?
d) they didn't?
e) didn't he?

6. The children were not surprised, _____
a) were they?
b) they were?
c) didn't they?
d) weren't they?
e) they weren't?

7. Bill has written a novel, _____
a) he has?
b) is he?
c) has he?
d) he hasn't?
e) hasn't he?

8. Mary never cooks, _____
a) doesn't she?
b) she doesn't?
c) does she?

d) she does?
e) isn't she?

9. They have seen him before, _____
a) they have?
b) haven't they?
c) have they?
d) had they?
e) they haven't?

10. Guide dogs can come in, _____
a) can't they?
b) they can't?
c) can they?
d) don't they?
e) they can?

Ex. 4. Сделайте следующие предложения отрицательными.

1. They have to work hard. The _____ to work hard. 2. You are my best friend. You _____ my best friend. 3. We can see the sea from the house. We _____ the sea from the house. 4. We have read the instructions. We _____ read the instructions. 5. Your boss will be angry. Your boss _____ angry. 6. That five pound note belongs to me. That five pound note _____ to me. 7. George had been there before. George _____ there before. 8. I want to sell this house. I _____ to sell this house. 9. He knows French. He _____ French. 10. They are able to translate the text. They _____the text.

2. СЛОВООБРАЗОВАНИЕ

2.1. КРАТКИЙ ПЕРЕЧЕНЬ НАИБОЛЕЕ УПОТРЕБИТЕЛЬНЫХ АФФИКСОВ

Префиксы

Префиксы, имеющие отрицательное значение:

un-	pleasant (приятный) – unpleasant (неприятный) familiar (знакомый) – unfamiliar (незнакомый)
im-	polite (вежливый) – impolite (грубый) possible (возможный) – impossible (невозможный)
in-	correct (правильный) – incorrect (неправильный)
ir-	regular (регулярный) – irregular (нерегулярный)
il-	literate (грамотный) – illiterate (неграмотный)
dis-	to appear (появляться) – to disappear (исчезать)
mis-	to understand (понимать) – to misunderstand (неправильно понять)
non-	smoker (курящий) – non-smoker (некурящий)

Префиксы, придающие слову противоположное значение или обозначающие противоположное действие:

un-	to dress (одеваться) – to undress (раздеваться) to tie (связывать) – to untie (развязывать)
dis-	to obey (повиноваться) – to disobey (не слушаться) to approve (одобрять) – to disapprove (не одобрять)
anti-	aircraft (самолет) – anti-aircraft (противовоздушный)
counter-	to act (действовать) – to counteract (противодействовать) attack (атака) – counterattack (контратака)

Префиксы, имеющие значение «сверх", «пере-", «чрезмерно":

over-	to do (делать) – to overdo (перестараться) to sleep (спать) – to oversleep (проспать)
super-	human (человеческий) – superhuman (сверхчеловеческий)
ultra-	short (короткий) – ultra-short (ультракороткий)

Префикс, обозначающий повторное действие со значением «снова", «заново", «вновь", «пере":

re-	to construct (строить) – to reconstruct (перестроить) to read (читать) – to reread (перечитать) to write (писать) – to rewrite (переписывать)

Префиксы, обозначающие общность действия, имеющие значение «между”, «взаимно”:

co-	owner (владелец) – co-owner (совладелец) existence (существование) – co-existence (сосуществование) operation (действие) – co-operation (сотрудничество)
inter-	action (действие) – interaction (взаимодействие)

Префиксы, обозначающие положение во времени и пространстве, степень законченности действия:

«пред-”, «до-”:	
pre-	war (война, военный) – pre-war (довоенный)
«после-”:	
post-	war (война) – post-war (послевоенный) revolutionary (революционный) – post-revolutionary (послереволюционный)
«недостаточно”, «недо-”:	
under-	to pay (платить) – to underpay (оплачивать низко, т.е. недостаточно оплачивать, недоплачивать)
«под-”:	
sub-	division (разделение) – subdivision (подразделение) committee (комиссия, комитет) – subcommittee (подкомиссия)
«экс”, «бывший”:	
ex-	wife (жена) – ex-wife (бывшая жена) champion (чемпион) – ex-champion (бывший чемпион) minister (министр) – ex-minister (бывший министр)

Префикс глагола, имеющий значение «делать”:

en-	large (большой) – to enlarge (увеличивать, делать больше) danger (опасность) – to endanger (подвергать опасности) force (сила) – to enforce (принуждать, настаивать) circle (круг) – to encircle (окружать)

Суффиксы

Основные суффиксы существительных

Суффиксы, обозначающие принадлежность:

1) к политическому направлению:	
-ist	Marxist (марксист), materialist (материалист)
2) к профессии:	
-ist	artist (художник), typist (машинистка)
-ian	historian (историк), musician (музыкант)

3) к нации:

-ian — Russian (русский), Belarusian (белорус)

Суффиксы, обозначающие действующее лицо:

-er — to teach (обучать, учить) – teacher (учитель)

-or — to direct (руководить) – director (руководитель)
to sail (плыть) – sailor (моряк)

Суффикс, обозначающий результат действия:

-ment — achievement (достижение), agreement (согласие), government (правительство, управление), development (развитие)

Суффиксы, обозначающие:

1) состояние:

-hood — brotherhood (братство), childhood (детство)

-ship — friendship (дружба), leadership (руководство)

2) действие, состояние:

-age — shortage (нехватка), marriage (брак, супружество), passage (проход), voyage (путешествие)

-al — arrival (прибытие), approval (одобрение), proposal (предложение)

-ing — hunting (охота), crossing (пересечение, перекресток), living (житье), suffering (страдание)

-ense — silence (молчание), difference (различие), existence (существование), patience (терпение)

-ance — importance (важность), performance (представление)

-tion — dictation (диктант), formation (образование)

-sion — decision (решение), discussion (обсуждение)

3) качество или состояние:

-dom — freedom (свобода), kingdom (королевство), wisdom (мудрость)

-ness — coldness (холод, холодность), darkness (темнота), kindness (доброта), weakness (слабость), happiness (счастье)

-to — activity (активность), safety (безопасность), equality (равенство)

Основные суффиксы прилагательных

Суффикс, образующий прилагательные от существительных и обозначающий национальную принадлежность или слабую степень качества:

-ish — Pole (поляк) – Polish (польский)
Scot (шотландец) – Scottish (шотландский)
red (красный) – reddish (красноватый)
young (молодой) – youngish (моложавый)
child (ребенок) – childish (ребячливый, детский)

Суффиксы, образующие прилагательные от глаголов и обозначающие наличие качества:

-ive	to act (действовать) – active (активный)
	to talk (разговаривать) – talkative (разговорчивый)
-ent	to differ (различать) – different (различный)
	to insist (настаивать) – insistent (настойчивый)
-ant	to observe (наблюдать, замечать) – observant (наблюдательный, внимательный)

Суффиксы, образующие прилагательные от существительных и обозначающие наличие качества, свойства:

-ic	poet (поэт) – poetic (поэтичный)
	hero (герой) – heroic (героический)
-al	music (музыка) – musical (музыкальный)
-ful	beauty (красота) – beautiful (красивый)
	power (сила, мощь) – powerful (сильный, мощный)
-ous	courage (храбрость) – courageous (храбрость)
-y	snow (снег) – snowy (снежный)
	sun (солнце) – sunny (солнечный)

Суффиксы, образующие прилагательные от различных частей речи и обозначающие:

1) качество, свойство:

-ary	element (элемент) – elementary (элементарный)
-ory	to explain (объяснять) – explanatory (объяснительный)

2) способность что-либо сделать, состояние, качество:

-able	to change (изменить) – changeable (изменчивый)
	to rely (надеяться) – reliable (надежный)
	profit (доход) – profitable (доходный)
-ible	access (доступ) – accessible (доступный)

Основные суффиксы глаголов

Суффиксы, образующие глаголы:

-ate	active (активный) – to activate (активизировать)
-en	short (короткий) – to shorten (укоротить)
-fy	pure (чистый) – to purify (очищать)
-ify	simple (простой) – to simplify (упрощать)
-ize, – ise	character (характер) – to characterize (охарактеризовать)
	modern (современный) – modernize (модернизировать)

Основные суффиксы наречий

Суффиксы, образующие наречия:

1) от прилагательных, иногда – существительных, порядковых числительных и причастий:

-ly loud (громкий) – loudly (громко)
bad (плохой) – badly (плохо, ошибочно)
part (часть) – partly (частично)
first (первый) – firstly (во-первых)

2) от существительных и наречий и обозначающие направление (или направленность):

-wards North (север) – northward (s) (к северу, на север)
after (после) – afterwards (впоследствии, позже, потом)

2.2. ПРАКТИКУМ ПО СЛОВООБРАЗОВАНИЮ

Методические указания

Level 1 – Contains 13 extracts from Elementary and Pre-Intermediate text contents. Each gap in the extract is numbered. The choice of derivatives for this or that number is given after the corresponding extract.

Level 2 – Contains 9 texts taken from Intermediate contents. There are numbered gaps in each text. There is a box with non-derivative words before the text. Your task is to guess the derivative which suits the meaning of sentences.

Тесты на использование производных слов в контексте

Level 1

Extract 1

The Greggs were coming back from their first trip to Europe. On board the Queen Elizabeth they got __1__ with a Frenchman. His English was good as soon as they got quite __2___. The Frenchman told the Greggs that he was an __3__ and his name was Mautisse. He asked them to keep it a secret. He did not like __4___.

The Greggs didn't know any artist whose name was Mautisse. So, they talked to the ship's __5__ and found out that their new friend was a famous artist whose pictures were very valuable and expensive. The librarian found a book with a __6__ sketch and a photograph. The sketch

said that the artist had retired at fifty-three to a villa on the Rivera. He said he would never touch a brush again.

1	3	5
acquaintance	publicity	library
acquainted	public	librarian
(to) acquaint	publication	to librate
2	4	6
friend	artistic	biography
friendliness	art	biographic
friendly	artist	biographical

Extract 2

India, the land where he began to write, saw the birth of Rudyard Kipling, on Bombay, on December 30, 1865. His parents were English. His father, John Lockwood Kipling, was professor of __1__ sculpture, curator of the Lahore Museum, a __2__ and an __3__ of some note.

As a child Rudyard was quick to learn and alert in games and __4__ puzzles. He spent his early __5__ in Lahore. The boy was the idol of the Hindoo servants. From them he learned the __6__ tales and songs of Indian folklore. Many of them were told him by Hindoo nurse. Hindoo was the first language he spoke.

1	3	5
architecture	illustrator	child
architect	(to) illustrate	childhood
architectural	illustration	childish
2	4	6
to paint	to solve	picturesque
painter	solving	pictorial
painting	solvable	picture

Extract 3

The style of «the Lord of the Flies' seems to be very simple. Despite this __1__ the book is a __2__ and finely written literary work.

The form of the novel is very much like that of a fable. The impression is confirmed by extreme __3__ of the story and the smoothly __4__ as well as by the feeling that within this simple tale is hidden an important message.

The setting of the story on __5__ island in the near future also helps to increase the tale's __6___.

Other devices are used to stress the __7__ of the story: the boys are not given last names and they are meant to represent types. For example, Ralf as a type __8__ the capacity for national thought and the ability to reason.

1	3	5	7
impressive	to simplify	known	universality
(to) impress	simplification	unknown	universal
impression	simplicity	(to) know	universally
2	4	6	8
care	narration	timely	(to) represent
careful	to narrate	timelessness	representation
carefully	narrative	timeless	representative

Extract 4

Wilde's dream to begin a new life and to write something entirely different from his previous works after his release never came true. The __1__ damage done by his __2__ was too great and the burden of shame too __3__.

He spent his remaining three years of life under the pseudonym of Sebastian Melmoth in Paris. His last and best known poem written in prison, "The Ballad of Reading Gaol", appeared anonymously in 1898. The grim stanzas of this tragic work, both __4__ and symbolic, __5__ Wilde's protest against human __6__ of contemporary life which kills "what is good in man".

He died alone in a Paris suburb in 1900.

1	3	5
morality	heaviness	(to) express
moral	heavily	expression
immoral	heavy	expressive
2	4	6
(to) imprison	realism	(to) justify
prison	reality	justice
imprisonment	realistic	justless

Extract 5

A novel is __1__ a story. The plot of the novel is the sequence of __2__ events, which make up the story. The __3__ must plan the sequence of events carefully, not only to hold the interest of his reader, but also to show the __4__ of his characters and to express the idea or theme which lies behind the story. As the plot develops, it reaches the high point

or climax, which is followed by a denouement. To be __5__, the plot must be __6 place, and that each event develops naturally from these that come before it.

1	3	5
basic	novel	effective
basically	novelity	effectiveness
basical	novelist	(to) effect
2	4	6
imaginary	psychological	believing
imagination	psychology	unbelievable
imagery	psychologist	beliavable

Extract 6

In «The Happy Prince" the sad, __1__ voice of the statue makes us doubt if pleasure is __2__ to __3__. It tells of the contrast between the life of poor and that of the rich. The mystery of the poor makes the __4__ statue give away everything, even his own eyes, made of sapphires. But it is only a little swallow, his noble messenger, who says to help him. The town councilors, however, are entirely __5__ to the sorrows of their citizens. They belong to the world of the __6__, chiefly concerned about their own fame.

1	3	5
music	happy	indifferent
musician	happiness	difference
musical	happiness	indifferently
2	4	6
equal	(to) weep	practice
equality	weeping	practical
equally	weepingly	practician

Extract 7

During the boyhood of William Shakespeare, the __1__ which he knew, indeed almost the only kind of acting which at that time existed in England, was a form of __2__ drama. In the cities there were also pageants, as they were called. These pageants re-acted scenes from the local history, and were the source for the __3__ plays for which the English Renaissance is famous. And sixteen century university students staged

plays by the Roman dramatists, Seneca, Plautus and others. They were acted in Latin, but later original English plays written in __4__ of these authors began to appear.

So far, all the various forms of drama had been played and __5__ almost entirely by amateurs. Bu the middle of the sixteen century, however, there were companies of __6__ actors, who tramped the roads from town to town, carrying their gear in a cart in all sorts of weather.

1	3	5
actor	history	(to) manage
acting	historic	manager
acted	historical	manageable
2	4	6
religious	imitation	(to) stroll
religion	to imitate	stroller
religioner	imitating	strolling

Extract 8

Kurt Vonnegut was born in Indianapolis in 1922 and studied biochemistry at Cornell University. During the Second World war he served in Europe and, as a prisoner of war in Germany, he witnessed the __1__ of Dresden by Allied __2__. It was from this profoundly disturbing experience that his most __3__ work, «Slaughterhouse-Five", arose – a novel which lifted him into the front rank of contemporary American novelists.

After the war, he __4__ in anthropology at the University of Chicago before turning to full-time free-lance writing. His earlier books were mainly sincere fiction, a genre, in which he achieved __5__ success; and his first novel, «Player Piano" (1952) has been hailed as a major work of SF antiutopianism. Although he has sincere declared that he has abandoned the sincere fiction genre, there are still strong elements of his particular style of __6__ in his later books.

1	3	5
destructor	celebrated	(to) consider
(to) destruct	celebration	consideration
destruction	celebrity	considerable
2	4	6
(to) bomb	specialist	imagination
bomber	(to) specialize	imaginative
bombing	speciality	imaginatively

Extract 9

By the time the child is nine or ten years old, he has usually developed a good sense of dark and light value and some sense of pattern or texture. The child's experience should include as many __1__ media as possible, and the more advanced children may attempt some works in oils. Tempera and water-colour are the most __2__ media to use at this stage; and the bristle brush is especially __3__ for large work. The child should work on both large and small scale, for while working in the large scale keeps his __4__ bold and free, working in the small scale __5__ his desire for details and small work. It will be __6__ to use the easel often to encourage spontaneous work, and to go about the neighborhood and city for new material and __7__. Diverse subject matter is an important element at this stage. The other studies at the school, especially, literature and current events, should help to furnish a variety of material for __8__ use.

1	3	5	7
paintful	(to) suit	(to) satisfy	(to) inspire
painter	suiting	satisfactory	inspirator
painting	suitable	satisfaction	inspiration
2	4	6	8
successful	(to) express	profit	pictorial
success	expressingly	profitable	picturesque
successfully	expression	profiteer	(to) picture

Extract 10

For nearly four hundred years the Britons had been ruled over by a people stronger then themselves, and, though they had __1__ gained much from their masters, the very fact that they had not had to depend upon their own power for their own __2__ had made them less fit to resist an enemy than on the day when Julius Caesar. The Britons had learned to rely upon the Romans to fight their battles for them, but now they would have to fight their own battles themselves. It was not long before their strength was put to the test by an enemy more __3__ than any they had yet had to __4__.

1	2	3	4
doubtful	safely	to terrify	(to) encounter
doubtless	safe (adj.)	terrible	encounter
to doubt	safety	terrific	encountering

Extract 11

The most __1__ teaching results when the principles taught coincides with a desire or interest on the part of the child, and when the child takes part in __2__ the problem. For example, a child will __3__ learn and remember the principle of balance when he realizes that the success of a definite piece of the work depends on its use. A child may draw or paint a picture which is __4__ because of all the drawing is placed on the half of the paper while the other half is left blank. He may feel that something is wrong, but he cannot detect what it is, or if he does, he may not know how to correct. The teacher can help him by calling his __5__ to the __6__ space. By wise direction, he may get the child to realize, that he can spread the drawing out over the blank area, or that he may add more drawing on the blank part to balance the part already drawn. In this way the child learns through self-__7__ and actual experience and not through __8__ of an empty principle.

1	3	5	7
effectively	ready	attention	discovering
effective	readiness	attentive	discovery
(to) effect	readily	attentively	discovered
2	4	6	8
(to) solve	balanced	(to) use	observance
solvation	unbalanced	useful	observer
solving	balancer	unused	observation

Extract 12

Until recently, all the mathematics taught in school before the time of Newton. Although this older mathematics is still taught and is still __1__, some newer __2__ are also important. Expanding technology is demanding more and better __3__. New ways of improving the mathematics curriculum are suggested.

Some time ago, a boy in classes complained to the teacher, “The homework for today was too hard. My mother couldn’t do it.” For years the teacher told this story at parents’ meetings, and it always got an __4__ laugh, but he doesn’t tell it any more. He can’t, it has lost its point. Mother can rarely help her son and daughter with their mathematics now. It’s not that Mother is any less intelligent or that her child is any brighter than before, but that in schools mathematics is not what it used to be. Frequently neither Mother nor Dad can understand what their child is talking about.

Why not? Are the new mathematics courses replete with new and different subject matter, __5__ to the uninitiated. Hardly. They do not contain much that has been developed recently, but they also have in them most of the order material __6__ to Mother and Dad. It seems strange to them __7__ because it is organized and arranged differently and partly because it uses different and more precise language and __8__.

1	3	5	7
user	mathematics	comprehensible	(to) part
usefulness	mathematician	comprehension	partly
useful	mathematical	incomprehensible	parted
2	4	6	8
development	appreciative	familiarity	(to) symbolize
(to) develop	appreciable	familiar	symbolic
developing	appreciation	family	symbolism

Extract 13

Restricting of international economic political agreements require common __1__ languages and __2__ across cultures. Most academic, technical, scientific and __3__ information is now being coded into a few languages, making __4__ of these languages necessary to realize economic __5__ in all parts of the world.

Increased global __6__ has created massive demographic shifts between so-called __7__ countries, made language education for migrant and immigrant populations __8__ essential for social __9__ and harmony as well as __10__ opportunities.

1	3	5	7	9
(to) facilitate	finance	advance	developed	participant
facilitation	financing	(to) advance	development	(to) participate
facility	financial	advancing	(to) develop	participation
facilitated	financed	advance	undeveloped	participated
2	4	6	8	10
aware	(to) know	migrant	(to) increase	occupation
unaware	knowledge	migration	increased	(to) occupy
awareness	knowledible	(to) migrate	increasingly	occupator
awareless	knowing	migrating	increasing	occupational

Level 2

Text 1. Burglarproof Your Home

Fortune, annual, protect, secure, install, able, prevent, neighbor, effect, burglar, value

Can you imagine anything worse than returning home to find that burglars have broken into your house? 0) Unfortunately, this happens to about 1 million people in Britain 1) _____. However, if you want better 2) _____ against burglars there are several things you can do. To improve 3) _____, check all the locks on your doors and windows. The 4) _____ of lighting all around the house will make sure a burglar is 5) _____ to hide in the shadows. An alarm system is another good 6) _____ measure you can take. Starting a 7) ___ watch group is also a very 8) _____ way to prevent crime in your area. Since 9) _____ take place when people are away on holiday, this is when your neighbours' help is most 10) _____. Ask them to collect your mail, open and close your curtains every day, switch your lights on and off and even mow your lawn to make your house look occupied.

Text 2. Working Lives

Major, finance, recent, import, choose, graduate, person, work, stress, enjoy, employ

Although the 0) majority of people say that they work "for money", the 1) _____ reward isn't actually the only thing that they think about. 2) _____, research has shown that people consider many different factors to be of 3) _____ when they make their 4) _____. A world wide survey of students showed that after 5) _____ they would be looking for jobs that allowed them to balance their 6) _____ lives with their work lives.

It's not just the younger generation who think like this either. There has even been an increase in the number of middle-aged 7) _____ who are moving away from highly-paid executive positions into less 8) _____ jobs. They are looking for something which is more 9) _____ and gives them more leisure time. All this has meant that 10) _____ are realizing that they need to do more than just offer good wages if they are going to keep their workers happy and motivated!

Text 3. Treasuring the Tundra

Tree, distinct, permanent, surprise, vary, survive, colour, protect, possible, pollute, consider

The tundra is a cold, dry, 0) treeless region with very cold temperature and little rain. One of its most 1) _____ characteristics is the 2) _____ frozen layer of ground called permafrost. 3) _____, these extreme conditions can support a wide 4) _____ of wildlife. In fact, several groups of Inuit people live there, relying on hunting and fishing for their 5) _____.

The animal life includes such species as arctic foxes, reindeer, wolves and seals. In spring, 6) _____ flowers cover the ground. The snow offers 7) _____ to such plants, allowing them to resist the cold temperatures.

However, it is 8) _____ for trees and larger plants to live in this environment. The tundra is extremely fragile, so any changes caused by increasing temperatures and high 9) _____ levels will have a 10) _____ effect on the environment. We need to safeguard this delicate environment for the future.

Text 4. Buying on Credit!

Tempt, particular, certain, use, expected, apply, advantage, difficult, actual, danger, pay

It can be a huge 0) temptation to apply for a credit card, 1) _____ if you are having problems managing your money. They can 2) _____ be very 3) _____ if you are travelling, if you need to 4) _____ make a big purchase, or if you shop online.

However, before you fill in your 5) _____ form remember that there are 6) _____ too. It can be very easy to get into 7) _____ buying things that you don't 8) _____ need or can't really afford on credit.

It's also 9) _____ not to pay off the whole balance every month as the interest 10) _____ can soon get the better of you.

Text 5. Can't Get Enough TV

Addict, nation, certain, research, favour, believe, bad, regular, major, entertain, digit

Is TV 0) addiction becoming Britain's new problem? New figures from the 1) _____ Office of Statistics 2) _____ suggest that this might be the case. Their 3) _____ have found that watching TV is the nation's 4) _____ pastime.

Britons on average, watch an 5) _____ amount of TV each week. The 6) _____ couch potatoes 7) _____ watch more than six hours of TV every day. The 8) _____ of these people enjoy soap operas, 9) _____ series and game shows and can't wait for 10) _____ TV with all the new channels it will offer.

Text 6. Talent

Favour, piano, profession, music, character, industry, envy, respond, perform, criticize, art, free, poem

My 0) favourite composer is Chopin and I am fortunate enough to have a friend who is also a very gifted 1) _____. As a 2) _____ musician, she believes strongly that 3) _____ ability is mostly something you learn, not a 4) _____ that you are born with. She thinks that 5) _____ students can improve their ability enormously. I feel really 6) _____ when I hear my friend perform and the ecstatic 7) _____ that she gets from her audiences at the end of a 8) _____. Both the public and 9) _____ agree that she is one of the country's most talented 10) _____. The huge amount of money she earns gives her the 11) _____to do almost anything that she likes, which I, as a humble 12) _____, cannot compete with.

Text 7. Superlative Vacuum Cleaners

Exhaust, tire, house, solve, clean, effect, inform, describe, demonstrate, try, oblige

We all know how 0) exhausting housework can be and sweeping the carpet must be one of the most 1) _____ of 2) _____ chores.

We think we have come up with a 3) _____ to back-breaking carpet cleaning – our new range of state-of-the-art vacuum 4) _____ provide a quick and 5) _____ answer to dust, however deeply ingrained.

We would be happy to send you 6) _____ about our new vacuum cleaners; our leaflets contain a complete 7) _____ of the latest models, and if you would like a 8) _____ of how they work why not take up our free 9) _____ offer today with no 10) _____ to buy.

Just send off the form below or ring us on 101 2433679 now!

Text 8. Not a Computer Whizz-kid

Lazy, advertise, process, inform, power, occupy, profess, necessary, please, promote, appoint

I was 0) lazily browsing through the small ads in the local newspaper when I saw an 1) _____for a second-hand word 2) _____ so I decided to give them a ring to get more 3) _____.

I have a computer but it doesn't really have a 4) _____ enough memory for the project I'm involved in at the moment. In most 5) _____ nowadays, it is becoming useful to be "computer-literate" but in my 6) _____ it has become an absolute 7) _____.

I must admit I do not get much 8) _____ out if sitting in front of a computer screen for hours, but I don't stand much chance of 9) _____ without computer skills.

So I made an 10) _____ to see my bargain computer the next day.

Text 9. A Formal Letter

Advertise, require, improve, quality, accept, account, invest, develop, busy, distant, attend, absent

Dear Sir or Madam,

I read your 0) advertisement in International Business magazine and I am writing for more information concerning entry 1) _____ for the course in English Language 2) _____. Could you tell me what language 3) _____ is required?

I do not possess the First Certificate and would like to know if 4) _____ on the course depends on having the FCE? In fact, as I am an 5) _____ for an international 6) _____ I would be interested in a course which focuses on language 7) _____for both social and 8) _____ purposes.

I would also like to know the 9) _____ from the college to London and if 10) _____ at all classes is obligatory, or whether an occasional 11) _____ for purposes of travel be acceptable.

I look forward to hearing from you.

Yours faithfully,

Nelson Fernandez

3. ЛЕКСИКА

3.1. ЗАДАНИЯ НА ВЫБОР ПРАВИЛЬНОГО ЛЕКСИЧЕСКОГО ВАРИАНТА / СООТВЕТСТВИЯ

Ex. 1. Из группы слов выделите то, которое не имеет к остальным никакого отношения:

1) weather, season, rain, cloudy, expensive, forecast, hot, cold;

2) London, sights, monument, tourist, art gallery, to found, to build, to design, guide, the president.

Ex. 2. Подберите слово, близкое по значению к подчеркнутому.

1. We do English at school.

a) work;

b) learn;

c) teach;

d) know.

2. She spoke to her English teacher after classes.

a) talked;

b) said;

c) told;

d) discussed.

Ex. 3. Определите, какое из слов не является продуктом питания.

Butter, cream, flour, tea, orange, cucumber, fish, sausage, beans, chicken, ham, hot dogs, chips, butter-fly, berries, jam, pine-apple.

Ex. 4. Выберите слово, которое не может относиться к описанию человека.

Tall, bright, beautiful, merry, sad, intelligent, pretty, slim, fat, dark-eyed, grey-haired, stupid, old, wise, comfortable.

Ex. 5. Отметьте, какое из утверждений является верным.

1. a) The Queen is the leader of the ruling party.

b) Great Britain is a monarchy.

c) The Queen of Britain is elected every four years.

2. a) Prime Minister is the head of the Parliament.

b) Now the Liberal Party is in power in Great Britain.

c) The English Parliament consists of two Houses.

Ex. 6. Подберите слова, противоположные по значению из наборов слов a и b.

1. a) cold, far, best, old, tall, slim, light;
   b) worst, new, fat, dark, short, near, hot.
2. a) stand, leave, take, borrow, find, come into;
   b) come, lend, give, lose, go out, sit.

Ex. 7. Укажите, какое из выражений не имеет отношение к остальным.

Every day, in time, on Saturdays, once a week, usually, occasionally, normally, as a rule, often, sometimes, once a year.

Ex. 8. Выберите обобщающее слово, объединяющее понятия.

Eggs, ham, tea, coffee, porridge, cornflakes, milk, sugar, butter, toasts, bread

a) lunch;
b) breakfast;
c) dinner.

Ex. 9. Подберите слова, близкие по значению, из двух колонок:

1) to describe	1) exciting
2) writer	2) book
3) interesting	3) author
4) novel	4) well-known
5) famous	5) to write about
6) hero	6) leading
7) scene	7) character
8) main	8) action

Ex. 10. Подберите пары слов противоположных значений:

1) careful	1) slow
2) noisily	2) expensive
3) fast	3) night
4) cheap	4) student
5) daytime	5) dirty
6) teacher	6) stupid
7) clean	7) careless
8) bright	8) quietly

Ex. 11. Подберите пары синонимов из двух колонок:

1) to come in	1) to visit
2) to be a success	2) to discover
3) to answer	3) to make progress
4) to come to see	4) to astonish

5) to find out	5) to enter
6) to surprise	6) to reply

Ex. 12. Выберите глагол, обобщающий предложения.

1. I'm sorry. Could I put a word in?

a) explain;

b) interrupt;

c) add.

2. I'm awfully sorry, I didn't mean to hurt you.

a) explain;

b) offer;

c) apologize.

Ex. 13. Соотнесите глагол из первой колонки и существительное из второй:

1) sign	1) model
2) make	2) illness
3) become	3) job
4) get	4) appointment
5) post	5) contract
6) diagnose	6) letter

Ex. 14. Подберите глагол, подходящий ко всем предложениям.

1. I think it will … us about an hour to get to the airport. 2. They do not allow to … pictures in this museum. 3. The children will be … care of. 4. I advise you to … notes of the lectures. 5. They broke the window, then came in and … the video. 6. It is sometimes difficult to … a decision. 7. It is very far. Let's … a bus. 8. Do you … me for a fool?

Ex. 15. Соотнесите слова первой группы со словами второй группы по принципу – более широкое/более узкое понятие:

1) music, animal, clothes, field of study, meal, transportation, food, occupation, athlete, literature, hobby;

2) subway, puppy, lunch, play, steak, song, economics, wrestler, skirt, manager, stamps.

Ex. 16. Составьте пары антонимов из слов первой и второй колонки:

1) intelligent	1) cheap
2) exciting	2) unfinished
3) costly	3) poor
4) complete	4) indifferent
5) beautiful	5) stupid

6) interested	6) plain
7) excellent	7) boring

Ex. 17. Образуйте словосочетания из слов первой и второй колонки:

1) make	1) care
2) take	2) an exercise
3) do	3) a mistake
4) make up	4) one's mind
5) have	5) one's promise
6) keep	6) a look

Ex. 18. Выберите правильный ответ.

1. He _____ smoking.

a) refused;

b) gave up.

2. Next year she will _____ high school.

a) leave;

b) graduate from.

3. _____your brother from the kindergarten, please.

a) bring;

b) take.

4. Why don't you _____ out to the garden? It's so warm here.

a) come;

b) go.

3.2. ПРАКТИКУМ НА ИСПОЛЬЗОВАНИЕ ОБЩЕУПОТРЕБИТЕЛЬНОЙ ЛЕКСИКИ

Методические указания

1. Текст 1: заполните пропуски словами из бокса. Слова в боксе даны в произвольном порядке. Переведите текст.

2. Текст 2: поставьте глаголы, данные в скобках, в соответствующее грамматическое время. Переведите текст.

3. Текст 3: исправьте лексические и грамматические ошибки в данном тексте. Текст содержит 20 ошибок. Переведите текст.

4. Текст 4: выберите правильный лексический вариант из двух представленных. Внимание! В некоторых случаях оба варианта являются верными. Переведите текст.

5. Тексты 5–8: заполните пропуски в текстах словами из боксов. Переведите тексты.

6. Текст 9: заполните пропуски в тексте, выбрав вариант A–C. Переведите текст.

Text 1

Soon, hear, what, getting, apart, pleased, heard, thing, forward, applied, loads, embarrassing, news, but, feel, anyway, apparently, by the way, well, sorry, forward

Dear Ian,

It was great to 1) _____ from you. I'm 2) _____ I haven't written sooner, 3) _____ my mother hasn't been very well, so I've been looking after her. She's a lot better now.

I was so 4) _____ to hear about your promotion. You deserve it – you've worked so hard at that job. 5) _____ done! I wish you were still living in Berlin so we could go out and celebrate.

Actually, I've got some good 6) _____ too – I've got a new job! You know I was fed up with my old job. Well, one day I was just looking through the ads in my local newspaper when I saw a job for an English school administrator. As you know, I've been looking for a job where I could use my English. So I 7) _____ for the job and got it. I'm really I've already learnt 8) _____ of new things. I have to answer the phone (sometimes in English), send out information about the school and deal with any problems the students have. And the best 9) _____ is that I'm getting more money! 10) _____ have you 11) _____about Anna and Giorgio?

They've called off the wedding. I've no idea why, but 12) _____ Giorgio's gone back to Italy and Anna's refusing to talk to anybody about it, even her old friends. I 13) _____ sorry for her parents – they've sent out all the invitations and now they've got to tell everybody that the wedding's canceled. How 14) _____! I wonder if she's given him back that gorgeous ring?! 15) _____, I suppose it's better that they've split up now rather than after the wedding?! 16) _____ from that, everything's fine here in Berlin. It's getting hot and I'm looking 17) _____ to going on holiday in August. Don't forget that you're always welcome to come and stay – we'd love to see you.

Anyway, I must go now. Write 18) _____ and tell me how you're 19) _____ on.

Lots of love,

Pia

PS: Guess 20) _____! I've finally passed my driving test.

Text 2

Dear Lena,

Just a quick note (in English!!!) to say that I 1) _____ (have) a fantastic time here in Australia. I 2) _____ (be) here for over two weeks now! The course 3) _____ (be) really good and my English 4) _____ (get) better every day. I 5) _____ (meet) lots of interesting people and I 6) _____ (become) quite friendly with some of them.

Guess what! 7) _____ (you/remember) Miguel who we 8) _____ (meet) in Paris last year? Well, his brother 9) _____ (study) here, in the same class as me actually, and he 10) _____ (tell) me that Miguel 11) _____ (come) over here next month. He 12) _____ (spend) a few days here, in Sydney on his way to Bali. I 13) _____ (hope) he 14) _____ (remember) me!

So, how's life for you? 15) _____ (you/miss) me? I 16) _____ (be) a bit homesick at first and I really 17) _____ (want) to see you, but I 18) _____ (feel) fine now. 19) _____ (you/see) Marcella recently? She 20) _____ (work) so hard for her exam when I last 21) _____ (see) her. The exam 22) _____ (be) next week, isn't it? 23) _____ (tell) her that I (24) _____ (think) of her.

Well, I 25) _____ (have got) a lesson in five minutes, so I 26) _____ (finish) now. I 27) _____ (write) again soon.

Take care and lots of love,

Virgina

Text 3

Dear Virgina,

Thanks for your letter last week. It's great to hear that you have a good time in Australia and I'm glad the school and the course are good.

So, when Miguel is coming to Australia? Maybe I visit you at the same time! And what is Miguel's brother like? Is he looking like him? Write soon and tell me all about it.

Life here is fine, although we all miss you lots. We especially have missed you last weekend. Juliette was having a partly for her birthday. Everybody were there and I spent most of the evening dancing.

Remember the people which last month we met at the Superhead concert? Well, Juliette was invited them to the party and we all got on re-

ally well. We had an absolutely good time. Stefan and me really hit it off! In fact, I'll see him again tomorrow. He rung me the day after the party to ask me out. I'm so exciting! I'll write soon and let you know how it's all going. Marcella she say hello to you. Her exam has been yesterday. I don't speak to her since then, but I'm sure she did fine.

Me, Mum, Dad and Thomas are passing next week a few days with my grandparents in Hamburg. As you know, we go usually there each year two times. I generally enjoy it, but I'm glad always when it's time to come home. And this year it'll write again soon and have fun!

Love,

Lena

Text 4

Dear Marcella,

Well, at last here we are in Vietnam and we 1) *have/'re having* an absolutely 2) *good/wonderful* time. We're now in a 3) *beautiful, small/ small, beautiful* market town in the mountains in the very north of the country. The town is at the end of a steep valley and there are the most 4) *amazing/amazed* terraces as far as the eye can see. Miguel 5) *said me/ said* he thought they 6) *were/are* the most spectacular views he 7) *had/ has* ever seen. I've taken so 8) *much/many* photos since we 9) *are/'ve* been here. I think I 10)*'ve/'d* only taken about a dozen in total before we 11) *arrived/had arrived* here in Sapa. We 12) *go/'ve been* for a long walk every day so far. In the evenings, we're pretty 13) *exhausting/exhausted* and we just have a meal – Vietnamese food is 14) *very/absolutely* great – and a beer or two before bed.

Yesterday, Stefan had his hair cut by the woman 15) *which/who* owns the hotel 16) *which/where* we're staying in. He says he 17) *likes/liked* it, but he 18) *mustn't/can't* have looked in a mirror! It looks awful!

We think we might 19) *to stay/stay* here for a 20) *few/little* more days before heading back south. With a bit of luck, this time next week, we'll 21) *have left/be leaving* the mountains behind us and we'll 22) *lie/be lying* on a deserted, sandy beach! I'm really looking forward to 23) *do/ doing* nothing for 24) *a few/few* days! We really wish you 25) *would be/ were* here with us. If you 26) *are/were*, you 27) *'d/'ll* really love it! If only you 28) *didn't break/hadn't broken* your arm! Never mind, I suppose things 29) *might/can* have been a lot worse! Anyway, I hope it 30) *gets/ is getting* better.

So, how are things back home? Miguel and Stefan want to know how 31) *are you/you are* coping without 32) *them/they*! We're all expecting 33) *lots of/much* juicy gossip when we 34) *'ll get/get* back next month!

It's late, so 35) *I'll finish/I'm finishing* now. 36) *Say/Tell* Juliette we'll write 37) *her/to her* soon. Take care and have fun!

Yours,

Virginia and Lena

Text 5. The Art of Delegation

Upset, subordinate, terror, employees, hurt, managers, staff

Getting something done is only half the job. Keeping staff happy at the same time is every bit as important. Many 0) *managers* believe that getting work done through others requires a free flow of information and open, productive relationships with 1) _____. Rather than creating a climate of 2) _____, they give clear instructions and realistic deadlines and take care to give only constructive criticism and not 3) ____ employees. They work towards creating and positive working environment where 4) _____ feel valued and trusted. Some specialists say that it is essential not to criticize as this 5) _____ and often causes stress and loss of confidence. Managers who successfully maintain the balance of power will not lose their authority even when certain 6) _____ members take control of projects. This style of management is particularly important during an economic upswing when employees can easily find work with another company.

Text 6. Breaking into a New Market

Leaders, trends, threat, founder, opportunity, concept

Mario Moretti Polegato is the 0) *founder* of Geox footwear. In the early 1990s he created a new footwear 1) _____: a special membrane that could be used in shoes to prevent perspiration. He approached Nike, Adidas, Timberland, the 2) _____ of the footwear market. But nobody was interested. So he decided to go it alone and set up his company with five employees. Today the company has 2,800 employees and sales of $350m. Mario thinks the company's next 3) _____ will come from the clothing market and he plans to produce a range of clothes incorporating the same patented material. The only 4) _____ that Geox faces is the same for all fashion businesses: a sudden shift in consumer 5) _____.

Text 7. Tristar Laminates

Entrepreneurs, supervise, subordinate, shareholders, producers, growth, planning, task

Viviane Rowland is the managing director of a small company, Tristar Laminates, which she founded with a group of fellow 0) *entrepreneurs* in June 2000. Together they had successfully identified a business 1) _____ to produce fibreglass components for the marine industry. Initially the three founders were the only 2) _____ in the company but it soon became clear that they would need extra capital. They eventually managed to convince a local businessman to invest £50,000 in exchange for 30 per cent of the company. Since then Tristar's 3) _____ has been spectacular and Viviane now 4) _____ a staff of 18 people and an operation with half a million pounds in sales. 5) _____ for the future is the immediate problem that the company has to face. At the moment production is carried out in a factory that has become too small but finding an alternative site is not an easy 6) _____. "This industry is a dangerous one for small 7) _____ like ourselves who only have limited resources," Viviane says, "and when we make a strategic decision like this we can't afford to get it wrong."

Text 8. Saying «I do" to the Marketers

Cynical, consumers, competition, markets, effective, pitches, customers, marketers, impressed

When young couples get married in the USA they also receive a gift bag marked "newly-wed kit". In a world of ever increasing 0) *competition* a lot of companies are happy to use this new way to reach 1) _____. Corporate 2) _____ say that certain points in life make people especially vulnerable to sales 3) _____. Companies such as Procter & Gamble have found this to be a very 4) _____ way to target extremely profitable 5) _____ such as young couples. US newly-weds spend an average of $70bl in the first year of marriage. One study shows that 67 per cent of women wear the same perfume they wore when they got married and a Bride's magazine study showed that after three years of marriage women were still 6) _____ of the same stores they had shopped in before the wedding. While the gift begs do appeal to lot of young couples, others are a little less 7) _____. As one rather 8) _____ young man said when he found a sample of deodorant and an offer for a new chequebook in his gift bag, "does this

mean that marriage stands for body odour and financial worries? This stuff seems better suited for a divorce kit!"

Text 9. Foreign Markets

Manufacturers have used foreign 1) _____ for years. But now, companies are also looking abroad for service 2) _____ in countries where labour costs are low. Growing pressure to produce healthy 3) _____ sheets and increased profits every year, means companies are seeking to 4) _____ people in cheaper markets.

India, with a large pool of workers who have the required 5) _____, low wages and English language is particularly popular with US companies wishing to offshore some of their key business 6) _____.

There are fears that corporate 7) _____ will lead to a protectionist mood in economically developed countries. However, economists claim that the job 8) _____ will benefit everyone as greater efficiency means lower prices. But 9) _____ for service jobs in the UK and US are finding it harder to secure work these days and therefore have trouble seeing the immediate advantage of 10) _____ abroad.

1)	A markers	B suppliers	C operators
2)	A providers	B facilitators	C processors
3)	A financial	B profit	C balance
4)	A hire	B market	C resource
5)	A qualification	B papers	C serrtificates
6)	A tasks	B systems	C processes
7)	A downsizing	B reductions	C shrinkings
8)	A sourcing	B demand	C migration
9)	A applicants	B candidates	C interviewees
10)	A outputting	B outplacing	C outsourcing

4. РАБОТА С ТЕКСТОВЫМ МАТЕРИАЛОМ

4.1. РАБОТА С ТЕКСТОВЫМ МАТЕРИАЛОМ ОБЩЕКУЛЬТУРНОЙ И СТРАНОВЕДЧЕСКОЙ НАПРАВЛЕННОСТИ

Методические рекомендации для чтения с пониманием основного содержания непрофессионального текста

Цель – получить общую информацию о содержании текста, выделить главную мысль, высказать свое отношение к прочитанному.

Алгоритм

1. Перед чтением спрогнозируйте по заголовку содержание текста.
2. Читайте текст с пониманием основного содержания, то есть:

– сконцентрируйтесь на основных фактах текста, опуская второстепенную информацию;

– старайтесь охватить взглядом все предложение или его часть;

– старайтесь догадаться о значении незнакомых слов или обратитесь к словарю;

– во время чтения подчеркивайте или выписывайте словосочетания и предложения, несущие основную информацию.

3. Проверьте, поняли ли вы основные факты текста, определите его основную мысль. Для этого необходимо:

– выбрать заголовок из предлагаемых вариантов или сформулировать самому;

– разделить текст на смысловые отрезки;

– ответить на вопросы, выделяющие основную информацию.

4. Для подготовки высказывания следует:

– сформулировать главную мысль текста;

– сказать, что вы узнали нового;

– кратко изложить основные идеи текста;

– высказаться по проблеме текста.

Тексты для обсуждения

Работа ведётся в следующей последовательности:

1) прочтите и переведите текст;
2) выберите несколько проблем для обсуждения;
3) выразите своё мнение;
4) используйте клише.

Рекомендуемые клише для пересказа текста

The article is devoted to… – Статья посвящена…

The article is called = The title of the article is… – Название статьи…

The theme of the article is… – Тема статьи…

It is spoken about… – Говорится о…

It is said in brief that… – Кратко говорится о…

Reader's attention is drawn to… – Внимание читателей привлекает…

The text gives an information about… – Текст дает информацию о…

The following facts are stressed in the article… – В статье подчеркиваются следующие факты…

The content of the text includes… – Содержание текста охватывает…

The text is devoted to the problem… – Текст посвящен проблеме…

The articles are taken from… – Статьи взяты из…

In the article it is analyzed… – В статье анализируется…

The author characterises… – Автор характеризует…

The author emphasizes … – Автор подчеркивает, что…

The author suggests… – Автор предлагает…

The author considers that… – Автор считает, что…

The main (sufficient) part of the research work contains… – Главная часть исследования содержит…

The text contains statistics about… – Текст содержит статистику о…

In the introductory part the author touches upon… – Во вступительной части автор касается…

At first it is depicted that… – Во-первых, изображается…

Secondly it is revealed that… – Во-вторых, обнаруживается, что…

First of all it is stressed that… – В начале ударение делается на…

The author underlines that… – Автор подчеркивает, что…

In concluding paragraphs it is pointed out… – В заключительных параграфах указывается на…

Summing up the information… – Подводя итог

Тексты общекультурной, страноведческой направленности для изучающего чтения и пересказа

ВНИМАНИЕ! Работа с текстовым материалом ведётся в следующем порядке:

1. Просмотрите текстовый материал, обращая особое внимание на первые предложения каждого параграфа. Помните, что

в большинстве параграфов именно первое предложение выражает главную идею.

2. Выделите ключевые моменты текста, отражающие основную идею содержания.

3. Изложите основные положения текста в сжатой форме, учитывая логическую последовательность фактов или событий.

4. Используйте структурирующие фразы для пересказа.

Text 1. How to Improve Your English-language Skills

The success of your educational experience in the United States largely rests on your ability to understand, speak, read and write the English language. Experience has shown that no other single factor is as important to academic success as proficiency in English. Before you come to the United States, you may want to improve your English-language skills in intensive English-study groups or programs or by other means offered in your country.

Ease with spoken skills does not necessarily assure adequate skills in written English. (Even native English speakers often need additional assistance with reading and writing for academic purposes.) Your academic work will demand a great deal of reading and writing. If you can read and write English easily and have a good vocabulary, it will be easier to study and to finish assignments on time.

Lectures are the most common method of instruction at U.S. colleges and universities. Professors will not be able to reduce their normal lecture speed simply to help you. You must be able to take notes easily on facts, ideas, and references presented in lectures.

Engaging in conversation is still the best way to improve your English speaking and listening skills and “to feel comfortable in English”. Speak English whenever you can. You should remember that the key to the academic success in the United States is the ability to use English well.

Before you come to the United States, read English-language books, magazines and newspapers, and the materials sent to you by the college or university. Read as much as possible about the United States. Make yourself well informed about its geography and climate, its history, system of government, social customs and values, and cultural activities. Watch movies, videotapes and television programs in English if possible. Watching videotapes and TV programs is one of the best ways to sharpen your skills in understanding English.

Text 2. How the Calendar Came About

The word "calendar" has been derived from the Latin "calends", the day of the new moon and the first day of the ancient Roman month. The calendar now in use throughout the world is called the Gregorian calendar; it was introduced by Pope Gregory XIII in the 16th century.

Though in early days a calendar was required primarily for religious observance, it was used for civil purposes as well. Unlike modern man, who uses artificial time intervals, primitive man utilized the cycle of recurring natural phenomena, the most obvious and most precise of which were the alternation of night and day and phases of the moon. Other less precise but naturally recurring phenomena were also made use of for calendar purposes, e.g. the sprouting of leaves, the coming of the rains, etc. Longer periods of time were often marked off by the number of harvests, the number of winters or some other occurrences. Thus a child who had lived through ten harvests or ten snows was ten years old.

Primitive man was intrigued by various celestial phenomena which displayed themselves in the clear night skies. He had recognized stars long before he invented written records. Principal stars were grouped into patterns which men identified with familiar animals or with the gods, goddesses, heroes, heroines and creatures of mythology. Since the appearance of the predominant constellations coincided with the natural phenomena, it was possible to trace the path of the moon and that of the sun through the sky. Those constellations were visible just before sunrise, or just after sunset, so primitive man naturally watched them as he rose with the dawn and "went to bed" at sundown. The risings and settings of stars allowed him to derive the position of the sun among the stars and thus a calendrical year was ultimately obtained. The height to which the sun rose above the horizon at midday was carefully observed by men and finally it was noticed that the sun was above the horizon for the longest period at midsummer. The shadows which were cast by trees were used by primitive civilizations to measure the altitudes of the sun. In such a way the seasons were discerned.

Text 3. All Thoughts of Centuries, All Dreams, All Worlds

Russian Encyclopaedia Publishers has put out the first volume of a new two-volume encyclopaedia called "Myths of the Peoples of the World", containing materials on mythological characters and tales of all epochs, countries and peoples – from the indigenous tribes of Australia and South America to Buddhist, early Christian and Muslim mythology.

What we all have considered since childhood to represent mythology has been given prominence: antique myths, the mythological legacy of Greece and Rome which has contributed so much to subsequent culture.

There are extremely interesting articles devoted to the Christian tradition and its Biblical roots. The ancient mythologies of Asia Minor, reflected in the earliest known manuscripts, are described in detail.

In the article "Fine Arts and Mythology" the author traces the mythological roots of art, from the cave paintings to the Renaissance artists.

Myths are regarded not as a simple play of the imagination, but as the reflection of historical events (as transformed in people's minds) and, even more interesting, of our ancestors' ideas about the world around them and its structure. When the myth pertaining to the origin of man (see the article "Anthropogonic Myths") is based on the outward resemblance of man and the monkey, one can only admire the power of observation of the people who created the myth. The same is true of myths about the stars in the sky (the article "Astral Myths"), reflecting ancient astronomical knowledge, whose high level has been confirmed by archaeology. One case is the earliest inhabitants of Europe who created primitive, observatories – stone structures like Stonehenge (Britain, second millennium B.C.).

The mythological characters and images incorporate the wisdom of the peoples of the world, their thoughts about their history and about the earliest and the most important cultural achievements, which in the myths are ascribed to "heroes", for example, the invention of fire – to Prometheus, in the Greek myth.

The authors and editors have produced not only a reference book, but an original piece of research which many enjoy reading. The encyclopaedia will undoubtedly attract those interested in philosophy as well as in culture and art.

Text 4. The Seven Wonders of the World

Of the seven celebrated creations of the ancient world known as The Seven Wonders of the World only the pyramids have survived.

In the 6th century B.C. Nebuchadnezzar [nebjukəd'nezə] the king of Babylon, ordered to build beautiful gardens on the roof of his palace. These were the famous Hanging Gardens of Babylon. They rose terrace upon terrace to a height of 64 meters and covered an area of 1.5 hectares. All sorts of trees and flowers were planted there. According to the story, these wonderful gardens were laid out to please a queen who came from a hilly country.

Next comes the statue of Zeus [zju: s], which was made by the famous sculptor Phidias [‘fidiəs] for the temple in Olympia. Zeus – a gigantic figure, seven times life size – was seated on a golden throne decorated with precious stones. The fate of it is unknown.

The temple of Artemis [‘a: timis] was erected in Ephesus [‘efisis], a city in Asia Minor. According to a legend, in 356 B.C. the temple was set on fire by Herostratus [hi’rostrətəs], who sought thereby to become famous. Some years later it was rebuilt. The new temple was all of white marble and filled with statues and works of art. Its columns were 20 meters in height, its length was 135 meters and its width 70 meters. It was destroyed by the Goths in the middle of the 3rd century A.D.

One of the Wonders was supplied by a widow’s tender thought of her husband. Upon the death of king Mausolos [mə’so: les], who had reigned over a small ancient state in Asia Minor, his queen ordered to erect a beautiful tomb known as the Mausoleum [ˌmo: sə’liəm]. It was 50 meters high and its pyramid-like top was surmounted by gigantic statues of Mausolos and his queen. At the beginning of the 15th century it was destroyed by the Crusaders.

The Colossus of Rhodes [‘roudz] had a short and inglorious history. A bronze statue of the Greek sun god Helios [‘hi: liəs] of about 35 metres in height, it was set up in 260 B.C. at the entrance to the harbour of Rhodes. Sixty years later it was overthrown by an earthquake.

The last of the Wonders was the Pharos [‘fɛərəs] – the lighthouse of Alexandria [ˌælig’za: ndriə]. It was built late in the third century B.C. on the island of Pharos at the entrance to the harbour of Alexandria. For years the flames on its top guided the ships safely into the harbour of Alexandria. It was destroyed in an earthquake.

Text 5. The Rosetta Stone

Napoleon Bonaparte’s ambition to control all the area around Mediterranean Sea led him and his French soldiers to Egypt. After losing a naval battle, they were forced to remain there for three years. In 1799, while constructing a fort, a soldier discovered a piece of stone pillar bearing an inscription known as the Rosetta stone. This famous stone, which would eventually lead to the deciphering of ancient Egyptian hieroglyphics [haiərə’glifiks] dating to 3100 B.C., was written in three languages: hieroglyphics (picture writing), demotic (a shorthand version of hieroglyphics), and Greek.

Scientists discovered that the characters, unlike those in English, could be written from right to left and in other directions as well.

Twenty-three years after discovery of the Rosetta stone, Jean Francois Champollion, a French philologist, fluent in several languages, was able to decipher the first word "Ptolemy" – name of an Egyptian ruler. This name was written inside an oval called a "cartouche". Further investigation revealed that cartouches contained names of important people of that period. Champollion painstakingly continued his search and was able to increase his growing list of known phonetic signs. He and an Englishman, Thomas Young, worked independently of each other to solve the deeply hidden mysteries of this strange language. Young believed that sound values could be assigned to the symbols, while Champollion insisted that the pictures represented words.

Text 6. Early Britain

The Romans ruled all the civilized world and in the 1st century A.D. they conquered Britain. Britain was a province of the Roman Empire for about four centuries.

There are today many things in Britain to remind the people of the Romans: towns, roads, wells and the words.

After the departure of the Romans Britain was attacked by the Germanic tribes of the Jutes, the Saxons and the Angels. The conquerors are generally referred to as the Anglo-Saxons. The Anglo-Saxons made up the majority of the population in Britain. The Anglo-Saxon language, or English, has been the principal language of the country since then.

In 793 the Danes from Denmark and the Northmen from the Scandinavian peninsular (frequently called as the Vikings) carried out their first raids in Britain. At last all England was in their hands. The Kingdom of Wessex alone was left to resist them. King Alfred (ruled 871–901) gathered his men and defeated the Danes.

In the 11th century England was invaded by the Normans, This was the fifth and the last invasion of England. The pretext for the invasion was the claims of Duke of Normandy, William, to the English throne. He gathered a numerous army and landed in the south of England. The battle between the numerous army and the Anglo-Saxons took place in 1066 at a little village near the town now called Hastings. The Anglo-Saxons were defeated. Thus the Norman Duke became king of England – William the Conqueror. He ruled England for 21 years (1066–1087). The Normans

had to put down many rebellions in different parts of the country and the rebels were punished severely.

Gradually the Normans mixed with the Anglo-Saxons and the Danes and from this mixture the English nation finally emerged. For many centuries this country was simply known as England. To the west and north, Wales and Scotland fought for their independence so passionately that it took hundreds of years to bring them under English domination.

Text 7. The Founding of the United States

About 500 years ago North America was a vast territory inhabited by Indians who perhaps 20,000 years earlier travelled across a land bridge from Asia to America where the Bering Strait is today. Icelandic Viking Leif Ericson sailed to America around the year 1000. Then in 1492 Christopher Columbus, an Italian, sailing under the Spanish flag, set out for Asia and discovered a "New World". For the next 100 years English, Spanish, Portuguese, Dutch and French explorers sailed forth looking for the New World, for gold and riches, for honour and glory.

But North America brought them little glory and less gold, so most explorers did not stay there. The people who did settle the New World arrived later, and they came in search of different goals – economic opportunity, religious and political freedom.

In 1607 the English settlers built the first village which they called Jamestown in commemoration of King James I of England. Bleak, hard and lonely immigrants soon founded colonies all along the Atlantic Coast. Over time settlers from many other nations joined the English in America. German farmers settled in Pennsylvania, French settled in Canada and Spanish explorers established missions and settlements in Florida and American South West. Africans were first brought in Virginia as slaves in 1619. The settlers cleaned the land for farms, built villages and established local governing bodies. By 1733 European settlers occupied 13 colonies along the Atlantic Coast.

A series of conflicts between the British and the French culminated in the French and Indian War (1754–63) in which the Britain with its American colonial allies won the victory. France ceded Canada and the Ohio territories east of Mississippi River.

In the following years the British started imposing new taxes on sugar, coffee, textiles and other imported goods. The British required the colonists to house and feed British soldiers. These measures seemed quite fair

to the British politicians who spent large sums of money to defend their American colonies during the French and Indian War. But the Americans feared the new taxes would make trading difficult and that British troops stationed in the colonies might be used to crush civil liberties, which the colonists had enjoyed, that's why they insisted that they could be taxed only by their own colonial assemblies. But the British Parliament heeded their protest and sent customs officers to Boston to collect the tariffs. When the colonists refused to obey, the British sent soldiers to Boston.

Text 8. Monarchy

The monarchy is the most ancient secular institution in the United Kingdom, with a history stretching back over a thousand years.

Queen Elizabeth II, who succeeded to the throne in 1952, is, in addition to being an integral part of the legislature, the heart of the judicial, the commander-in-chief of the armed forces of the Crown and the temporal head of the established Church of England.

The monarchy in the United Kingdom has evolved over the centuries from absolute personal authority to the present constitutional form by which the Queen reigns but does not rule. Her Majesty's government governs in the name of the Queen who must act on the advice of the ministers. The Queen summons, prorogues (dismisses at the end of a session) and dissolves Parliament; she usually opens new sessions of Parliament with a speech from the throne in which the major government policies are outlined.

The Monarch must give the Royal Assent before a Bill which has passed all its stages in both Houses of Parliament can become a legal enactment (Act of Parliament). The Monarch's approval is required before a Cabinet can be formed. As Head of State the Monarch has the power to sign international agreements, to cede or receive territory, and to declare war or make peace. The Monarch makes appointments to all important offices of state, including judges, officers in the armed services, diplomats and the leading positions in the Established Church. It is only the Monarch who is able to remit all or part of the penalties imposed upon persons convicted of crimes through the exercise of the prerogative of mercy on the advice of the appropriate minister.

The Privy Council is the body on whose advice and thought the Monarch exercises most statutory and many prerogative powers. There are about 330 members of the Privy Council, which, however, only meets as

a full body on the death of the Monarch. It conducts much of its business in committees at which the Monarch may not constitutionally be present. All Cabinet ministers are members; other members are appointed by the Monarch on the recommendation of the Prime Minister.

Text 9. Human Rights

Everybody knows that many of the rights of citizens are considered human rights. For example, a constitutional right is one which a state guarantees to its own citizens and sometimes even to foreigners who are within its jurisdiction. Still a question comes: What are human rights? Not everyone agrees that being born a human being entitled someone to certain freedoms and certain treatment. And those who agree have different opinions as to what these rights are. A human right is one to which people all over the world are entitled, whatever their nationality and wherever they live.

Most of the law in the world is made by governments for their own people. But human rights are independent of any political divisions. They are basic minimum standards of freedom and security for all people. When governments do not meet these standards, they are criticized by their own citizens and even by foreign governments. Sometimes some countries impose economic sanction against those countries where human rights are violated.

As a rule, human rights are violated when governments violate their own constitutions, and very often their policies make citizens to escape to other countries. But legally, most countries of the world have signed international agreements concerning the treatment of individuals. The most important agreement is the Universal Declaration of Human Rights (UDHR) adopted by UN General Assembly in 1948. Article 1 of UDHR declares that all human beings are born free and equal in dignity and rights, and Article 2 states that it does not depend upon race, color, sex, language, religion or any other difference among people.

Text 10. Methods of Instruction in U.S. Universities

Methods of instruction in U.S. colleges and universities vary with the type of class and the type of the professor teaching it. Professors are allowed a great deal of freedom in conducting classes, and sometimes students need extra help in learning how to study for classes.

If a student should fall behind in any of his / her classes, he / she is expected to seek help immediately from the professor, teaching assistant or his / her academic advisor.

The most common method of instruction at U.S. colleges and universities is a classroom lecture usually lasting 55–60 minutes. Lecture classes are usually large, while seminar classes are much smaller and involve more participation and representation based on independent reading or research in the library.

In many courses lectures are followed by discussion at seminar classes. If class discussion is encouraged, it is important to contribute to it. In many classes the student's grade will be partly determined by his / her participation in class discussion.

High level of English language proficiency is very important for native and foreign students for successful work at a classroom lecture or a seminar. One should be able to write down the main points of the lecture, to take part in question sessions before the end of the lecture because challenging the teacher or professor is regarded as a healthy sign of interest, attention and independent thinking though in some countries questioning or challenging the teacher is disapproved.

American colleges and universities operate on three main types of calendars, which divide the year into terms: the semester, trimester and quarter systems.

The academic year is approximately nine months long, no matter how it is divided. The semester system divides this period of nine months in half, resulting in fall and spring semesters. It is used by 69% of U.S. colleges and universities. Schools, that use the trimester and quarter, divide the same nine months into three-month terms. The summer quarter is the fourth quarter in the quarter system, and enrollment in classes is optional.

Text 11. Faculty Members and Methods of Instruction

Students and faculty members typically interact less formally in U.S. undergraduate programs than they do elsewhere in the world. They often develop close relationships or friendships. The size of the institution and the size of the class will be important factors. Professors sometimes invite students to their homes, join them for lunch or participate with them in community activities. Each professor has his or her own personality and style, but, in general, faculty members at U.S. schools are more accessible than those in many other countries.

The classroom experience is frequently characterized by discussion between the professor and the students. A portion of a student's grade for a course is often determined by the quality of participation in class dis-

cussions. It is unusual to find a course where the entire grade is based on one examination at the end of the term. International students should be prepared to participate in class discussions since classmates and professors will expect it. Most faculty members are aware that cultural factors and English language skills may initially make participation difficult for international students. With time, most international students find that this participation adds a great deal to the learning process.

There are three basic methods of instruction. Large introductory-level courses are usually taught through lectures at which several hundred students gather to hear a professor speak. The small class or seminar is used with a smaller group of five to thirty students. This method is generally used in more advanced courses and allows for more interaction between the students and the professor, laboratory sections are similar to seminars and are usually required with courses in the sciences or applied fields like computer science or engineering. Almost all colleges and universities offer opportunities for students to work individually with professors in tutorials or independent study courses.

Text 12. The Way to Good Health

Recent work on vitamins C and A illustrates we are not passive organisms in the control of germs, but that we can achieve total resistance if our health is good. We only attract infection if we are already out of balance, and that infection may have a cleansing effect on us, such as a cold which promotes the release of toxic material. In other words, we, not the germs or viruses, are responsible for our health and lack of it.

Pasteur's works emerged in a time when epidemics were common, and through his brilliant work thousands of lives were saved.

Yet, in the modern world we are no longer threatened by typhoid and cholera. Our primary concerns are degenerative diseases such as cancer, heart disease, rheumatism and arthritis. And we are right to be concerned. After all, a very high percentage of people will have some form of arthritis before they reach 70, while huge numbers will die of cancer or circulatory disease.

The alarming increase in degenerative diseases has accompanied a drastic change in our lifestyle. The food we eat has changed, the lives we lead are different and probably faster, the air we breathe is polluted.

More than 200 new foods have been introduced in the past 100 years. How do you know what effect they have on us?

We must understand our body, how it works, what it needs and how it can combat today's hazards.

Most medical care has become impersonal, and often concerned solely with treating the symptoms. A holistic approach to health is aimed primarily at understanding the individual, as well as finding the cause for any imbalances.

The first and foremost principle of holistic healing is that you are unique. You and I do not have the same face, personality, the same ability to produce enzymes, nor the same nutritional needs. We are born different and our life experiences have shaped us differently. For this reason there cannot be one diet, one recommended level of vitamins, proteins and minerals for all people.

Text 13. The Science of Ecology

People all over the world are concerned about ecological and environmental protection problems. Ecology is the scientific study of how organisms interact with their environment. The word "ecology" comes from the Greek word "oikos' (house). The term was first introduced by the German biologist E. Hackel in 1870, and since the late 1960s it has become a subject of international interest. A key word in the definition of ecology is INTERACT. So numerous are each organism's interactions with other living things and the physical environment that biologists organize ecology, the science of interactions, into a hierarchy of four levels: populations, communities, ecosystems and the biosphere. "Environment" describes the conditions surrounding an organism. Organisms interact with the other living things that collectively constitute their BIOTIC environment, as well as with the non-living physical surroundings (air, water, soil, light, temperature) that make up their ABIOTIC environment. A permanent change in any of these conditions, for example, a change in the intensity of the light, is a change in the environment.

Highly industrialized states cannot ignore the problems of environmental protection. The practical results of the state policy in environmental protection include agricultural pollution control, the study of man's influence on the climate, the biological and genetic consequences of pollution, protection of rare and vanishing plants and animals.

Recent scientific research suggests that the growing industrial use of chlorine compounds called chlorofluorocarbons (CFCs) is responsible

for destroying the protective layer of ozone around our planet. CAC is a gas commonly used in aerosol sprays, air cooling systems in refrigerators and air-conditioning. Researchers suggest that the level of CFCs in the atmosphere is actually increasing by 5% each year. An ever-thinning ozone layer could eventually allow a more harmful form of radiation, known as Ultra Violet C. Laboratory experiments have shown that UVC can penetrate cells in the body and irreparably damage the nucleic acids proteins which are the building blocks of life.

Text 14. Science and Technology. What Science Is

It can be said that science is a cumulative body of knowledge about the natural world, obtained by the application of a peculiar method practiced by the scientist. It is known that the world science itself is derived from the Latin ”scire”, to know, to have knowledge, to experience. Fundamental and applied sciences are commonly distinguished, the former being concerned with fundamental laws of nature, the latter engaged in application of the knowledge obtained. Technology is the fruit of applied science, being the concrete practical expression of research done in the laboratory and applied to the manufacturing commodities to meet human needs.

The word ”scientist” was introduced in 1840 by a Cambridge professor of philosophy who wrote: ”We need a name for describing a cultivator of science in general. I should be inclined to call him a scientist.” ”The cultivators of science” before that time were known as ”natural philosophers”. They were curious, often eccentric, persons who poked inquiring fingers at nature. In the process of doing so they started a technique of inquiry which is now referred as the ”scientific method”.

Briefly the following steps can be distinguished in this method. First comes the thought that initiates the inquiry. It is known, for example, that in 1896 the physicist Henry Becquerel, in his communication with the French Academy of Sciences, reported that he had discovered rays of an unknown nature emitted spontaneously by uranium salts.

Second comes the collecting of facts: the techniques of doing this will differ according to the problem which is to be solved. But it is based on the experiment in which anything may be used to gather the essential data.

This leads to step three: organizing the facts and studying the relationships that emerge. It was already noted that the above rays were different from anything known. How to explain this? Did this radiation come from the atom itself? It might be expected that the other materials

also have the property of emitting radiation. Some investigators made by Mme Curie proved that this was so.

Then follows the clearer statement of the theory. In December 1898, the Curies reported to the Academy of Sciences: "The various reasons enumerated lead us to believe that the new radioactive substance contains a new element to which we propose to give the name of Radium. The new radioactive substance certainly contains a great amount of barium, and still its radioactivity is considerable. It can be suggested therefore that the radioactivity of radium must be enormous."

And the final test is the practical test of theory, i.e. the prediction of new facts. This is essential, because from this follows the possibility to control the forces of nature that are newly revealed.

Text 15. Nature's Building Blocks

What are atoms? Over two thousand years ago, about 400 B.C., the Greek philosopher Democritus tried to figure out what the world is made up of and how it came to be the way it is. He came to the conclusion that all things are made up of tiny particles, too small to be seen. There are many kinds, he thought, and they are always moving about, sometimes combining, and sometimes separating again.

Democritus deserves tremendous credit for giving us this theory: In the past people believed in many ideas which new knowledge and experience later proved false. But all the discoveries of science in over two thousand years of work and study show that Democritus was right.

Investigations by chemists have shown that every chemical compound, such as salt or water, is made up of many tiny particles called molecules. In solids and liquids they are packed closely together. In gases they are spread out thin, with big spaces separating the molecules from each other. Each molecule in a compound is the same as all the other molecules in the same compound, but it is different from the molecules in other compounds. Since there are thousands of different compounds, there are thousands of different kinds of molecules, ranging from simple ones, like the molecules of salt or water, to very complicated ones found only in living things.

Further study has shown that the molecules themselves are made up of still smaller particles known as atoms. Although there are thousands of different molecules, there are only 103 different kinds of atoms. These 103 different kinds of atoms, known as the chemical elements, are the building blocks out of which all material things are made.

Text 16. Computer Skills for Information Problem-Solving

There seems to be clear and widespread agreement among the public and educators that students need to be proficient computer users – students need to be ”computer literate”.

However, there seems to be only a vague notion of what computer literacy really means.

Can the student who operates a computer well enough to play Doom be considered computer literate? Will a student who has used computers in school only for running tutorials have the skills necessary to survive in our society?

Clearly not. In too many schools, most teachers and students still use computers only as the equivalent of electronic worksheets. There are, however, some encouraging signs concerning computers and technology in education.

Over the past 20 years, media professionals have worked hard to move from teaching isolated skills to teaching integrated information skills.

Effective integration of information skills has two requirements: the skills must directly relate to the curriculum and to classroom assignments, and the skills themselves need to be tied together in a logical and systematic information process model. Media specialists, computer teachers, and classroom teachers need to work together to develop units and lessons that will include both computer skills, general information skills, and content-area curriculum outcomes. A computer literacy curriculum must be more than a list of isolated skills. Students need to be able to use computers flexibly, creatively and purposefully. Individual computer skills take on a new meaning when they are integrated within this type of information problem-solving process, and students develop true ”computer literacy” because they have genuinely applied various computer skills as part of the learning process.

Text 17. Some Facts About the Development of the Number System

There was a time when man did not know how to count. The origin of number and counting is hidden behind prehistoric ages. No one knows when counting first began. Counting represents a very important milestone in the progress of civilization. At first there were no names for numbers; so counters were used. For counters men used sticks, small stones, his fingers

and sometimes even his toes. The numerals are called digits from the Latin, meaning finger. The early shepherd probably learned that instead of calling his sheep by name, he could, lay aside a little stone for each sheep.

Somewhere in the distant past man learned that number was useful and necessary in life. Historical records show the astronomical and arithmetical achievements of the early Babylonians. One of the greatest mathematicians recorded in history was the Greek Archimedes, who developed mathematics which could be applied to the laws of nature.

The civilization of ancient Rome, great in many other fields, contributed little to mathematics. If we try to add the numbers LXI, XXVII, XLIV, we see why the Romans found it difficult to develop a good written arithmetic. For making calculations they used a counting frame, such as an abacus and then wrote down the result. The abacus is still in use today in some countries, but modern electronic calculating machines are rapidly taking its place.

During the Renaissance period, we find the tribes of Moslems coming to Europe, bringing with them the culture of many civilizations, including a strange number system taken from the Hindus. The Hindus invented special symbols, or numerals, to represent numbers; we call these symbols digits, or numerals. The Hindus also invented the principle of place value, which means that the value of a digit depends on its position in a number. For example, the 4 in 3476 represents four hundred, while the 4 in 6743 represents four tens. We can see the connection between this principle and abacus.

The Hindu number system was brought into Europe by the Arabs, and so it is called the Arabic system; it was in common use by merchants especially in Italy – by about A.D. 1250.

Only about 400 years ago a great French mathematician and philosopher Rene Descartes represented number pairs by points. This creation made possible a great advance, in science and mathematics. Isaac Newton (1642–1727), one of the greatest minds of all time, was one of the inventors of the calculus which is now studied by students who are seriously interested in mathematics or physical science. Few discoveries in the world science can equal the discovery of Lobachevsky (1792–1856). Like Archimedes, Galileo, Copernicus and Newton, Lobachevsky is one of those who laid the foundations of mathematical Science. Lobachevsky created one of the greatest masterpieces in mathematics – non-Euclidean geometry, one of the greatest achievements in mathematics.

Text 18. Memory

If you do not use your arms or your legs for some time, they become weak; when you start using them again, they slowly become strong again. Everybody knows this, and nobody would think of questioning this fact. Yet there are many people who do not seem to know that the memory works in the same way. When someone says that he has a good memory, he really means that he keeps his memory in practice by exercising it regularly, either consciously or unconsciously. When someone else says that his memory is poor, he really means that he does not give it enough opportunity to become strong. The position is exactly the same as that of two people, one of whom exercises his arms and legs by playing tennis, while the other sits in a chair or a motor car all day.

If a friend complains that his arms are weak, we know that it is his own fault. But if he tells us that he has a poor memory, many of us think his parents are to blame, or that he is just unlucky, and few of us realize that it is just as much his own fault as if it was his arms and legs that were weak. Not all of us can become extremely strong or extremely clever; but all of us can, if we have ordinary bodies and brains, improve our strength and our memory by the same means – practice.

Have you ever noticed that people who cannot read or write usually have better memories than those who can? Why is this? Of course, because those who cannot read or write have to remember things: they cannot write them down in a little notebook. They have to remember dates, times, and prices, names, songs and stories; so their memory is the whole time being exercised. So if you want a good memory, learn to practice remembering.

Text 19. The First Four Minutes

When do people decide whether or not they want to become friends? During their first four minutes together, according to a book by Dr. Leonard Zunin. In his book ”Contact. The First Four Minutes’ he offers this advice to anyone interested in starting new friendship, ”Every time you meet someone in a social situation, give him your undivided attention for four minutes. A lot of people’s whole lives would change if they did just that.”

You may have noticed that the average person does not give his undivided attention to someone he has just met. He keeps looking over the other person’s shoulder, as if hoping to find someone more interesting in another part of the room. If anyone has ever done this to you, you probably did not like him very much.

When we are introduced to new people, the author suggests, we should try to appear friendly and self-confident. In general, he says, "People like people who like themselves." On the other hand, we should not make the other person think we are too sure of ourselves. It is important to seem interested and sympathetic, realizing that the other person has his own needs, fears, and hopes.

Hearing such advice, one might say, "But I am not a friendly, self-confident person. That's not my nature. It would be dishonest for me to act that way." In reply, Dr. Zunin would claim that a little practice can help us feel comfortable about changing our social habits. We can become accustomed to any changes in our personality. "It's like getting used to a new car. It may be unfamiliar at first, but it goes much better than the old one."

But isn't it dishonest to give the appearance of friendly self-confidence when we don't actually feel that way? Perhaps, but according to Dr. Zunin, "total honesty" is not always good for social relationships, especially during the first few minutes of contact. There is a time for everything, a certain amount of play acting may be best for the first minutes of contact with strangers. That is not the time to complain about one's health or mention faults one finds in other people. It is not the time to tell the whole truth about one's opinions and impressions.

Much of what has been said about strangers also applies to relationships with family members and friends. For a husband and wife or a parent and a child problems often arise during their first four minutes together after they have been apart. Dr. Zunin suggests that these first few minutes together should be treated with care. If there are unpleasant matters to be discussed they should be dealt with later.

The author declares that interpersonal relations should be taught in every school, along with reading, writing and mathematics. In his opinion, success in life depends mainly on how we get along with other people. That is at least as important as how much we know.

Text 20. Preparing a Presentation

ВНИМАНИЕ! Данный текст представляет собой подробную методическую инструкцию для подготовки устной презентации текстового материала на английском языке.

STEPS

Step 1. Know the context of the presentation: Who are the audience, and what are their interests? How big will the audience be? How long is

the presentation to be? What facilities are available for visual aids? What about time for questions?

Step 2. Decide on your topic. Think carefully about the main point or points that you want to communicate. You should be able to write these clearly in one or two sentences.

Step 3. Structure the content. Most people begin with an unordered collection of ideas and then put them into sequence. Then decide on the relative weight of each section of the talk.

Step 4. Think of ways of catching the listeners' interest: examples, anecdotes, impressive statistics, and interesting quotations.

Step 5. It is useful to "rough-draft" visual aids at this stage, because they can help you make the sequence of points more clear and logical. Think about whether some information should be put into handouts.

Step 6. Check overall length, and the relative weight of sections. A little too short is better than even a little too long. As a rough guide, allow about 1 minute for every 100 words, plus time if necessary for changing transparencies. One A4 page, double-spaced, takes about 3 minutes of speaking time.

Step 7. Finish preparation of visual aids. If you are using PowerPoint data projection, having slides or transparencies is a useful back-up in case of last-minute technical problems.

Step 8. Prepare handouts, if you want them. Make copies.

Step 9. Plan the exact words you will use for the opening, the transition points, and the conclusion. Practice them again and again. If you are anxious, write on cards the introductory and concluding sentences. Make more notes if you need them.

Step 10. REHEARSE your presentation, as often as necessary. Do not omit this step! You can practice alone, or ask a friend or colleagues to listen to you. With practice, you will become more fluent and at ease. Make sure you speak simply, but in academic not conversational style. Project your voice across the room. You will find this slows your speech. Check the timing carefully and make adjustments if necessary. Mark a time reference at one or two points in the presentation.

Step 11. Think about the questions the audience may want to ask you. Plan how you will answer them.

Step 12. On the day of your presentation, be calm and organized. If you are unfamiliar with the location, go beforehand to plan where you will stand and where you will put your papers and to see how the projec-

tion works. Arrive in good time for your presentation. Remember to take all your visual aids, notes and papers.

If you feel nervous, do not worry. That's normal. Breathe slowly and deeply for a few minutes beforehand, and try to relax the muscles of your face, mouth and neck. This will make you look relaxed, and will improve the quality of your voice. Then remind yourself how well prepared you are, and enjoy it. Concentrate not on yourself or your notes, but on the audience and making clear to them what you have to say.

Visual aids

If you are using an **overhead projector**, follow steps 1–4 below.

1. Before your presentation, check that the equipment works. Decide on the best place to stand, so that you do not obscure the view of the audience; decide where to put transparencies before and after use; decide whether you will point at the transparency or at the screen (or not at all).

2. If you point at the transparency, use a pen as a pointer.

3. Detach the transparencies from their backing paper to make things easier during your presentation. Interleave them with plain paper.

4. Number the transparencies in case you drop them.

If you are using **PowerPoint** data projection, follow steps 1–6 below.

1. Check beforehand whether you should bring your presentation on diskette or CD or DVD. If you are bringing a computer, check on the type of connection required for the data projector.

2. If possible, set up your presentation before your talk. This can take several minutes, even if all goes well.

3. Have a blank slide at the start and end of your presentation. This makes your start and finish smooth.

4. PowerPoint has an excellent online tutorial and help system. Use it when you are preparing your presentation so that you can make full use of its faculties (such as time monitoring, handouts and notes).

5. Don't be tempted, because of PowerPoint's capabilities, to make your slides too "busy". That will distract the audience's attention.

6. Even if you are giving your presentation in a well-equipped room, technology can go wrong. Print out your PowerPoint slides on to transparencies, so that you have an alternative.

Handouts

Handouts are useful in **three ways**.

1. They show data that are too detailed for a visual aid, such as transcript data from interviews, or mathematical calculations. If there is a

lot of detail, the points you want to refer to in your presentation should be clearly highlighted in the handout. The handout is given immediately before the presentation, and then referred to.

2. They provide a ”signposting” framework to guide the audience through your talk. In this case, the handout will be a note-frame, which is given out before the presentation. Don’t put too much into it, or the audience will read the handout instead of listening to you.

3. They act as a record of your presentation, which the audience can take away. This could be either a note-frame or a fuller text. For this ”record” type of handout, it’s common practice to add your address and email address, so that people working in the same field can contact you later. Some presenters like to give out this type of handout at the end of their talk, so that the audience listens with full attention. Others give it out at the start, as a support to listening.

Keep your handout short – one page if possible.

Notes

Visual aids often provide sufficient support for your presentation. If you feel you need notes as well, remember that they will be more to cope with during the presentation: you will have to deal with the visual aids, the notes, and the audience.

1. Cards or A5 paper are often recommended because they are neater in the hand than big pages. Make sure you number them clearly!

2. A good alternative is to use photocopies of your visual aids, with notes written on them. It is then easier to coordinate your progress through notes and visual aids.

3. Write very large and clear, with plenty of space.

4. Use colour, so that you can quickly locate key points or words.

4.2. МЕТОДИЧЕСКИЕ РЕКОМЕНДАЦИИ ДЛЯ ЧТЕНИЯ С ПОНИМАНИЕМ И АННОТИРОВАНИЯ СОДЕРЖАНИЯ ПРОФЕССИОНАЛЬНОГО ТЕКСТА

Аннотация – короткая справка о печатном произведении, излагающая содержание в виде перечня его основных вопросов.

Аннотация дает представление только о характере оригинала (книга, статья и т.д.), о его строении (перечень вопросов), о его назначении (на кого оригинал рассчитан), а также об объеме оригинала (количество страниц).

Аннотации пишутся как на языке оригинала, так и на родном языке. При составлении аннотации используются языковые клише. Объем аннотации составляет 0,5 страницы.

Структура аннотации стабильна. Она состоит из заголовочной части (название оригинала, фамилия автора, издательство, место и дата издания и др.).

Написание собственно аннотации начинается с чтения текста и нумерации абзацев, определяется ведущая тема текста, темы и подтемы каждого абзаца, составление логического плана текста в виде перечня тем и подтем текста.

Клише, используемые при составлении аннотации:

1. Клише, начинающие аннотацию и вводящие в главную тему:

The article (text) is called…

The title of the article (text) is…

The article (text) is published in…

The article is printed in…

The article consists of…

The article is devoted to…

The text touches upon the probleme…

In the introductory part the author points out…

2. Клише, оформляющие основную мысль произведения:

The author raises the problem of…

The main part of the text informs about…

The article contains statistics about…

3. Клише, оформляющие выводы автора оригинала:

In the concluding paragraphs it is pointed out…

Summing up the information it is important to say that…

Generalizing the information it is necessary to say that…

При написании аннотации рекомендуется использовать приведенные ниже фразы и выражения.

the article is called… = the title of the article is…	статья называется…, статья озаглавлена…
the article is published in…	статья опубликована в…
the article is about/on	статья повествует о…
the article is devoted to	статья посвящена
the article is concerned with	статья касается
the article deals with	статья имеет дело с…
the article touches upon the problem of	статья затрагивает проблему
in the introductory part of the article the author points out	во вводной части статьи автор указывает

the following facts are stressed in the article	в статье акцентируется внимание/ подчеркиваются следующие факты
the article contains useful information on…	статья содержит полезную информацию о…
in concluding paragraphs it is pointed out that	в заключительной части статьи указывается, что…
the article contains statistics about…	содержит статистику о…
the reader's attention is drawn to…	внимание читателя привлечено к…

Для логического перехода к подаче новой информации используются следующие переходные слова и словосочетания (Transitional words and expressions): first of all/ at first/ second/ secondly/ then/ besides /next/ in conclusion/ finally.

4.3. ТЕКСТЫ ПРОФЕССИОНАЛЬНОЙ НАПРАВЛЕННОСТИ

Тексты профессиональной направленности с практическими заданиями

Text 1. An Agronomist

Источник: http://www.agriinfo.in/default.aspx?page=topic&superid=1&topicid=306

1. Read and translate the professional text using the dictionary.

An agronomist is called an expert of agriculture except veterinary science. An agronomist is also known as doctor of plants.

An agronomist is a specialized scientist in agronomy, which deals with the science of utilizing plants for food, fuel, feed & fiber. Agronomists are involved in many issues including food, feed & fuel production without impact on environment.

Agronomists should be specializing in areas such as crop rotation, irrigation & drainage, plant breeding, soil science, weed control, disease & pest control.

The role of an agronomist:

1. An agronomist aims at obtaining maximum production at minimum cost by exploiting the knowledge developed by basic and applied sciences.

2. In the broader sense he deals with production of food and fiber to meet the needs of the growing population.

3. He has to test the suitability of others specialists' research findings in the field, accept them and judge the reaction of the farming community.

4. He is a coordinator of different specialists involved in the process of crop growing and treatment.

5. He carries out research on scientific cultivation of crops taking into account the effect of such factors as soil, climate and variety of crop production techniques and has to choose the most suitable growing technology depending on the situation and area of growing.

6. He is a person with applied knowledge of all agro-disciplines.

2. Match the following words with their meaning.

1) expert of agriculture	a) селекция растений
2) scientist	b) технологии выращивания
3) environment	c) защита растений (от болезней и вредителей)
4) crop rotation	d) почвоведение
5) plant breeding	e) ученый
6) soil science	f) сообщество сельхозпроизводителей
7) weed control	g) агроном
8) disease and pest control	h) культивация зерновых культур
9) knowledge	i) севооборот
10) research findings	j) проводить исследования
11) farming community	k) окружающая среда
12) growing technology	l) борьба с сорняками
13) scientific cultivation of crops	m) принять во внимание
14) to take into account	n) знания
15) to carry out research	o) результаты исследований

3. Complete the sentences with the words given in the box.

Suitability, growing technology, soil, agronomy, food and fiber, treatment, crop rotation, doctor

1. An agronomist is a specialized scientist in_____. 2. An agronomist is also known as _____ of plants. 3. Agronomists should be specializing in areas such as _____, irrigation & drainage. 4. In the broader sense he deals with production of_____ to meet the needs of the growing population. 5. He has to test the _____ of others specialists' research findings 6. He is a coordinator of different specialists involved in the process of crop growing and _____. 7. He takes into account the effect of such factors as _____ climate and variety of crop production techniques 8. He chooses the most suitable _____ depending on the situation and area of growing.

4. Choose the correct grammar form.

1. An agronomist *is/are* known as doctor of plants. 2. Agronomy *deals/deal* with the science of utilizing plants for food, fuel, feed & fiber. 3. Agronomists *should/shall* be specializing in a lot of areas. 4. An agronomist *exploiting/exploits* the knowledge developed by basic and applied sciences. 5. He deals with production of food and fiber to meet the needs of the *growth/growing* population. 6. He *has/can* to test the suitability of others specialists' research findings in the field. 7. Agronomists *carries/carry* out research on scientific cultivation of crops taking into account the effect of a lot of factors. 8. He carries out research to choose *the most/more* suitable growing technology.

5. Discuss the content of the text using the set of questions given below:

1. What kind of a doctor can an agronomist be called? 2. What sciences are agronomists specialized and involved in? 3. Which is the principal aim of an agronomist? 4. What does an agronomist deal with (in a broader sense)? 5. What is the role of an agronomist in connection with the farming community? 6. What kind of research can agronomists carry out? 7. How can you define an agronomist as a professional?

6. Explain the following words and expressions

Specialized scientist, impact on environmental, crop rotation, irrigation & drainage, plant breeding, soil science, weed control, disease & pest control.

7. Make up a list of key-words (terminative words) to the text.

8. Present the general ideas of the text in the form of oral retelling. Consult 4.2.

Text 2. Introduction to Principles of Agronomy

Источник: http://www.agriinfo.in/default.aspx?page=topic&superid=1&topicid=307

1. Read and translate the professional text using the dictionary.

The principles of agronomy deal with basic concepts & common agronomic principles as well as crop management approaches. They are useful for the application with many crops.

The principles of agronomy are based on two key purposes:

– to develop an understanding of the important principles underlying the management;

– to develop the ability to apply these principles to production situations.

The major principles of Agronomy are:

1. Agro meteorology: study of climatic factors in relation to agriculture.

2. Soils & Tillage: Tillage is the agricultural preparation of the soil by ploughing, ripping, or turning it. There are two types of tillage: primary and secondary tillage. Soil is a natural body consisting of layers of mineral constituents with variable thicknesses, which differ from the parent materials in their morphological, physical, chemical, and mineralogical characteristics.

3. Soils & Water Conservation: Water conservation refers to reducing the usage of water and recycling of waste water for different purposes like cleaning, manufacturing, agriculture, etc.

4. Dry Land Agriculture: Dry land farming is an agricultural technique for cultivating land which receives little rainfall.

5. Mineral Nutrition of Plants, Manures & Fertilizers: Plant nutrition is the study of the chemical elements that are necessary for plant growth.

6. Irrigation & Water Management: Water management is the activity of planning, developing, distributing and optimum use of water resources under defined water polices and regulations.

7. Weed Management: Management of unwanted plants in field.

8. Cropping & Farming systems.

9. Sustainable Agriculture: Sustainable agriculture refers to the ability of a farm to produce fertile soil without causing severe or irreversible damage to ecosystem health.

2. Match the following words with their meaning.

1) common agronomic principles	a) вспашка
2) crops	b) обработка почвы
3) application	c) возделывание засушливых земель
4) key purposes	d) выпадение осадков
5) study of climatic factors	e) рыхление
6) tillage	f) борьба с сорняками
7) ploughing	g) базовые принципы агрономии
8) ripping	h) политика и регулирование водопользования
9) parent materials	i) устойчивое земледелие
10) waste water	j) (геол.) основная/базовая порода
11) rainfall	k) сельскохозяйственные культуры
12) dry land farming	l) изучение климатических факторов
13) water polices and regulations	m) сточные воды
14) weed management	n) применение
15) sustainable agriculture	o) основные цели

3. Complete the sentences with the words given in the box.

Crop management, key, developing, fertile soil, necessary, unwanted plants, ploughing, parent materials

1. The principles of agronomy are based on two _____ purposes. 2. The principles of agronomy deal with basic concepts & common agronomic principles as well as_____ approaches. 3. Tillage is the agricultural preparation of the soil by _____, ripping, or turning it. 4. Soils differ from the _____ in their morphological, physical, chemical, and mineralogical characteristics. 5. Plant nutrition is the study of the chemical elements that are _____ for plant growth. 6. Water management is the activity of planning, _____, distributing and optimum use of water resources. 7. Weed Management is the management of _____ in field. 8. Sustainable agriculture refers to the ability of a farm to produce _____ soil without causing severe or irreversible damage to ecosystem health.

4. Choose the correct grammar form.

1. They are useful for the application with *many/much* crops. 2. The principles of agronomy *are/is* based on two key purposes. 3. *There/They* are two types of tillage: primary and secondary tillage. 4. Soil is a natural body consisting *of/from* layers of mineral constituents. 5. Plant nutrition is the *study/studies* of the chemical elements that are necessary for plant growth. 6. Sustainable agriculture *refers/is referring* to the ability of a farm to produce fertile soil without causing severe or irreversible damage to ecosystem health.

5. Discuss the content of the text using the set of questions given below:

1. What do the principles of agronomy deal with? 2. What are the principles of agronomy based on? 3. What does agro meteorology study? 4. Can you comment upon such operation as tillage? 5. What is the difference between soil and parent materials? 6. What are the main purposes of water conservation? 7. What is the Dry Land Agriculture principal purpose? 8. Why is Water Management so important? 9. Can you comment upon the term ”Sustainable Agriculture’? 10. What is meant by the *ecosystem health*?

6. Explain the following words and expressions.

Agro meteorology, agricultural preparation of the soil, water conservation, recycling of waste water, dry land farming, plant nutrition, irriga-

tion & water management, unwanted plants in field, irreversible damage to ecosystem.

7. Make up a list of key-words (terminative words) to the text.

8. Present the general ideas of the text in the form of oral retelling. Consult 4.2.

Text 3. Integrated Pest Management and Plant Protection – Practical Tips for Farmers

Источник: http://www.cacilm.org/en/technologies/section/ipm/recommendations

1. Read and translate the professional text using the dictionary.

It is necessary to take certain measures for the preservation of natural enemies. These measures should be aimed at the preservation of natural enemies and, if possible, at increasing their populations.

For sustainable pest control the diversity of predatory insects is a pre-requisite. To expand the species composition and propagation of predatory insects the nectariferous plants and forage crops should be planted. The use of nectariferous plants from different families increases the efficiency of the biological plant protection from dangerous pests.

Natural enemies prefer small flowers of umbrellate, Compositae and cruciferous plants. The optimal will be the successive cropping with nectariferous plants, when entomophages have food from spring to autumn.

Predatory insects and flies are attracted to flat open flowers of daisies, chamomile, mint and savory. The early flowering plants are important for predatory hoverflies (Syrphidae), after their dormancy when they immediately need food.

Spiders and ground beetles prefer to live and lay eggs in the tall grass under the bushes of live fences, from where they hunt at on vegetable beds. Ground beetles overwinter in the soil. Scientists have found that their number can be increased by 1.5 times, if there are favorable conditions for overwintering by tilling and preparing beds for potatoes in autumn. It is desirable to maintain in the garden a certain number of wild flowering plants, such as tansy, chamomile, yarrow, which are attractive for a ladybird.

Some guidelines for farmers to preserve and increase the population of natural enemies:

– Leave a certain amount of insect pests, since they are the food for their natural enemies. Have a regular check of your field!

– Be extremely careful when working with pesticides and selected fungicides due to their toxicity for ”natural enemies”!

– Do not apply insecticides until you find that the pest population has significantly increased.

If weeds grow at field edges, especially the flowering ones, they can become a refuge for natural enemies. Many adult parasites live longer and are more effective if the there are enough flowers for feeding.

Green fences, mulch and cover crops also provide to preserve and increase the population of natural enemies:

Some basic rules for spreading and spraying the pesticides:

1. The pesticide liquid must be sprayed onto the plants, including the underside of the leaves.

2. The sprayer’s tip must be placed at approx. 0.5 m from the treated surface. During the treatment, it should not be kept long at one point so as to avoid the large drops and dripping.

3. During the hot season it is best to spray in the morning after the dew has dried or in the evening before the night dew. You should not spray the plants in windy weather or before the rain, during the rain and immediately after rain.

4. Infusions and decoctions for spraying must be carefully filtered before filling the sprayer. During the operation shake the pesticide suspension.

2. Match the following words with their meaning.

1) natural enemies	a) кормовые культуры
2) pest control	b) грядка
3) forage crops	c) спячка
4) nectariferous plants	d) естественные враги
5) successive cropping	e) тысячелистник
6) dormancy	f) борьба с вредителями растений
7) population	g) обрабатываемая поверхность
8) favorable conditions	h) медоносные растения
9) tansy	i) настой и отвар
10) predatory insects	j) чередование посевов
11) hoverfly	k) популяция (насекомых)
12) treated surface	l) благоприятные условия
13) yarrow	m) муха-журчалка
14) vegetable bed	n) пижма
15) infusion and decoction	o) насекомые хищники

3. Complete the sentences with the words given in the box.

Insect pests, preservation, composition and propagation, nectariferous plants, decoctions, refuge, weeds, ground beetles

1. Measures should be aimed at the _____of natural enemies. 2. To expand the species _____of predatory insects the nectariferous plants and forage crops should be planted. 3. The optimal will be the successive cropping with _____, when entomophages have food from spring to autumn. 4. Spiders and _____ prefer to live and lay eggs in the tall grass under the bushes of live fences. 5. Leave a certain amount of _____, since they are the food for their natural enemies. 6. If _____ grow at field edges, especially the flowering ones, they can become a refuge for natural enemies. 7. Green fences, mulch and cover crops also provide a _____ for many adult parasites and predators. 8. Infusions and _____ for spraying must be carefully filtered before filling the sprayer.

4. Choose the correct grammar form.

1. For sustainable pest control the diversity of predatory insects *is/are* a pre-requisite. 2. The use of nectariferous plants from different families *increases/increase* the efficiency of the biological plant protection from dangerous pests. 3. Natural enemies prefer small flowers of/from umbrellate, Compositae and cruciferous plants. 4. Predatory insects and flies *are/is attracted* to flat open flowers of daisies, chamomile, mint and savory. 5. Scientists *have/has found* that their number can be increased by 1.5 times, if there are favorable conditions. 6. Do not apply insecticides until you *will find/find* that the pest population has significantly increased. 7. During the hot season it is best to spray in the morning after the dew *has/had dried* or in the evening before the night dew. 8. If weeds *will grow/grow* at field edges, especially the flowering ones, they can become a refuge for natural enemies.

5. Discuss the content of the text using the set of questions given below:

1. What is the principal aim in connection with the measures for the preservation of natural enemies? 2. What is the pre-requisite for sustainable pest control? 3. What kind of plants are predatory insects attracted by? 4. Can you comment upon the favorable conditions for the living cycle of different species of insects? 5. What plants is it desirable to maintain in the garden? Why? 6. What guidelines should a farmer keep in mind to

preserve and increase the population of natural enemies? 7. Which places can become a refuge for the population of natural enemies? 8. What are the basic rules for spreading and spraying the pesticides esp. in connection with the climate conditions and periods of time?

6. Explain the following words and expressions.

Pest control, predatory insects, nectariferous plants, entomophages, dormancy, natural enemies, insecticides, pesticide suspension.

7. Make up a list of key-words (terminative words) to the text.

8. Present the general ideas of the text in the form of oral retelling. Consult 4.2.

Text 4. Biological Control Methods

Источник: http://www.infonet-biovision.org/PlantHealth/Natural-enemies

1. Read and translate the professional text using the dictionary.

Biological control is the process of pest management by the use of living organisms that prey on or attack pests. Three important steps are generally required to improve the biological control of pests:

1. Find out which natural enemies are present.

In most cropping systems natural enemies are already present or close by and do not need to be introduced. It is crucial that natural enemies can be recognized and distinguished from pests.

To find out who is eating who or what, an ”insect zoo” can be set up. A small group of suspected pests and natural enemies are kept together in ventilated jars or other small containers with a small portion of the crop, for example kale leaves. Always make sure that the insects have fresh food. Keep the zoo in a shaded place to avoid high temperature. Take care that the environment inside the zoo does not get too dry or too humid. Maintain all of them have gone through their complete development, so that you can see who eats who or what. Insect zoos can be used to study the life cycle of insects and their behavior. They are also very useful to study the effects of predators.

2. Select appropriate cultivars.

It is important to choose crop cultivars that are not highly susceptible to pests and diseases. Information on the susceptibility of different cultivars can often be obtained by asking other farmers, extension staff or relevant research institutes. If the information is not available, it may even be useful to run on-farm trials of different cultivars.

3. Conserve natural enemies by cultural means.

There are many ways to encourage natural enemies on your farm:

– Providing food sources for adult stages of natural enemies such as flowering plants (fennel, thistles, coriander, Indian mustard) close to the crop.

– Mixed cropping systems provide food and shelter and attract a wider range of natural enemies. Green manure plant such as legumes and sun hemp grown in rotation with other vegetables also improve soil fertility.

– Live fences (trees, hedges) act as windbreaks and provide shelter for natural enemies.

– Mulches around plants provide attractive environments for ground-living predators such as beetles and spiders.

2. Match the following words with their meaning.

1) to distinguish	a) (зд.) способствовать появлению
2) pests	b) заболевание
3) cropping system	c) живая изгородь
4) attractive environment	d) источник пищи
5) life fence	e) насекомые
6) insect	f) различать
7) complete development	g) схема выращивания
8) life cycle	h) благоприятное окружение/среда
9) behavior	i) сорт (культурного растения)
10) manure plant	j) полный цикл развития
11) to encourage	k) компостные растения
12) cultivar	l) восприимчивый
13) susceptible	m) вредители
14) food source	n) поведение
15) disease	o) жизненный цикл

3. Complete the sentences with the words given in the box.

Environment, ground-living, predators, crucial, biological control, susceptibility, natural enemies, cropping systems

1. Three important steps are generally required to improve the _____of pests. 2. It is _____ that natural enemies can be recognized and distinguished from pests. 3. A small group of suspected pests and_____ are kept together in ventilated jars or other small containers. 4. Take care that the_____ inside the zoo does not get too dry or too humid. 5. They are also very useful to study the effects of _____. 6. Information on the _____ of different cultivars can often be obtained by asking other farmers. 7. Mixed

_____ provide food and shelter and attract a wider range of natural enemies. 8. Mulches around plants provide attractive environments for_____ predators such as beetles and spiders.

4. Choose the correct grammar form.

1. Three important steps *are/is* generally required to improve the biological control of pests. 2. In most cropping systems natural enemies *do/does not need* to be introduced. 3. It is important *to choose/choosing* crop cultivars that are not highly susceptible to pests and diseases. 4. Always make sure that the insects *has/have* fresh food. 5. Insect zoos can be *used/using* to study the life cycle of insects and their behavior. 6. If the information *is not/will not available*, it may even be useful to run on-farm trials of different cultivars. 7. There are *much/many* ways to encourage natural enemies on your farm. 8. Mixed cropping systems *provide/provides* food and shelter and attract a wider range of natural enemies.

5. Discuss the content of the text using the set of questions given below:

1. How many steps are required to improve the biological control of pests? What are they? 2. Is it possible to distinguish natural enemies from pests? 3. Can you describe the ”insect zoo’? 4. What are the practical and scientific utility of the ”insect zoo’? 5. What factor is the most important for the choice of crop cultivars? 6. Where can a farmer obtain the information on susceptibility of different cultivars? 7. What are the ways of natural enemies conservation by natural means? 8. What do agronomists mean by mixed cropping system?

6. Explain the following words and expressions.

Pest management, susceptibility of different cultivars, insect zoo, biological control, mixed cropping systems, extension staff, highly susceptible to pests and diseases, on-farm trials, attractive environments.

7. Make up a list of key-words (terminative words) to the text.

8. Present the general ideas of the text in the form of oral retelling. Consult 4.2.

Text 5. Plant Breeding

Источник: https://monsanto.com/innovations/plant-breeding/

1. Read and translate the professional text using the dictionary. Why is there a need for plant breeding today?

One reason is genetic diversity. Some plants better adapt to certain evolving challenges, improving their probability of survival. Access to key characteristics through the preservation of genetic diversity leads to a wider array of plant innovations.

Finding the one characteristic that can offer farmers an advantage is incredibly difficult and time-consuming. Through generations of research and discovery, plant breeding has gone beyond selecting a parent plant simply based on its physical appearance and now includes an understanding of the genetic makeup of a plant. This allows plant breeders to better predict which plants will have a higher probability of success.

These innovations have opened the door to new opportunities. Understanding the genetic markers in a plant's DNA helps us know which plants carry traits that will help them combat environmental challenges like disease or drought. It can also help us select plants that taste better, or offer more nutritional value. Our plant breeding innovations and technologies are helping farmers do what they've done for thousands of years. We continually strive to be even better, helping them ensure that their harvest makes it from their field to your family's table.

How does it work?

The simplest definition of plant breeding is crossing two plants to produce offspring that, ideally, shares the best traits of the two parent plants. Throughout the history of civilization, plant breeding innovations have helped farmers solve problems. Even the earliest farmers understood that in order to survive, they needed plant varieties specifically adapted to their conditions.

Almost everything we've ever eaten has evolved and changed through generations of breeding. Some of the most popular fruits and vegetables originated from plants that would be almost unidentifiable today:

Carrots: Originally, carrots were yellow and purple. In the 1600s humans started breeding them to be white and orange, and then in 1700s they were bred to be red. Purple carrots are still grown in Europe and Asia, and red carrots are grown in China and India.

Watermelons: 5,000 years ago they were only two inches in diameter and tasted bitter. Nothing like the sweet-tasting fruit we eat today.

Bananas: About 6,500 years ago humans started breeding Musa acuminate, the banana's forefather. That plant was crossed with Musa balbisiana and produced plantains, a relative of the modern banana.

Corn: About 10,000 years ago humans discovered Teosinte, which was a plant with small, thin "cobs' that were only two or three inches long

and had kernels so hard they could crack your teeth. Over thousands of years of selection, Teosinte was adapted to produce the 12-inch ears of today.

Cauliflower, broccoli, cabbage, Brussels sprouts, and kale: These common vegetables descended from the common Wild Mustard plant about 10,000 years ago.

2. Match the following words with their meaning.

1) plant breeding	a) отбирать, селекционировать
2) genetic diversity	b) исходное/материнское/ родительское растение
3) a parent plant	c) разведение растений; селекция растений
4) the genetic makeup	d) скрещивание
5) the genetic markers	e) генетическое разнообразие
6) DNA	f) признак, особенность, черта
7) nutritional value	g) адаптированный; приспособленный
8) crossing	h) сорта растений
9) a trait	i) открывать; обнаруживать
10) be adapted to	j) ДНК, дезоксирибонуклеиновая кислота
11) plant varieties	k) питательная ценность
12) a harvest	l) генетическая характеристика; набор генов
13) to discover	m) предок; предшественник
14) to select	n) урожай
15) a forefather	o) генетический маркер; доминирующий ген

3. Complete the sentences with the words given in the box.

Breeding, breeders, plant, innovations, varieties, forefather, physical, diversity, conditions

1. In plant breeding scientists select a parent plant taking into account not only its _____ appearance but also its genetic makeup. 2. Plant _____ can predict which plants will be promising. 3. Genetic _____ is one of the reasons to develop plant breeding today. 4. Understanding of the genetic makeup of a _____ has opened the door to new opportunities in breeding a number of disease resistant plant _____. 5. Throughout the history of civilization, plant breeding _____ have helped farmers solve problems. 6. Even the earliest farmers understood that in order to survive, they needed plant varieties specifically adapted to the growing _____ in their region. 7. The corn's _____ was a plant with small, thin "cobs" that were only two or three inches long and had hard kernels which could crack your teeth. 8. Almost all fruit and vegetables we consume have evolved and changed through generations of _____.

4. Choose the correct form of the verb.

1. Plant breeding *is/are* the art and science of changing the traits of plants in order to produce desired characteristics. 2. Plant breeding *have/has* been used to improve the quality of nutrition value in products for humans and animals. 3. Plant breeders are *striving/strive* to create potentially new plant varieties. 4. Plant breeding *has been practised/is practised* for thousands of years, since near the beginning of human civilization. 5. Plant breeding *is used/is being used* worldwide by individuals such as gardeners and farmers, and by professional plant breeders employed by organizations such as government institutions, universities, crop-specific industry associations or research centers. 6. The desirable properties of new plant varieties *include/includes* such characteristics as a higher yielding potential, disease resistance, drought tolerance or regional adaptation to different environments and growing conditions. 7. Modern plant breeding *may/must* use techniques of molecular biology to select, or in the case of genetic modification, to insert, desirable traits into plants. 8. Sometimes many different genes can *influence/to influence* a desirable trait in plant breeding.

5. Say if it is true or false.

1. Plant breeding means crossing two plants to produce an offspring that shares the best traits of the two parent plants.

2. Understanding the genetic markers in a plant's DNA helps us to produce varieties that can resist to diseases or drought.

3. Plant breeders cannot select the traits to breed plant varieties with an improved taste.

4. All crops we eat now have evolved and changed through generations of breeding.

5. Breeding helped to change the color of carrots.

6. Musa acuminate was crossed with Musa balbisiana and produced plantains, a relative of the modern banana.

7. Cauliflower, broccoli, cabbage, Brussels sprouts, and kale descended from the common Wild Mustard plant about 10,000 years ago.

8. Watermelons were two inches in diameter and tasted sweet 5,000 years ago.

6. Explain the following words and expressions.

Traits, plant breeding, disease resistant, drought tolerant, growing conditions, a parent plant.

7. Make up a list of key-words (terminative words) to the text.

8. Present the general ideas of the text in the form of oral retelling. Consult 4.2.

Text 6. Crop Rotation – Effects, Means and Practices, Advantages

Источник: http://www.infonet-biovision.org/PlantHealth/Crop-rotation

1. Read and translate the professional text using the dictionary.

Crop rotation is a practice of growing different crops on the same land in a regular recurring sequence. It means the planned order of specific crops planted on the same field. It also means that the succeeding crop belongs to a different family than the previous one. The planned rotation may vary from 2 or 3 years to a longer period. Rotation of crops is not only necessary to offer a diverse ”diet” to the soil microorganisms, but as they are rooting at different soil depths hence are capable to explore the different soil layers for nutrients. Nutrients that have been leached to deeper layers and that are no longer available for the commercial crop can be ”recycled” by the crops in rotation. This way the rotation crops function as biological pumps. Furthermore, a diversity of crops in rotation leads to a diverse soil flora and fauna, as the roots excrete different organic substances that attract different types of bacteria and fungi, which in turn, play an important role in the transformation of these substances into plant available nutrients. The most important reason of crop rotation is to hinder the development of weeds, arthropod pests and short-persistent soil-borne diseases by reducing their population levels in the soil.

Many of the pests and diseases that plague vegetable plants live in the soil. A common source of soil-borne problems is the seedbed. If a farmer has a problem with his or her seedbed it may mean that plants are infected/infested very early and never have a chance to thrive. Often seedbeds are drenched with pesticide to prevent this.

Another and more common source of soil-borne pest and disease infection is the main production field itself. If a farmer grows crops in the same category year after year on the same land an almost certain result is a buildup of pest and disease problems.

Effects of Crop Rotation

– Higher diversity in plant production and thus in human and livestock nutrition.

– Reduction and reduced risk of pest and weed infestations.

– Greater distribution of channels or biopores created by diverse roots (various form, size and depths).

– Better distribution of water and nutrients through the soil profile.

– Exploration for nutrients and water of the whole soil profile by roots of many different plant species resulting in an optimal use of the available nutrients and water.

– Increased nitrogen fixation through certain plant-soil biota symbionts and improved balance of N/P/K from both organic and mineral sources.

– Increased humus formation.

Means and Practices of Crop Rotation

Crop rotation plan/design should be guided by the set objectives i.e. food and fodder production (grain, leaf, stalks), residue production, pest and weed control, nutrient uptake and biological subsurface mixing/cultivation, etc. for better result; appropriate/improved seeds as well as high residue production of above ground and below-ground biomass.

Advantages or Benefits of Crop Rotation

It improves the soil structure and reduces depletion/erosion: Some crops have strong, deep roots. They can break up hardpans, and tap moisture and nutrients from deep in the soil. Others have many fine, shallow roots. They tap nutrients near the surface and bind the soil. They form many tiny holes so that air and water can get into the soil.

It increases soil fertility: Legumes (such as groundnuts and beans) fix nitrogen in the soil. When their green parts and roots rot, this nitrogen can be used by other crops such as maize. The result is higher, more stable yields, without the need to apply expensive inorganic fertilisers.

It helps control weeds, pests and diseases hence reduce reliance on synthetic chemicals: Planting the same crop season after season encourages certain weeds, insects and diseases. Planting different crops breaks their life cycle and prevents them from multiplying.

It produces different types of output: Growing a mix of grain, beans, vegetables and fodder means a more varied diet and more types of produce to sell.

It reduces risk: A single crop may fail because of drought. It may be attacked by pests. Or its market price may be low when time comes to sell it. Producing several different crops reduces these risks.

Crop rotation may also replace ploughing the soil since it helps aerate, the soil, recycles nutrients, and helps control weeds, pests and dis-

eases hence perfectly fitting within the ideals of conservation agriculture. Intercropping, strip cropping and relay cropping bring many of the same advantages as rotation. Even so, it is a good idea to rotate crops even if you use these approaches.

2. Match the following words with their meaning.

1) crop rotation	a) почва, грунт, земля; почвенный слой
2) family	b) грибы
3) soil	c) представитель семейства членистоногих
4) root	d) грядка; почва, подготовленная для посева
5) fungi	e) сосредоточение; накопление
6) arthropod	f) культурооборот; ротация севооборота
7) soil-borne disease	g) симбиотический организм; симбионт; сожитель
8) seedbed	h) корень; пускать корни, укореняться
9) buildup	i) болезнь, передаваемая через почву
10) nutrient uptake	j) влажность; влага; сырость
11) moisture	k) плодородие; продуктивность
12) fertility	l) бурьян, сорняк, сорная трава; пропалывать
13) conservation agriculture	m) рациональное / ресурсосберегающее сельское хозяйство
14) symbiont	n) семейство
15) weed	o) поглощение / усвоение питательных веществ

3. Complete the sentences with the words given in the box.

Rotation, roots, cropping, drought, soil-borne, nitrogen, reduces, seedbed

1. Crop _____ means the planned order of specific crops planted on the same field. 2. The most important reason of crop rotation is to prevent the development of weeds, arthropod pests and _____ diseases by reducing their population levels in the soil. 3. A usual source of soil-borne troubles is the _____. 4. Crop rotation _____ risk of pest and weed infestations. 5. Crop rotation helps to increase _____ fixation. 6. Crops with strong, deep _____ can break up hardpans, and tap moisture and nutrients from deep in the soil. 7. A single crop may fail because of _____ and a shortage of water resulting from this. 8. Intercropping, strip _____ and relay cropping are as good practices as rotation.

4. Choose the correct form of the verb.

1. The term ”crop rotation” *mean/means* the practice of growing a series of different types of crops in the same area in sequenced seasons. 2. The planned rotation may *vary/to* vary from 2 or 3 years to a longer

period. 3. Crop rotation *helps/is helping* in reducing soil erosion and increases soil fertility and crop yield. 4. There *are/is* no limit to the number of crops that can be used in a rotation. 5. Crop rotation *used/is used* to control pests and diseases in the soil. 6. Middle Eastern farmers *practised/have practised* crop rotation in 6,000 BC. 7. Crop choice is often related to the goal the farmer *is going to/will* achieve with the rotation. 8. There *are/is* numerous factors that must *take/be taken* into consideration when planning a crop rotation.

5. Say if it is true or false.

1. Crop rotation is a practice of growing crops, which belong to different families, on the same land in a regular periodic sequence. 2. Nutrients that have been leached to deeper layers cannot be ”recycled” by the crops in rotation. 3. None of the pests and diseases, that damage vegetable plants, lives in the soil. 4. If a farmer grows the same crops on the same land year after year it most probably will result in a growth of pest and disease problems. 5. Crop rotation increases humus formation. 6. Legumes collect nitrogen from the soil and when they are harvested, the biomass of uncollected roots breaks down, making the stored nitrogen available to future crops. 7. Planting different crops breaks the life cycle of insects and prevents them from multiplying. 8. Crop rotation may be applied instead of ploughing.

6. Explain the following words and expressions.

Crop rotation, pest control, biomass. weed infestations, soil fertility, soil erosion, fodder, nitrogen fixation.

7. Make up a list of key-words (terminative words) to the text.

8. Present the general ideas of the text in the form of oral retelling. Consult 4.2.

Text 7. What are the Pros and Cons of Using Poultry Manure for Fertilizer?

Источник: http://www.wisegeek.com/what-are-the-pros-and-cons-of-using-poultry-manure-for-fertilizer.htm

1. Read and translate the professional text using the dictionary.

Using poultry manure for fertilizer has many pros and a few cons. Poultry manure has more of the three components needed in a fertilizer – nitrogen, phosphorus, and potassium – than does manure from other animals. Using manure rather than commercial fertilizers may have environ-

mental benefits and may be less expensive, especially if poultry manure is readily available for collecting. Using poultry manure is more labor intensive than buying a commercial fertilizer. There may also be some chance of contaminating vegetables with manure if the proper processes aren't followed and if produce isn't thoroughly washed before it is eaten.

One of the pros of using poultry manure for fertilizer is also the cause of one of the cons. Poultry manure contains large amounts of nitrogen, which plants need to grow. The level of nitrogen in poultry manure is so high, however, that the manure must go through a process before it can be applied to plants. If fresh poultry manure is applied directly to plants, the nitrogen content is so high that poultry manure can burn the plants and even kill them. This means using poultry manure as fertilizer is much more labor intensive than using a commercial fertilizer or even some other types of animal manure for fertilizer.

The nitrogen content means that poultry manure must go through a composting or aging process before it is applied to plants. This process brings nitrogen levels to a point that plants can use it without causing the plants harm. In the composting process, the poultry bedding, including the manure, is put into a composting bin for 6 to 12 months. It must be watered and turned periodically during this time. Once the composting process has been completed, the compost is spread over the garden, and a natural fertilizer is in place to help plants thrive.

The composted poultry manure for fertilizer will likely increase carbon in the soil, may help to reduce soil erosion, and can reduce nitrate leaching from the soil. Nitrates are necessary for plants to grow. Nitrate leaching refers to the nitrates in soil being removed from plants as water moves through the roots.

The risks of contaminating produce by using poultry manure as fertilizer are low, especially if the manure is composted. To further reduce this risk, poultry manure for fertilizer should be applied to plants at least two months before harvesting the food for consumption. It is also important that foods grown with manure fertilizer be thoroughly washed before serving.

2. Match the following words with their meaning.

1) poultry manure	a) преимущества использования для окружающей природной среды
2) commercial fertilizer	b) трудоемкий
3) phosphorus	c) компостирование; изготовление компоста
4) potassium	d) вымывание нитратов

5) environmental benefits	e) фосфор
6) labor intensive	f) калий
7) composting	g) промышленное / химическое удобрение
8) nitrate leaching	h) буйно разрастаться
9) to contaminate	i) природные удобрения
10) to thrive	j) содержать в себе, включать, иметь в составе
11) natural fertilizers	k) неперепревший навоз
12) to apply	l) птичий помет
13) burn	m) загрязнять; заражать; портить
14) fresh manure	n) ожог; обжигать
15) to contain	o) применять; употреблять

3. Complete the sentences with the words given in the box.

Contaminate, applied, manure, composting, phosphorus, nitrate, nitrogen, fertilizer

1. Poultry manure contains nitrogen, _____, and potassium. 2. Using natural poultry manure may be cheaper than buying a commercial _____. 3. Fresh poultry _____ is unsuitable for immediate use. 4. The disadvantage of using poultry manure is that it may _____vegetables we consume. 5. The level of _____ in poultry manure is so high that the manure can burn the plants and even kill them. 6. In the _____ process the poultry bedding with parts of the manure is put into a composting bin for six to twelve months. 7. _____ leaching refers to the nitrates in soil being removed from plants as water moves through the roots of plants. 8. Poultry manure for fertilizer should be _____ to plants at least two months before harvesting the food for consumption.

4. Choose the correct form of the verb.

1. Using poultry manure for fertilizer *have/has* a lot of pros and a few cons. 2. Poultry manure *can/must* be composted before its application. 3. Once the composting process *has completed/has been completed*, the compost is spread over the garden or field. 4. Poultry manure for vegetable garden fertilizing is excellent, but there *is/are* some things you need to know about it in order to use it correctly. 5. The high nitrogen in the poultry manure is dangerous to plants if the manure *has/have* not been properly composted. 6. Composting poultry manure is simple. If you *will have/have* chickens, you can use the bedding from your own chickens. 7. Take the used bedding and put it into a compost bin *composting/to compost* poultry manure. Water it thoroughly and then turn the pile every few weeks to get air into the pile. 8. I think your vegetables *will grow/are growing* bigger and healthier as a result of using poultry manure fertilizer.

5. Say if it is true or false.

1. Poultry manure is used as an organic fertilizer, especially for soil which is low in nitrogen. 2. Of all animal manures, poultry manure has the lowest amount of nitrogen, phosphorus, and potassium. 3. If poultry manure is used without composting, it can damage roots and possibly kill plants. 4. Poultry manure needs to be composted and aged at least two to three months before it can be added to your garden soil. 5. The composting process brings nitrogen levels in poultry manure to a point that is not harmful to plants fertilized with this type of manure. 6. The composted poultry manure for fertilizer will likely increase carbon in the soil and can reduce nitrate leaching from the soil. 7. There are high risks of contaminating produce by using poultry manure as fertilizer, especially if the manure is composted. 8. Vegetables grown with manure fertilizer must be thoroughly washed before eating.

6. Explain the following words and expressions.

Natural fertilizers, commercial fertilizers, fresh poultry manure, composting process, contaminating vegetables, damage plants.

7. Make up a list of key-words (terminative words) to the text.

8. Present the general ideas of the text in the form of oral retelling. Consult 4.2.

Text 8. Forestry and Forest Management

Источник: Английский язык в профессиональном общении: учебное пособие для магистрантов направления подготовки 35.04.01 ”Введение в лесопарковое хозяйство, уход за деревьями в урбанизированной среде” / Л. Р. Валитова. – Оренбург: ИЦ ОГАУ, 2015. – 81 с.

1. Read and translate the professional text using the dictionary.

Forestry is the art, science, and practice of studying and managing forests and plantations and related natural resources. A practitioner of forestry is known as a forester.

Silviculture, a related science, involves the growing and tending of trees and forests. The scientific study of forest species and their interaction with the environment is referred to as forest ecology, while the management of forests is often referred to as forestry.

Forestry is the art of growing rotational crops of timber trees in forests and woods. It may be defined in principle as the management of forests to insure maximum benefit to mankind.

While the continuous production of timber products is generally the main objective, secondary benefits such as recreation, wildlife protection, and watershed maintenance are almost always involved. Forest management has changed considerably over the last few centuries, with rapid changes from the 1980s onwards culminating in a practice now referred to as sustainable forest management. Foresters who practice sustainable forest management focus on the integration of ecological, social and economic values.

The concept of forest management has acquired a broader content than it used to have and now relates more to caring for the forest environment as an integrated totality. The actions and methods employed in wood production are nowadays designed to ensure that the requirements of the natural environment are taken into consideration during all stages of the forest growth. Likewise in forest regeneration, the alternatives now chosen have the farthest-reaching effects on both wood production and environmental protection.

Forest regeneration

Regeneration is an inseparable aspect of sustainable use of forests. Generally conifer stands are regenerated at an age of 60–120 years (depending on growth site) in the central parts and at 80–160 years in the north of Russia. The corresponding recommendation for birch stands is 60–80 years, but they can be regenerated earlier if the tree trunks are stout enough.

In most cases, regeneration is intended to create a mixed forest, in which the dominant species is pine or spruce, with birch in a complementary role. Forests on the most barren soils, where hardwood species do not thrive, are an exception. The main tree species and regeneration method used are chosen primarily on the basis of soil type and fertility. Especially on nutrient-poor soils, the first option to be considered is natural regeneration. It is the least expensive and easiest alternative – when it succeeds. In the event of enough seedlings failing to spring up spontaneously, expensive and labour-intensive efforts to redress the matter – such as supplementary planting and removing grass and other undergrowth – must be resorted to.

Site preparation is of decisive importance in forest regeneration. Exposing mineral soil gives planted seedlings a better chance of thriving and promotes the natural sprouting of, especially, birch as a supplementary species. Gentler soil preparation methods have been adopted in recent years and deep ploughing has been almost completely abandoned. Today,

about two-thirds of the area treated is gone over by scarifying or scalping machines and the remainder mounded using tractor-diggers or excavators. Interest in controlled burning is reviving, but the areas on which this method is practised are still small.

Management of young stands

The species balance in young tree stands is regulated by means of cleaning and thinning. This involves removing shrubs and other undergrowth likely to interfere with the growth of the main species.

The guidelines for tending young stands have been revised in recent years. The main changes are that now the aim is to have more hardwoods and to delay final treatment of the young stand. Having hardwoods mixed with the main softwood species improves soil properties, reduces pest and disease damage and increases biodiversity. Hardwoods also improve the quality of softwoods, especially pine, by retarding the growth of branches. Stands of young trees usually need tending once or twice during their first fifteen years of life.

In the final tending operation, the stands are thinned to a density of, depending on species, 1,600–2,000 trees per hectare and then left to grow on until it is time for the first thinning.

Undergrowth is removed with a clearing saw; herbicides are nowadays rarely used. There is growing interest in using biomass obtained when older seedling stands and young forests are thinned as fuel.

Thinning

The purpose of thinning is to control the amount and distribution of available growing space, to replicate the forest's natural development and ensure an even age structure. Removing trees whose growth has been stunted or which are diseased or otherwise of poor quality gives the others more room in which to grow. Depending on growing conditions and species, a stand is usually thinned 1–3 times during a rotation.

The frequency of thinning has been reduced to improve the economy of these operations and lessen the damage done to standing trees.

The first thinning is done 30–35 years after regeneration, when the trees are 12–14 metres tall, and reduces the number per hectare to around 1000. First thinnings ought to be carried out considerably more often than at present. Neglecting them decisively reduces the profitability of wood production.

Second and subsequent thinnings cut the density to 450–550 per hectare and these trees are allowed to grow on until the area in question is due for regeneration.

Ecological thinning is where the primary aim of forest thinning is to increase growth of selected trees, favoring development of wildlife habitat (such as hollows) rather than focusing on increased timber yields.

Pruning

Pruning, as a silvicultural practice, refers to the removal of the lower branches of the young trees so clear knot free wood can subsequently grow over the branch stubs. Clear knot-free lumber has a higher value.

Pruning in landscaping and gardening is the practice of removing diseased, non-productive, or otherwise unwanted portions from a plant.

2. Match the following words with their meaning.

1) natural regeneration	a) очистка, осветление, рубки осветления
2) thinning	b) культиватор-рыхлитель
3) cleaning	c) подлесок, подрост
4) seedling	d) лесонасаждение, древостой
5) sustainable forest management	e) последняя рубка ухода
6) undergrowth	f) обрезание ветвей, удаление сучьев
7) stand	g) уход за молодым древостоем
8) final tending operation	h) прореживание (леса), рубка ухода
9) pruning	i) устойчивое лесоуправление
10) scarifying machine	j) естественное восстановление, естественное лесовозобновление, самосев
11) clear wood	k) деревья на корню
12) knot-free lumber	l) обнажение (почвы), удаление растительного слоя
13) tending young stands	m) сеянец, саженец, рассада, зернышко
14) scalping	n) пиломатериалы без сучков
15) standing trees	o) бездефектная древесина

3. Complete the sentences with the words given in the box.

A clearing saw, deep ploughing, density, dominant, fertility, final treatment, first thinning, growing conditions, integration, pruning, tree trunks, wildlife habitat

1. Foresters who practice sustainable forest management focus on the _____ of ecological, social and economic values. 2. The recommendation for birch stand regeneration is 60–80 years, but it can be regenerated earlier if the _____ are stout enough. 3. In most cases, regeneration is intended to create a mixed forest, in which the _____ species is pine or spruce, with birch in a complementary role. 4. The main tree species and regeneration method used are chosen primarily on the basis of soil type and _____. 5. Gentler soil-preparation methods have been adopted in recent years and _____ has been almost completely abandoned.

6. The main changes in tending stands are that now the aim is to have more hardwoods and to delay _____ of the young stand. 7. Undergrowth is removed with a _____; herbicides are nowadays rarely used. 8. Depending on ____ and species, a stand is usually thinned 1–3 times during a rotation. 9. _____ ought to be carried out considerably more often than at present. 10. Second and subsequent thinnings cut the _____ to 450–550 trees per hectare and these trees are allowed to grow on until harvesting. 11. Ecological thinning is to increase growth of selected trees, favoring development of _____ (such as hollows) rather than focusing on increased timber yields. 12. _____ is the removal of the lower branches of the young trees so clear knot free wood can subsequently grow over the branch stubs.

4. Choose the correct form of the verb.

1. The scientific study of forest species and their interaction with the environment *is/are* referred to as forest ecology, while the management of forests is often referred to as forestry. 2. Foresters who practice sustainable forest management *focuses/focus* on the integration of ecological, social and economic values. 3. The concept of forest management *has/have* acquired a broader content than it used to have and now *relate/relates* more to caring for the forest environment as an integrated totality. 4. In the event of enough seedlings failing to spring up spontaneously, expensive and labour-intensive efforts to redress the matter – such as supplementary planting and removing grass and other undergrowth – must *to be/be* resorted to. 5. This involves/is involving removing shrubs and other undergrowth likely *interfere/to interfere with* the growth of the main species.

5. Say if it is true or false.

1. Depending on growing conditions and species, a stand is usually thinned 3–5 times during a rotation. 2. Forest management has changed considerably over the last few centuries, with rapid changes from the 1960s onward, culminating in a practice now referred to as sustainable forest management. 3. The alternatives now chosen have the farthest-reaching effects on both wood production and environmental protection. 4. Regeneration is an inseparable aspect of sustainable use of forests. 5. There is no interest in using biomass obtained when older seedling stands and young forests are thinned as fuel.

6. Explain the following words and expressions.

Dominant species, barren soil, endangered species, site preparation, pest, disease, subsequent thinning, ecological thinning.

7. Make up a list of key-words (terminative words) to the text.

8. Present the general ideas of the text in the form of oral retelling. Consult 4.2.

Text 9. What are the Different Types of Landscape Architect Jobs?

Источник: http://www.wisegeek.com/what-are-the-different-types-of-landscape-architect-jobs.htm

1. Read and translate the professional text using the dictionary.

There are four different types of landscape architect jobs: a designer, a consultant, a business owner, and an instructor. A landscape architect is someone who is responsible for the design of a physical space. This space is typically a garden or exhibition space. Well-designed landscape spaces are enjoyable, multi-purpose and create a tranquil environment.

Landscape architects have a minimum undergraduate degree in landscape architecture from a recognized university. This program is not widely available, and is usually incorporated into the Faculty of Architecture. There are many similar courses between these two professions, including design concepts, project management and specialized design software.

A design landscape architect is responsible for creating an artistic rendering of the proposed solution. The design must incorporate the existing landscape; create the desired impact while meeting all the environmental requirements, such as proper drainage and moisture absorption tools. Many designers use computer software technology to provide digital representations of the design in two and three dimension format.

One of the most popular landscape architect jobs is professional consulting. This job is most suitable to an architect with at least ten years of experience and a well-established professional reputation. A consultant often reviews design proposals provided by others, discusses the options with property owners and provides assistance in the decision making process.

Although most people start their careers working for a landscape architecture firm, many people branch out and open their own business. As a business owner, they often start landscaping companies and provide consulting services. The combination of business and subject matter expertise allows these types of landscape architect jobs to provide many opportunities.

Experienced landscape architects often find employment as course instructors or professors in landscape architecture schools. These roles are attractive to people with a great deal of experience and education. Many people who take on teaching roles also write books or articles on landscape architecture.

Many landscape architect jobs are available within established firms or in government agencies. In a government agency, an architect can review submissions for planning permission, provide analysis of environmental impact of other designs. They can also provide an overview of all designs in an area to ensure a cohesive overall impression.

Landscape architects often work very long hours designing and refining proposals for potential clients. The average submission has three different designs to allow the client to make the final decision. The creation of these drawings and designs is quite labor-intensive and time-consuming.

2. Match the following words with their meaning.

1) landscape architect	a) визуальное пространство
2) physical space	b) поглощение влаги; впитывание влаги
3) design concepts	c) проектное предложение
4) environmental requirements	d) дизайнер садов и парков; специалист по садово-парковой архитектуре
5) moisture absorption	e) принципы проектирования
6) professional reputation	f) требования, связанные с условиями окружающей среды
7) experience	g) связанный; образующий единое целое
8) cohesive	h) отнимающий много времени; трудоёмкий
9) to refine	i) опыт
10) time-consuming	j) соединяться; заключать, содержать в себе
11) tranquil	k) профессиональная репутация
12) to incorporate	l) усовершенствовать, улучшать
13) design proposal	m) госучреждения
14) government agencies	n) надежный; общепризнанный
15) well-established	o) спокойный; мирный; безмятежный

3. Complete the sentences with the words given in the box.

Designer, instructors, time-consuming, consultant, combine, landscape, clients, agency

1. There are four different types of landscape architect jobs: a _____, a consultant, a business owner, and an instructor. 2. A lot of _____ designers present their projects to clients in two and three di-

mension format. 3. A _____ often assesses provided design proposals, offers possible alternatives to property owners and renders assistance in the decision making process. 4. Some landscape architects prefer to open their own business to _____ landscape architecture designer's services and expert advice. 5. Well-educated and highly-qualified landscape architects with decades of experience often work as course _____ or professors in landscape architecture schools. 6. In a government ____, an architect can make an analysis of environmental impact of different designs. 7. Landscape architects often work very long hours designing and refining suggestions for possible _____. 8. The process of making drawings and designs is quite labor-intensive and _____.

4. Choose the correct form of the verb.

1. There *is/are* two undergraduate landscape architect professional degrees: a Bachelor of Landscape Architecture (BLA) and a Bachelor of Science in Landscape Architecture (BSLA). These programs usually *requires/require* 4 years of study. 2. A landscape architect is someone who *are/is* responsible for the design of a physical space. 3. Landscape architects *plan/plans* and design land areas for parks, recreational facilities, private homes, campuses, and other open spaces. 4. Landscape architects *has/have* to select appropriate materials for use in landscape designs and analyze environmental reports on land conditions, such as drainage and energy usage. 5. Landscape work must be *inspected/inspect* by landscape architects to ensure that it adheres to original plans. 6. People *enjoy/are enjoying* attractively designed gardens, public parks, playgrounds, residential areas, college campuses, and public spaces. Landscape architects design these areas so that they *were/are* not only functional but also beautiful and harmonious with the natural environment. 7. Landscape architects who *work/are working* for government agencies design sites and landscapes for government buildings, parks, and other public lands, for instance, recreation areas in national parks and forests. 8. About 46 percent of landscape architects in the USA in 2012 *were/are* employed in the architectural, engineering, and related services industry. Another 15 percent *worked/work* in the landscaping services industry. About 1 in 5 *were/was* self-employed.

5. Say if it is true or false.

1. A landscape architect is a person who is educated in the field of landscape architecture. 2. Well-designed landscape spaces are pleasing to look at, multi-purpose and create a calm environment. 3. You may get a

degree in landscape architecture at the faculty of architecture. 4. A design landscape architect deals with creating an artistic rendering of the proposed solution. 5. If landscape architects want to become consultants in the area of landscape architecture, they should have at least five years of experience and a spotless professional reputation. 6. The only option for the landscape architects to start their careers is to work for a landscape architecture company. 7. It doesn't take landscape architects much time to design a project for potential clients. 8. Landscape architects usually submit at least three various designs to their customers to let them make up their minds.

6. Explain the following words and expressions.

A designer, a consultant, a business owner, an instructor, a landscape architecture firm, a government agency, a time-consuming process.

7. Make up a list of key-words (terminative words) to the text.

8. Present the general ideas of the text in the form of oral retelling. Consult 4.2.

Text 10. Water Conservation: Digital Solutions in a Changing Climate

Источник: https://modernag.org/water-conservation/digital-tools-for-water-conservation/

1. Read and translate the professional text using the dictionary.

The world today faces a variety of pressures on the supply of fresh water. Worldwide, farming uses 70 percent of the water from rivers, lakes, groundwater, and glaciers, known collectively as blue water. Regions that benefit from plentiful rainfall have an added source, called green water that either evaporates or is used by plants. Another source of pressure on fresh water supplies comes from a rapidly changing climate, which alters weather and precipitation patterns across the planet. When less rain falls as compared to historical averages, farmers must adapt by irrigating more often. When more rain falls, farmers must also adapt, usually by selecting different seeds that are bred to tolerate wet soils. In response to these circumstances, farmers are adopting more efficient irrigation systems, improving their ability to keep water in the soil.

Modern Irrigation

The most innovative approaches to water conservation on today's farms usually begin with collecting data in real time, using a new gener-

ation of field and satellite sensors that measure soil moisture levels. Next, farmers can evaluate that data with digital tools such as advanced software and analytics. When necessary, they can apply water with precision tools like drip irrigation that provide only the amount of water each plant needs.

Here are some examples from around the globe.

1. The AquaTEK™ partnership in Italy uses a three-part approach to improving irrigation practices: they educate growers on available tools and practices, introduce the most advanced field sensors, and distribute superior irrigation technology. Since the program's inception in 2013, the program has achieved dramatic improvements, including: reduced water usage by 17 percent, improved harvests by 27 percent, increased energy efficiency by 20 percent, and cut nitrogen loss in groundwater by 78 percent.

2. In Ica, Peru, a combination of approaches to conserving water helped reduce consumption at a major vegetable-producing facility. These included sheltering the plants with net houses to reduce evaporation, installing moisture sensors, and adopting a modified approach to pruning that permits plants to be grown closer together.

Always Looking Ahead

Water conservation has always been a goal achieved in part by embracing innovation. Farmers and others in agriculture have joined forces, sharing information with one another and constantly pursuing new solutions. More and more, those solutions use sophisticated technology to help farmers do their jobs in the most precise manner possible, moving the industry forward by using natural resources less.

2. Match the following words with their meaning.

1) rainfall	a) удерживать влагу в почве
2) to tolerate	b) ледники
3) supply of fresh water	c) обрезка (растений)
4) soil moisture	d) средние показатели
5) drip irrigation	e) почвенная влага
6) harvest	f) (зд.) адаптироваться
7) groundwater	g) схема выпадения осадков
8) evaporation	h) осадки в виде дождя
9) glaciers	i) точные приборы
10) to keep water in the soil	j) испарение
11) nitrogen loss	k) снабжение чистой / свежей водой
12) precipitation pattern	l) капельная ирригация
13) pruning	m) грунтовые воды
14) historical averages	n) потеря (вымывание) азота
15) precision tools	o) урожай, урожайность

3. Complete the sentences with the words given in the box.

Precision tools, water conservation, rain, natural resources, irrigation systems, pruning, added source, vegetable-producing

1. When more _____ falls, farmers must also adapt. 2. Regions that benefit from plentiful rainfall have an_____, called green water. 3. Farmers are adopting more efficient _____. 4. When necessary, farmers can apply water with _____ like drip irrigation. 5. A combination of approaches to conserving water helped reduce consumption at a major _____ facility. 6. _____ has always been a goal achieved in part by embracing innovation. 7. A modified approach to pruning permits plants to be grown closer together. 8. Sophisticated technology moves the industry forward by using _____ less.

4. Choose the correct grammar form.

1. Worldwide, farming uses 70 percent of the water from rivers, lakes, groundwater, and glaciers, *known/knowing* collectively as blue water. 2. Water conservation *has always been/had been* a goal achieved in part by embracing innovation. 3. Regions that benefit from plentiful rainfall *have/has* an added source, called green water. 4. The AquaTEK™ partnership in Italy *introduces/introduce* the *most/more* advanced field sensors. 5. Another source of pressure on fresh water supplies comes from a rapidly changing climate, *which/who* alters weather. 6. Since the program's inception in 2013, the program *has achieved/achieved* dramatic improvements.

5. Discuss the content of the text using the set of questions given below:

1. How much water does farming use worldwide? 2. How do you understand the terms "blue water" and "green water'? 3. What is the connection between the precipitation patterns across the planet and the challengers for farmers? 4. What are the most innovative approaches to water conservation on today's farms? 5. What are digital tools and precision tools like drip irrigation aimed at? 6. Can you describe the approaches to conserving water which helped reduce consumption at a major vegetable-producing facility in Peru? 7. Why should farmers and others in agriculture join forces as far as the problem of water conservation is concerned?

6. Explain the following words and expressions.

Blue water, green water, precipitation pattern, irrigation systems, field and satellite sensors, drip irrigation, vegetable-producing facility, a modified approach to pruning.

7. Make up a list of key-words (terminative words) to the text.

8. Present the general ideas of the text in the form of oral retelling. Consult 4.2.

БАНК ТЕКСТОВ ПРОФЕССИОНАЛЬНОЙ НАПРАВЛЕННОСТИ 35.03.04, 35.04.04 – АГРОНОМИЯ

ПРОФИЛИ: Агрономия, Агрономия – программа "Управление продукционным процессом агроценозов Западной Сибири"

Text 1. Agronomy

Источник: http://www.gpedia.com/en/gpedia/Agronomy

Agronomy (Ancient Greek ἀγρός agrós "field" + νόμος nómos "law") is the science and technology of producing and using plants for food, fuel, fiber, and land reclamation. Agronomy has come to encompass work in the areas of plant genetics, plant physiology, meteorology, and soil science. It is the application of a combination of sciences like Biology, Chemistry, Economics, Ecology, Earth science, and Genetics. Agronomists of today are involved with many issues, including producing food, creating healthier food, managing the environmental impact of agriculture, and extracting energy from plants. Agronomists often specialize in areas such as crop rotation, irrigation and drainage, plant breeding, plant physiology, soil classification, soil fertility, weed control, and insect and pest control.

Plant breeding

This area of agronomy involves selective breeding of plants to produce the best crops under various conditions. Plant breeding has increased crop yields and has improved the nutritional value of numerous crops, including corn, soybeans, and wheat. It has also led to the development of new types of plants. For example, a hybrid grain called triticale was produced by crossbreeding rye and wheat. Triticale contains more usable protein than does either rye or wheat. Agronomy has also been instrumental in fruit and vegetable production research.

Biotechnology

Agronomists use biotechnology to extend and expedite the development of desired characteristic. Biotechnology is often a lab activity requiring field testing of the new crop varieties that are developed.

In addition to increasing crop yields agronomic biotechnology is increasingly being applied for novel uses other than food. For example, oilseed is at present used mainly for margarine and other food oils, but it can be modified to produce fatty acids for detergents, substitute fuels and petrochemicals.

Soil science

Agronomists study sustainable ways to make soils more productive and profitable. They classify soils and analyze them to determine whether they contain nutrients vital to plant growth. Common macronutrients analyzed include compounds of nitrogen, phosphorus, potassium, calcium, magnesium, and sulfur. Soil is also assessed for several micronutrients, like zinc and boron. The percentage of organic matter, soil pH, and nutrient holding capacity (cation exchange capacity) are tested in a regional laboratory. Agronomists will interpret these lab reports and make recommendations to balance soil nutrients for optimal plant growth.

Soil conservation

In addition, agronomists develop methods to preserve the soil and to decrease the effects of erosion by wind and water. For example, a technique called contour plowing may be used to prevent soil erosion and conserve rainfall. Researchers in agronomy also seek ways to use the soil more effectively in solving other problems. Such problems include the disposal of human and animal manure, water pollution, and pesticide build-up in the soil. Techniques include no-tilling crops, planting of soil-binding grasses along contours on steep slopes, and contour drains of depths up to 1 metre.

Agroecology

Agroecology is the management of agricultural systems with an emphasis on ecological and environmental perspectives. This area is closely associated with work in the areas of sustainable agriculture, organic farming, and alternative food systems and the development of alternative cropping systems.

Theoretical modeling

Theoretical production ecology tries to quantitatively study the growth of crops. The plant is treated as a kind of biological factory, which processes light, carbon dioxide, water, and nutrients into harvestable parts. Main parameters kept into consideration are temperature, sunlight, standing crop biomass, plant production distribution, nutrient and water supply.

Text 2. Tilth and Tillage – Concepts of Tillage in Different Countries

Источник: http://www.agriinfo.in/default.aspx?page=topic&superid=1&topicid=322

There are a lot of various concepts of tillage applied in different countries. Here are the descriptions of some of them.

Minimum Tillage

It is aimed at reducing tillage operations to the minimum necessary for ensuring a good seedbed, rapid germination, a satisfactory stand & favorable growing conditions. Tillage can be reduced by omitting operations which do not give much benefit when compared to the cost and combining agricultural operations like seeding & fertilizer application.

The advantages of minimum tillage are:

– Improvement of soil condition due to decomposition of plant residues in situ.

– Higher infiltration caused by decomposition of vegetation present on soils & channels formed by decomposition of dead roots.

– Less resistance to root growth due to improved structure.

– Less soil compaction by reduced movement of heavy tillage vehicles.

– Less soil erosion compared to conventional tillage.

The disadvantages of minimum tillage are:

– Less seed germination.

– More nitrogen has to be added as rate of decomposition of organic matter is slow.

– Nodulation may affect in some legumes.

– Sowing operations are difficult with ordinary implements.

Zero Tillage

It is an extreme form of minimum tillage. The primary tillage is completely avoided & the secondary tillage is restricted to seedbed preparation in the row zone only. It is applied where soils are subjected to wind & water erosion, timing of tillage operations is too difficult & requirements of energy & labour for tillage are too high.

The advantages of zero tillage are:

– Soils are homogenous in structure with a higher number of earth worms.

– Organic matter content increased due to less mineralization.

– Surface runoff is reduced due to presence of mulch. Several operations are performed by using only one implement. Weeds are controlled by spraying of herbicides.

The disadvantages of zero tillage are:

– More nitrogen is to be applied due to slower mineralization of organic matter.

– Large population of perennial weeds appears.

– Build up of pests is higher.

Stubble Mulch Tillage

The soil is protected at all times either by growing a crop or by crop residues left on the surface during fallow periods. It is a year round system of managing plant residue with implements that undercut residue, loosen the soil and kill weeds. Soil is tilled as often as necessary to control weeds during the interval between two crops. However, it presents the practical problem as the residues left on the surface interfere with seedbed preparation & sowing operations. The traditional tillage & sowing equipment is not suitable under these conditions.

Puddling

Puddling is ploughing the land with standing water so as to create an impervious layer below the surface to reduce deep percolation losses of water and to provide soft seedbed for planting rice. This followed in rice as the growth and yield are higher when grown under submerged conditions. Maintaining standing water throughout the crop period is not possible without pudding. It aims at destroying soil structure and separates individual soil particles i.e. sand, silt & clay, during operation and settles later. The sand particles reach the bottom, over which silt particles settle & finally clay particles fill the pores thus making impervious layer over the compacted soil. It is done with several implements depending on the availability of equipment and the nature of land such as spade, wetland plough, worn out Dryland plough, mould board plough, wetland puddler, country plough, etc. It consists of ploughing repeatedly in standing water until the soil becomes soft & muddy. Initially, 5–10 cm of water is applied depending upon the water status of the soil to bring saturation and above and the first ploughing is carried out after 2–3 days. By this operation, most of the clods are crushed and majority of the weeds are incorporated. Within 3–4 days, another 5cm of water is given & third ploughing is done in both directions. Planking or leveling board is run to level the field.

Conservation Tillage

It is disturbing the soil to the minimum extent & leaving crop residues on the soil. It includes minimum & zero tillage which can reduce soil loss up to 99% over conventional tillage. In most cases, it reduces soil by 50% over conventional tillage. Conventional tillage includes ploughing twice or thrice followed by harrowing & planking. It leaves no land unploughes & leaves no residues on the soil.

Text 3. Sowing of Seed – Methods of Sowing

Источник: http://www.agriinfo.in/?page=topic&superid=1&topicid=337

Methods of Sowing

The sowing method is determined by the crop to be sown. There are 6 sowing methods which differ in their merits, demerits and adoption. Those are: Broad casting, Broad or Line sowing, Dibbling, Transplanting, Planting and Putting seeds behind the plough.

Broad Casting

It is the scattering of seeds by hand all over the prepared field followed by covering with wooden plank or harrow for contact of seed with soil. Crops like wheat, paddy, Sesamum, methi, coriander, etc. are sown by this method.

Advantages:

– Quickest & cheapest method.

– Skilled labour is not uniform.

– An implement is not required.

– Followed in moist condition.

Disadvantages:

– Seed requirement is more.

– Crop stand is not uniform.

– Result in gappy germination & defective wherever the adequate moisture is not present in the soil.

– Spacing is not maintained within rows & lines, hence interculturing is difficult.

Drilling or Line Sowing

It is the dropping of seeds into the soil with the help of implement such as mogha, seed driller, seed-cum-ferti driller or mechanical seed drill and then the seeds are covered by wooden plank or harrow to have

contact between seed & soil. Crops like Jowar, wheat Bajara, etc. are sown by this method.

Advantages:

– Seeds are placed at proper & uniform depths.
– Along the rows, interculturing can be done.
– Uniform row to row spacing is maintained.
– Seed requirement is less than when ”broad casting” is applied.
– Sowing is done at proper moisture level.

Disadvantages:

– Require implement for sowing.
– Plant to plant (Intra row) spacing is not maintained.
– Skilled person is required for sowing.

Dibbling

It is the placing or dibbling of seeds at cross marks (+) made in the field with the help of maker as per the requirement of the crop in both directions. It is done manually by dibbler. This method is followed in crops like Groundnut, Cotton, etc. which are having bold size and high value.

Advantages:

– Spacing between rows & plants is maintained.
– Seeds can be dibbled at desired depth in the moisture zone.
– Optimum plant population can be maintained.
– Seed requirement is less than other methods are applied.
– An implement is not required for sowing.
– An intercrop can be taken in wider spaced crops.
– Cross wise intercultivation is possible.

Disadvantages:

– A laborious & time consuming method.
– Require more labour, hence increase the cost of cultivation.
– Only high value & bold seeds are sown.
– Require strict supervision.

Transplanting

It is the raising of seedlings on nursery beds and transplanting of seedlings in the laid out field. For this, seedlings are allowed to grow on nursery beds for about 3–5 weeks. Beds are watered one day before the transplanting of nursery to prevent jerk to the roots. The field is irrigated before actual transplanting to get the seedlings established early & quickly which reduce the mortality. Besides the advantages & disadvantages of dibbling method, initial cost of cultivation of crop can be saved but

requires due care in the nursery. This method is followed in crops like paddy, fruit, vegetable, crops, tobacco, etc.

Planting

It is the placing of vegetative part of crops which are vegetatively propagated in the laid out field. E.g.: Tubers of Potato, mother sets of ginger & turmeric, cuttings of sweet potato & grapes, sets of sugarcane.

Putting Seeds behind the Plough

It is dropping of seeds behind the plough in the furrow with the help of manual labour by hand. This method is followed for crops gram in some areas for better utilization of soil moisture. The seeds are covered by successive furrow opened by the plough. This method is not commonly followed for sowing of the crops.

Text 4. Mechanical or Physical Methods of Weed Control

Источник: http://www.agriinfo.in/default.aspx?page=topic&superid=1&topicid=2182

Mechanical or physical methods of weed control include the use of hand tools, implements and machinery operated either with the help of man power, or machine power to control the weeds. These are the costly and time consuming methods. However, these methods cause minimum damage to the environment.

Hand Pulling or Hand Weeding

Pulling the weeds by hand or hand weeding with the help of weeding hook is the oldest and most effective methods for control of weeds. Weeds can be easily uprooted after a good soaking irrigation or rain. Weeding should be done before flowering stage of weeds for avoiding seedling and further spread of weeds. Because as per the old saying. One year's seeding is seven years weeding. This is a costly and time consuming method.

Tillage

It is one of the most practical methods of destroying weeds of all categories.

– Deep Ploughing: Weeds are buried deep in the soil and also exposed to heat of the sun by deep ploughing. Many annual and perennial weeds can be controlled by deep ploughing and exposing the field to heat of the sun.

– Discing: It is helpful for cutting and burying of weeds. Harrowing with blade harrow is very effective for destroying newly germinated weeds before sowing of the crop.

– Interculturing: Interculturing with different types of hoes or mechanical weeders is useful to control weeds in between rows of the crop.

Mowing and Sickling

This method is used in lands, pastures, gardens and roadsides. The implementation of mower is used for cutting weeds. It does not destroy the weeds completely but prevents seed production by cutting growing parts. Cutting above ground parts of weed with sickle is called sickling and it prevents seed formation.

Flooding

It helps to control weeds like kans grass (Saccharum spontaneum) which grows luxuriantly in heavy ill drained soils during rainy seasons. The fields are embanked with tall bunds to impound water. The weeds get submerged under water and are smothered.

Burning

This method is adopted to destroy weeds in non-cropped areas like waste lands road sides, railway lines, bunds etc. The flame throwers and steam boxes are used for burning weeds in advanced countries. The flame should be so adjusted that it causes only wilting but not charring of weeds. Heat kills the living cells by coagulating the protoplasm and inactivating enzymes. The thermal death point (TDP) of most plant cells lies between 45 to 55 degrees Celsius (113 to 131 degrees Fahrenheit). Rabbing (or burning) is widely practiced to kill weeds seeds particularly from paddy nursery areas. It is not a good method, since the useful vegetation and organic matter is also destroyed along with weeds.

Digging

This method is useful for controlling perennial weeds like nut grass, hariali etc. Digging is very useful for removing the under ground propagation parts of weeds form the deeper layer of soil digging, hand collection and destruction of under ground parts of weeds is adopted when noxious weeds are observed in the patches in the field. It is not economical on large areas as it is a costly and time consuming method.

Mulching

The principle aim of this method is to cut off light and avoid all top growth of weeds. The organic mulches such as plant residues i.e Stubbles, wheat straw, rice hulls, sugarcane trash etc are spread in between crop rows from 5 tonnes/ha and thickness is about 10 to 15 cm. The inorganic mulches such as black or white polythene sheet is spread in between crop rows. However, it is expensive and used for high value crops only. The black polythene is more effective for controlling weeds.

Summer Fallow

This method is widely practised in dry farming areas. The land is ploughed after harvest of rabi crop and left without any crop in summer season. The underground parts of the perennial weeds are exposed to strong sunlight and destroyed.

Dredging and Chaining

These methods are useful for controlling aquatic weeds. Removing of weeds along with their roots and rhizomes from the water with the help of mechanical force is called dredging. The floating aquatic weeds are removed by changing. A heavy chain in pulled over the water bodies to collect the weeds.

The combination of mechanical and cultural methods is effective for minimizing the weed population.

Text 5. Intercropping

Источник: http://www.infonet-biovision.org/PlantHealth/Intercropping-and-Push-Pull

Intercropping is growing two or more crops at the same time in the same field. It is a practice often associated with sustainable and organic farming. It is commonly used in tropical parts of the world, particularly by small scale farmers in Africa, but it is far less widespread in the mechanised agriculture of Europe and North America.

In intercropping, there is often one main crop and one or more added crops, with the main crop being the one of primary importance because of economic or food production reasons. The two or more crops used in an intercrop may be from different species and/or different plant families.

The most common goal of intercropping is to produce a greater yield on a given piece of land by making use of resources that would otherwise not be utilised by a single crop. Careful planning is required, taking into account the soil, climate, crops, and varieties. It is particularly important not to have crops competing with each other for physical space, nutrients, water, or sunlight. Examples of intercropping strategies are planting a deep-rooted crop with a shallow-rooted crop, or planting a tall crop with a shorter crop that requires partial shade.

When crops are carefully selected, other agronomic benefits are also achieved. Lodging-prone plants (those that are prone to tip over in wind or heavy rain) may be given structural support by their companion crop. Delicate or light sensitive plants may be given shade or protection, or oth-

erwise wasted space can be utilised. An example is the tropical multi-tier system where coconut occupies the upper tier, banana the middle tier, and pineapple, ginger, leguminous fodder, medicinal or aromatic plants occupy the lowest tier.

Intercropping of compatible plants also encourages biodiversity, by providing a habitat for a variety of beneficial insects and soil organisms that would not be present in a single crop environment. This biodiversity can in turn help to limit outbreaks of crop pests by increasing the diversity or abundance of natural enemies, such as spiders or parasitic wasps. Increasing the complexity of the crop environment through intercropping also limits the places where pests can find optimal foraging or reproductive conditions.

There are some different variants of intercropping: mixed intercropping, row intercropping and relay intercropping.

Text 6. Mulching

Источник: http://www.infonet-biovision.org/PlantHealth/Mulching

Introduction

Mulch is dry, vegetative material used to cover the soil. It helps reduce evaporation and retain moisture, reduce soil erosion, suppress weed growth and provide plant nutrients as the material decomposes.

Mulch can be used in fields before and after planting, as well as around young crop plants. It is especially useful for high-valuable vegetable crops, and for growing crops in dry areas, during dry-season cropping, and in places where the soil is easily eroded by heavy rains. Where soil erosion is a problem, slowly decomposing mulch material (low nitrogen content, high C/N-ratio) will provide a long-term protection compared to quickly decomposing material.

Traditional banana mulching in Uganda Note: Mulch should be applied at least 60–90 cm away from the banana stem in order to encourage banana to have more vertical roots: when mulch is applied close to banana stem, it encourages development of more superficial lateral roots, which do not held the plant firmly against wind and exposes the plants to water shortage during short dry spell.

Advantages and disadvantages of mulching

What are the advantages of mulching? Mulch keeps the soil underneath moist longer than bare soil. It controls soil erosion by cushioning the impact of raindrops and by slowing runoff. Mulch suppresses weeds by shading them out. It leads to healthy crop growth.

What are the disadvantages? Mulching is labour-intensive. It can introduce new pests and diseases into a field. Mulch material may not be available.

How to do it:

1. Carry to the field the material you want to spread as mulch.

2. Spread it on the soil using your hands or a rake. Put a layer of mulch 7–15 cm (3–6 inches) deep all over the bed, or around the growing plants. Do not put on so much mulch that you bury the plants or shade them out.

Do's and Dont's:

Use dry plant material that does not rot quickly.

Don't use wet or green material as mulch.

Constraints of Mulching

Some organisms can proliferate too much in the moist and protected conditions of the mulch layer. Slugs and snails can multiply very quickly under a mulch layer. Ants or termites which may cause damage to the crops also may find ideal conditions for living. When crop residues are used for mulching, in some cases there is an increased risk of sustaining pests and diseases.

Damaging organisms such as stem borers may survive in the stalks of crops like cotton, corn or sugar cane. Plant material infected with viral or fungal diseases should not be used if there is a risk that the disease might spread to the next crop. Crop rotation is very important to overcome these problems.

When carbon rich materials such as straw or stalks are used for mulching, nitrogen from the soil may be used by microorganisms for decomposing the material. Thus, nitrogen may be temporary not available for plant growth (risk of N-immobilisation).

Risk of Nitrogen-immobilisation

When organic material is applied to the soil, the decomposing microbes multiply quickly. For growth, they need nutrients, especially nitrogen, like plants do. If the applied plant material does not contain sufficient nitrogen, the micro-organisms will take it from the soil. This process is called nitrogen immobilisation, as the nitrogen is fixed temporarily in the microbes and released only after some time. During this time, the microbes compete with the plants for nitrogen and the crop may suffer from malnutrition.

How to prevent N-immobilisation?

Old or rough plant materials should be applied to the soil at least 2 months before planting or sowing the main crop.

Nitrogen immobilisation can occur when the following materials are applied: straw or grain husks, material containing wood (e.g. twigs, saw dust), half rotten compost.

Text 7. Introduction to Organic Plant Nutrition

Источник: http://www.infonet-biovision.org/PlantHealth/Introduction-organic-plant-nutrition

An often quoted first rule of sustainable and organic agriculture is ”Grow a Healthy Crop” and proper nutrition and water are the foundations of crop health and therefore its pest and disease status. If there are shortages of particular nutrients, or the soil pH (acidity/alkalinity) is wrong, the crop may not be able to grow well.

Also, if weeds are not controlled they tend to outcompete vegetable crops for these valuable resources. Farmers should test soils for acidity and nutrients and then take steps to correct deficiencies and problems. An excess of nutrients can also have unwanted effects including stimulating weed growth. For example, if too much nitrogenous fertilizer is used on brassicas, they can become very soft and sappy and susceptible to sucking pests. Water can also have a major influence. Heavy rainfall or overhead irrigation can have positive effects in washing off pests such as caterpillars and aphids, but can have negative effects in encouraging fungal and some bacterial diseases.

In organic farming artificial fertilizers which can easily be dissolved in water are not allowed. Adding fertilizers that are easily dissolved in water can disable the soil micro-organisms. By adding water dissolved plant nutrients, plants absorb these salts whether they need them or not.

When plants are forced to absorb nutrients they do not need, they become unbalanced, less healthy and more prone to insects and diseases.

Calcium and magnesium also affect what we call soil pH, or soil acidity. Apart from being plant nutrients, these two elements are added when the soil is too acidic for plants to grow well. We put lime on the soil. Some crops like potatoes do not like very much lime.

Most of the time animal manure contains all the micro nutrients, but sometimes when the land on which animals graze is deficient in something, also the manure these animals make can have low content of some micronutrients. Composts and manures mostly contain all the plant nutrients needed.

Overview of plant nutrients

Nitrogen

Nitrogen is the element that plants require in greatest amounts. It is the most important-yet the most often deficient-element in plant growth worldwide. Nitrogen is essential to the photosynthesis and healthy cell growth and reproduction. It is vital in producing chlorophyll (which gives the leaves good green color) and amino acids. It also promotes shoot and leaf growth.

Nitrogen deficiency in maize causes yellowing of older leaves, progressing upward. In young maize plants, nitrogen deficiency causes the whole plant to be pale yellowish green with spindly stalks. In organic farming commercial nitrogen fertilisers are not allowed but legumes can be grown that fix nitrogen directly from the air at no cost except the seeds. Legumes seeds such as lucerne, beans, peas, clover, vetch and many others which fix nitrogen from the air are available. Many of them can be used for interplanting between various crops to help supply nitrogen. Also many legume trees can help fix nitrogen if planted in rows between crops.

To ensure the soil microorganisms are able to fix the nitrogen from the air, air must enter into the soil. If the soil has a hard surface and is compacted or eroded this cannot happen. So, a healthy soil must be soft and full of airholes. This is normally the case when the soil is shaded, mulched or covered with crops.

If the farm has animals it is a good idea to grow one crop of pasture like lucerne to cut for these animals. While growing, the legumes will fix nitrogen. Some will be used as animal feed. When ploughing in the legume before another crop a large amount will still be left in the soil to be used by following crops. This is then called green manure.

Phosphorous

Phosphorus is required for cell growth and plant reproduction, and is crucial for flower and fruit formation. Too little phosphorus can result in stunting, but too much can cause bitter flavor in crops. Symptoms of phosphorus deficiency are often mistakenly attributed to viral diseases.

Phosphorous is found in soil particles in animal manure and plant tissue. It is not easy to dissolve in water, so plants often miss phosphorous if the level of organic matter in the soil is low.

Healthy soil which is rich in organic matter contains some fungi called mychorrhiza which attach themselves to many plant roots and help the roots extract (pull out) phosphorous from the soil. The only plants that do not have mychorrhiza on them in organic soils are plants from the cabbage family. In conventional soils mychoirrhiza are often either absent

or very few, as they do not develop with large amounts of added phosphorous salts in the soil. Mychorriza are very useful microorganisms, and need to be fed properly with organic material to digest.

Potassium

The above table shows very large uptake of potassium by many crops. Plants take up large amounts of potassium when available because they can, not always because need it. But plants do need potassium in fairly large amounts. Potassium can easily move within the plant, so symptoms of deficiency will appear on old leaves first as the plant tries to continue growing. So, old leaves will start getting yellow spots followed by wilted leaf margins and tips. Sometimes the leaves start curling up. Potassium can be found in wood ashes, plant tissue, urine and manure. The African soils do not have large amounts of potassium, as it easily washes out with rain. Potassium (K) is needed by plants in fairly large amounts.

Calcium

Calcium is needed for cell division and plant growth. Its buffering characteristics are critical to soil balance and largely determine the availability of other nutrients. Lack of calcium results in yellow or pale leaves, and causes blossom-end rot on tomatoes and peppers. A deficiency in beans causes yellow leaves with curling margins, stunted plants, and blackened, dying shoot tips. Deficiency causes brown-tipped leaves on cabbage, forked roots in beets, and unusually small potatoes.

Micro-nutrients

Unless soils are deficient in one or more micro nutrients, organic farmers do not need to over worry about them. If enough organic waste is returned to the soil, also the micro-nutrients are supplied. Deficiencies are common, for instance all Rift Valley soils in Kenya are more or less deficient in copper. If organic waste is used this is not easy to see, but conventional wheat and barley farmers have to treat their seeds and later on spray copper onto the crops to be able to harvest good yields. Selenium is another mineral that can sometimes be deficient.

Selenium deficiency has an impact on fertility of animals, so if the deficiency is serious, the animals will have trouble becoming pregnant.

Text 8. A Hydroponic Medium

Источник: http://www.wisegeek.com/what-is-a-hydroponic-medium.htm

Hydroponic gardening involves the use of water and other materials instead of soil. The materials, known as hydroponic media, usually in-

clude specific nutrients to foster plant growth. A hydroponic medium can be anything such as sand, rockwool, vermiculite, perlite, or coconut coir, along with components to support the plants.

According to gardening sources, a hydroponic medium offers several benefits compared to soil-based gardening. Plants in this soil-less method tend to grow faster than plants grown in the traditional way. A hydroponic growing medium is designed to allow more oxygen to enter a plant's root system, thereby making it easier for it to absorb adequate water and nutrients. In hydroponic gardening, the medium combines the nutrients and water to feed a plant so that it doesn't have to rely on soil. Similar to soil-based plants, hydroponic plants must also be placed in an area of sunlight and mild temperatures as well as receive adequate amounts of water.

Materials used to set up a hydroponic gardening system include pots, growing cubes, or blocks. Grow rocks such as shale may also be added to aerate a plant's root system. Components such as wicks, pumps, reservoirs, and drainage systems move the nutrients throughout a plant and its roots. A hydroponic medium, such as sand, rockwool, vermiculite, perlite, or coconut coir, often follows.

Beach sand works well for certain types of plants like orchids. Gardening experts note that wet sand helps some orchid species to grow. Sand usually drains well compared to clay-based soil, and it is easiest to use as a hydroponic medium. Horticultural rockwool comprises of limestone and volcanic rock. This hydroponic medium usually comes in the form of blocks and cubes with pre-drilled holes that allow for seed and plant placement, and its porous consistency allows for adequate plant water drainage.

Vermiculite consists of pebbles that help circulate water and nutrients through a plant. Vermiculite holds more water than most other hydroponic media and should be used with moisture-tolerant plants. In hydroponic gardening systems, vermiculite makes it easier for water to move through the pumps via capillary action. Perlite also can be obtained as pebbles that resemble glass beads. This particular hydroponic medium holds air quite well and also helps the pumps used in hydroponic gardening process oxygenate the water that feeds a plant.

Known as one of most popular hydroponic solutions, coconut coir works as an organic nutrient in soil-less plant growth. It consists of coconut husks that get transformed into blocks of fibrous material for grow-

ing vegetables, tree plants, and ornamental flowers. Properties of coconut coir include a high water-holding capacity, an excellent balance of water drainage and passable air, and sufficient amounts of phosphorous and potassium for healthy plant growth without soil.

Text 9. Key Aspects of Growing in Soilless Substrates

Источник: http://www.netafim.com/Greenhouse_Technology/growing_methods

The Advantages

The advantages of growing in soilless substrates are enhanced control of water and fertilizer applications, optimal moisture in the substrate, optimal nutrient supply, significant advantage in disinfecting between growing periods, water recycling enables reduced expenses, environmental solution, excellent alternative when soil is not suitable for growing crops due to salinity, drainage problems, etc.

The Limitations

The limitation are low root volume, low nutrient storage, trace elements — important to control, low buffering capacity, fast changes in pH and salinity control.

The Ideal Substrate must have the following properties

High water capacity and mobility, high air content, light weight, stable, high capacity to supply nutrients, non-salinity.

To make efficient use of a substrate, it is necessary to be familiar with its physical and chemical properties; and to enable optimal irrigation and fertilization interface applications.

Physical Properties

The Physical properties are air/water ratio, water content, air capacity, specific gravity, volume weight.

Chemical Properties

The Chemical properties include EC, pH, mineral content and exchangeable cation capacity.

Substrate Types

Substrates can be divided into two main groups of inorganic and organic types.

Inorganic Substrates

Some inorganic substrates are inert. They do not decompose, are not chemically active, have low buffer capacity and exchangeable cation content, and contain no organic material that enables micro-biological

activity. Chemical changes are quick, necessitating intensive irrigation and fertilizer control. This group includes rock wool, perlite, Styrofoam and sponge.

Mineral substrates that react chemically, absorb and release nutrients, have a medium buffer capacity, and are therefore involved in plant nutrition. This group includes volcanic ash, pumice and vermiculite.

Organic Substrates

Composed of organic materials that absorb and release nutrients to plants, have relatively high buffer capacity and exchangeable cation content compared to inert materials. Chemical changes are slower, requiring less intensive control. This group includes coco peat, peat moss, composts and other organic mixtures.

Growing Containers

There are different growing containers. They are buckets, foamed polystyrene containers, continuous polypropylene containers, gutters and grow bags. The system drainage capacity is crucial to ensure the best air/water ratio for a crop. This is applicable to all types of substrates. Therefore, it is essential to utilize maximum height and length of the container type and ensure installation on the most suitable slope.

Selecting a Container

Allowance for resistance to chemical and steam disinfection processes must be made when used in greenhouses. Containers must be made of UV radiation resistant material. Most soilless substrates require relatively high and frequent irrigation applications to balance the air-water ratio. It is critical to ensure that spacing between drippers is relatively small, and that low flow rates and anti drain properties are maintained.

Text 10. Greenhouse Technologies – Irrigation

Источник: http://www.netafim.com/Greenhouse_Technology/irrigation_nutrition

Netafim's greenhouse irrigation systems' portfolio comprises a wide range of sensors and equipment for determining a plants' water requirements including: Light, measurments, tensiometers, capacitance sensors, lysimeters and meteorological stations.

Designing greenhouse irrigation systems based on water and nutrient plant demands:

– Accurate water and nutrient applications will affect plant growth and development.

– The system enables the grower to adjust water and fertilizer applications according to changing plant needs.

– Operating accuracy, reliability, functionality and convenience are the main pillars of Netafim's irrigation systems.

Netafim Greenhouse Irrigation Systems are world renowned for their accuracy, reliability and flexibility. Irrigation system design and its components are usually determined according to the grower's strategy which is generally in accordance with the quality required by the market.

Irrigation strategy is determined by:

– Climate conditions, substrate properties.

– Plant development status, water quality.

Text 11. Greenhouse Technologies – Heating

Источник: http://www.netafim.com/Greenhouse_Technology/heating

Currently, the energy cost is high. Therefore the concept adaptation of suitable heating system is highly important.

In some regions, heating is a costly requirement. Consequently, Netafim company has put much effort into optimizing the utilization of the resources used for heating, taking into consideration the following factors:

– Accurate and efficient temperature and humidity control.

– The heat supply must be suited to the plants' requirements.

– The heating system must be suited to the energy sources available in the region.

– Uniform heat dispersal in all the greenhouses.

During the heating-system design stage, Netafim calculates the required heat supply, and based on this calculation determines the size of the burner, the boiler and the heat dispersal system.

Greenhouse heat requirements are determined by:

– Crop heat requirements.

– Minimum means temperature in the region.

– Expected heat loss from the greenhouse.

To estimate heat loss, Netafim takes into account:

– Covering properties.

– Volume of air exchange.

– Greenhouse structure and shape.

– Temperature differences between the exterior and interior of the greenhouse and air exchange.

– Wind velocity.

Two heating options:

– Heat dispersal by hot water, (steel or aluminum pipes).

– Heat dispersal by hot air (polyethylene sleeves).

Hot Water Method

This heating method is partly based on direct radiation, in which parts of the plant receive direct radiation from the heating pipes.

The water temperature is normally controlled by 3–4-way valves, which control the ratios of hot and cold water. The system enables the establishment of a continuous temperature regimen, with few fluctuations. Another advantage is that heat dispersal inside the greenhouse is uniform. Control and command are carried out by the central system computer.

Conducting the water in steel pipes is also a convenient method for transporting trolleys over the pipes, thus improving efficiency.

Hot Air Method

The burner causes combustion in the burning cell. Heat thus produced is ejected and passes over the external walls of the burning cell by radiation and convection.

Cold air passing over the burning cell is sucked into the greenhouse cavity, is heated and is then released through the sleeves into the greenhouse.

The air circulation process is executed by a centrifugal blower operated by electric motor. Heat in the greenhouse is dispersed through a system of perforated sleeves.

Text 12. Greenhouse Technologies – Cooling

Источник: http://www.netafim.com/Greenhouse_Technology/cooling

Technically, three methods are used for cooling and reducing greenhouse temperatures:

The first one is air exchange between the air inside the greenhouse and the outside atmosphere.

This exchange is accomplished either passively through roof and side vents, or actively by operating ventilators that increase the rate of air exchange when natural air exchange is insufficient for the plant's requirements.

The second method is adiabatic cooling, which increases the humidity while lowering the temperature inside the greenhouse. Coolnet foggers or wet pads are used for this process.

A Coolnet system

A super-fine mist sprayer is highly suitable for rooting. It does not wet crop leaves and operates at accepted working pressures.

This system delivers an ultra-small drop size of 80 microns at a pressure of 4 bars. Used in extremely short water bursts, it can reduce the ambient temperature by 5–10 °C (depending on atmospheric conditions, relative humidity and/or temperature).

– Acid resistant.

– Fogs at any pressure.

– Can be used for chemical applications.

The Coolnet's complete system includes Coolnet emitters with micro-sized droplets of 80–90 micron at 4 bar, an AD (anti drainage) valve, fans and a pipe system for water supply.

A Wet Pad System

The wet pad system includes a wet pad, fans, a pipe for water dispersion over the wet pad, a submerged pump, a water tank and a pipe system for water supply.

The third method of cooling is reducing radiation penetration which uses stationary or movable shade screens. Radiation causes the greenhouse space to heat up (the greenhouse effect). By reducing the intensity of radiation penetration, the heat inside the greenhouse is decreased. Radiation reduction also cuts down light penetration, essential to the plant's photosynthesis process. This conflict can be optimized by using moveable screens operated automatically or manually, and/or screens with relatively low shading percentages.

The shading rate can be adjusted to between 20 % and 80 % depending on climatic conditions and type of crop. House plants, for example, will have relatively high shading levels in comparison with vegetables.

The most common shade screens are black. However, it was recently found that by Colorshadenets, which change the light spectrum while retaining the same level of shading, can reduce radiation penetration and influence morphological changes in a large range of plant varieties.

Text 13. Greenhouse Technologies – Water Recycling

Источник: http://www.netafim.com/Greenhouse_Technology/drainage_ water_recycling

Growing crops in a soilless substrate appears wasteful in terms of water and fertilizer because in order to properly flush the substrate, it is

necessary to apply 30–50 % more water than the evapo-transpiration rate (plant requirements).

However, it is possible to recycle drainage water, but in order to recycle this water, it must first be possible to collect and store it.

Recycling technologies offer several advantages: significant water and fertilizer savings (50–70 %), enhanced quality yields, (as the result of increasing water applications), improved availability of nutrients and more efficient flushing, which reduces ground water contamination and ecological damage in agronomic regions.

Key Challenges

Chemical Aspects

The water source contains chloride and other elements, very little of which is absorbed by the plant.

Thus in a closed system, chloride will accumulate over a period of time.

When it exceeds a certain concentration, depending on the sensitivity of the crop, it can adversely affect the crop. Different plant types react differently: tomatoes are considered to be relatively resistant, while roses are considered sensitive.

Phyto-Pathological Aspects

Localized infection from fungi, bacteria, nematodes, and viruses can spread in the system and potentially cause swift contamination of the plant population.

Recycling Methods

– Collecting drainage water from a soilless substrate, and using it to irrigate an adjacent crop grown in soil (open system).

– Recycling drainage water in a closed system; with or without disinfecting the drainage water.

– Recycling drainage water diluted with rain water or with desalinated water.

Five Common Disinfection Methods

Biological Filter

A biological filter composed of a corrugated tank filled with sand or volcanic ash (2 mm) enables drainage water solution to trickle through the filter at a given rate. A population of beneficial microorganisms which develops in the biological filter destroys pathogens. The main problem is clogging, which will result in changes in the flow rate.

Chlorination

By injecting chlorine gas into the drainage water, disinfection effectiveness depends on water turbidity, the concentration of active chlorine, duration of contact and the acidity of the treated water (optimal pH: 5.5–6.5).

A concentration of 3 ppm for 30 minutes has been found to be effective in exterminating a wide range of pathogens, including viruses. Chlorine residue control is required, because a concentration of 1 ppm chlorine remaining in the water after chlorination can be harmful to the plants. It is necessary to wait until the residual chloride decomposes after this treatment.

Hydrogen Peroxide O2H2

Hydrogen Peroxide is used as a very effective disinfection agent because of its strong oxidation effect by degrading to H2O (Water) forming free radicals O, degrading complex organic chemicals. Hydrogen Peroxide fully and easily dissolves in water with no toxic residues and does not depend on specific pH or temperature.

In reaction with UV radiation, Hydrogen Peroxide forming OH (Hydroxyl) free radicals named Photo Fenton effect.

UV Irradiation Disinfection

When drainage water is irradiated with UV radiation, the intensity of the treatment depends on the lamp voltage selected according to the type of pathogen. The effectiveness of the treatment depends on the degree of water turbidity that may necessitate initial filtration of suspended particles. UV radiation also breaks down various chelates, so after disinfection, it is necessary to add microelements, such as iron, to prevent shortages. It is necessary to constantly clean the UV lamps as dirt tends to reduce disinfection efficiency.

Heat Disinfection

Drainage water can be heated to high temperatures via a heat exchanger and heated to 90 °C for 30 seconds or to 85 °C for three minutes in order to exterminate all pathogens. A temperature of 60 °C for a period of two minutes is effective only against bacteria, fungi and nematodes. Before using heated water for irrigation, it must be once again put through a heat exchanger to cool it down. This method is considered highly efficient and poses no danger to plants; however it requires a considerable investment in energy.

Text 14. How to Grow Potatoes: Location, Seasons, Climate and Organic Soil and Fertilizers

Источник: http://www.countryfarm-lifestyles.com/growing potatoes.htm l#How_to_Grow_Potatoes:_Location_Climate

Location

To grow potatoes, look for a sunny location either in hills or ridges. Growing potatoes in hills is the more common way of growing. If planted

in hills, they should be from three feet to three and a half feet apart; the distance will depend on the variety of potatoes planted. If you are growing your potatoes in ridges or drills, these can be made from two and a half to three feet apart; although some of the earlier and smaller potato varieties may be successfully grown at eighteen or twenty inches.

Seasons and Climate

The best climate for growing potatoes is a mild climate where daytime temperatures are between 16–20 degrees Celsius. Potatoes should be planted during spring and early autumn in cool, mild regions. If you have harsh winters then plant the tubers out 4–6 weeks before the final frosts into early spring. If you are going to grow potatoes in the subtropics in the southern hemisphere you can grow potatoes all year around if you live in a frost-free zone, but you are better off growing them only from January to August.

How to Grow Potatoes in Good Organic Soil

The best soil for growing potatoes is a light and sandy one allowing the potatoes to develop freely, without a heavy clay soil where they won't do well at all. When the soil is wet or clayey, they are very likely to get diseased and the quality of the potatoes grown in such soil is very inferior. On soils which have been long cropped and heavily manured, they also rarely succeed well. They like a soil with a pH of about 5.5. Avoid growing potatoes in very alkaline soils, or on soil that has recently been limed as the lime and the alkalinity levels will encourage the growth of scab disease. Also avoid growing potatoes in places where the area was limed in a previous season for growing brassicas.

How to Grow Potatoes using Organic Fertilizers

The less manure that is used when growing potatoes, the better the flavor; and the potatoes will also be much less affected by disease. Therefore, it is not advisable to apply a lot of manure. What you can include are barnyard and stable manures, leaves, leaf mold, peat-charcoal, and other carbonaceous substances, lime, gypsum, or plaster, (if necessary, you need enough just to get the pH levels right), and bone.

Wood ash is useful in supplying potash and other inorganic substances required by potato plants; and they may be advantageously applied where the soil contains a large amount of decayed vegetable matter. The same remark will also apply to lime, which is useful in destroying slugs and other vermin, which attack the tubers. Crushed bone and super-phosphate of lime are best for humid soils.

Text 15. Harvesting Potatoes and Storage

Источник: http://www.countryfarm-lifestyles.com/growing-potatoes.html #How_to_Grow_Potatoes:_Location_Climate

Crop Yield

When growing potatoes it is important to know how many potatoes will you get from each plant. Well, this differs greatly from one potato variety to the next. However, you can expect between 1–2 kilos of potatoes per plant for early varieties and 3–4 kilos of potatoes from your main crop.

There are some growers who practice removing the flowers from the potatoes as soon as they appear in order to improve the size and number of their potato crop. It helps the plant to stay green for longer time allowing the potatoes to continue to grow.

Harvesting Potatoes

The early varieties should be dug when they are a suitable size; which, can start when they are new potato size. This means that potatoes can be harvested 12–20 weeks after planting. The practice of partially removing the soil from about the roots, and gathering the largest tubers, leaving the smaller ones, with the expectation that they will get bigger is not a good idea, as the potato will not take kindly to the invasion. It is far better to take the little potatoes and leave the bigger tubers to carry on growing.

Harvesting potatoes takes place after the plant has flowered; the leafy parts turn yellow and the plant tops start to die down. If you find that the weather is good, there is no fear of disease and the ground moist the tubers can stay in the ground another week before you start cropping, as they will increase in size during this period.

Late potato growing varieties usually make up the main crop, and it's these that require most care when digging up and storing. So long as the plants are green, the potatoes should be allowed to remain in the ground; as this is quite indicative that the tubers are not fully mature.

Just take care when digging up your potatoes. Many a potato has been ruined by an impatient gardener using a spade. It is better to use a fork and try and lift the soil a little way away from the main plant so as not to damage the tubers.

If you do end up damaging the tubers, these should be eaten first.

Storage

When growing potatoes in bulk, you will need to think about how and where you are going to store them. The most important thing is mak-

ing sure that you don't expose them to light. Again, if you do they will become green and poisonous.

Therefore it is important that potatoes are kept in a dark spot on the same day that they have been dug up. Never let potatoes dry off in the sun after they have been removed, but they should be dry before they are stored. The vegetables should be stored in boxes in a dark cellar, free from rodents.

When storing potatoes in your kitchen, never store potatoes near onions, as the gases they each emit will cause the degradation on one another.

The ideal temperatures for storing potatoes are 40–45 degrees Fahrenheit (4–7 degrees Celsius) with 90% humidity. Storage temperatures below 38 degrees Fahrenheit (3 degrees Celsius) tend to make potatoes sweet through a change of some of the starch to sugar, and this is not what you want.

If you find that your potatoes have been stored at a temperature lower than optimal then you can rectify this by keeping them at a temperature at 70 degrees Fahrenheit (21 degrees Celsius) for about 2 weeks before using.

ПРОФИЛЬ: Защита растений – программа ”Интегрированная защита растений”

Text 1. Importance of Integrated Pest Management and Plant Protection

Источник: http://cacilm.org/en/technologies/section/ipm

The independence established in the Central Asian countries in 1991 opened up the opportunities for many residents to work on the land and become farmers. Often, the new farmers were interested in greater yields, in food security of their families, or higher profits. Targeting at higher yields, they have not paid much attention to the rational use of resources, the land in particular. Until now the land users apply different pesticides, fungicides and herbicides to combat pests and diseases. This resulted in high resistance of pests to pesticides, and in the vast habitats of pests that dominate the beneficial species. As a consequence, growers had to apply more chemicals, and therefore spend more.

The use of insecticides and the crop management practices lead to almost complete destruction of pest populations. However, the few surviving individuals are able to restore the population again and pass their descendants the ability to resist poisoning and death. Other important changes occur in populations when they merge with the other ones, or when the new species – workers – enter the population. Many insects behave as dangerous pests of agricultural crops since there are no former predators and parasites at the new location. At the same time, in nature, there are certain relationships between living organisms, so as the insects cannot propagate out of control and cause therefore damage to crops. Pests are destroyed by a large number of predators.

The development of environmentally friendly methods of plant protection, the biological control in particular, is nowadays given special attention. In Central Asian countries the biological method is used to protect field and greenhouse crops. In all provinces of Uzbekistan the biolaboratories under the plant protection stations provide farmers with pure cultures of microorganisms and natural enemies, as well as provide methodological guidance on the use of biological control methods.

However, until now the share of environmentally friendly methods applied in the fields and gardens of Central Asia is not significant. This gap can be improved by introducing the experiences from the developed countries and especially the United States and Canada.

Presently, biological control in plant protection has to be enriched by new non-chemical methods of suppressing the pest population, whilst the role of biological control among various methods of pest control has to be enhanced as well.

History

People have attempted to use certain organisms to fight the other ones for a long time. Ants were used to combat the pests of citrus plants; similarly the bird myna imported from India was used to combat red locusts on the island of Mauritius. People repeatedly used to spread the predatory beetles in different countries.

The first scientific experiments on biological control methods have been conducted in the late seventies – early eighties XIX century. Ilya Mechnikov, famous Russian zoologist, discovered the pathogens of fungal and bacterial diseases of grain beetle, and conducted a series of experiments on the use of agents of green muscardine and founded the prospects for the practical use of pathogens.

Since the 1970s the Soviet scientists have carried out the reproduction of three types and 15 interspecific forms of trichogramme at 16 industrial biocontrol laboratories of the Ministry of Agriculture. The different forms of Trichogramma evanescens have been used against winter, cabbage and other types of noctuids of winter cereals, sugar beet, cabbage and potatoes. This progressive method was largely applied in Uzbekistan in more than 3 million ha. A large group of scientists and agricultural experts of that time was awarded the prizes for the development and implementation of biological control in the country.

Uzbekistan has developed and is currently implementing measures to introduce an integrated system of plant protection with pesticides safe for humans and animals. A network of biological laboratories and biofactories (total 809) with improved entomological services has been established in provinces throughout the country.

In the United States, Japan and in Europe there are large firms in the sphere of "biological control" – Valent Bioscience, Certis, Koppert Biological Systems, Biobest and many smaller companies. Jointly they produce about 90 agents of biological protection of more than $ 100 million dollars a year.

Today, the biological method is considered as part of an integrated pest management system (IPM), which is used together with the other measures to combat pests. The biological control products are produced out of beneficial microorganisms and their metabolic products that cause disease and mortality of pests.

Text 2. Biological Control Method in Plant Protection

Источник: http://cacilm.org/en/technologies/section/ipm

The biological method of pest management (biological control) is based on the use of parasitic and predatory insects (entomophages), as well pathogens to suppress, restrict or prevent mass reproduction of harmful species.

Initially, parasitic and predatory insects, entomophages, have been used, which were then followed by pathogens (bacteria, fungi, viruses) — the causative agents for plants.

Crop protection from pests, diseases and weeds has to combine a variety of agronomic, chemical and biological methods. However, the crop management and biological control methods shall have a priority and thus gradually replace the chemical measures.

Biological control may include a number of techniques to reduce the number of unwanted organisms with the help of other species (animal predators specialized herbivorous species or parasites), by sterilizing male pest species that displace males capable of reproduction (genetic method). Close to the biological control are the agronomic and microbiological methods, the former utilizes crop management practices, the latter uses microorganisms to combat pests.

Biological pest control means balancing the pest populations by means of natural factors and human intervention. The method should imply knowledge of the environment and functioning of ecological systems. It is important to understand that the biological agents are not designed for the complete extermination of pest population, but only to control its density and reduce the damage to an acceptable level.

Natural Enemies in Biological Control Method

The fauna of pests (insects and mites) threatening agricultural crops in Central Asia – is rich and diverse. The largest number of pests belongs to the order of mites, beetles and lepidopterous insects.

Natural enemies of insect pests are divided into several groups: predators, parasites, pathogens and nematodes.

Well-known predators – spiders, ladybugs, ground beetles, dragonflies, lacewings and hoverflies – hunt or set traps to catch their prey. They feed on a variety of insects. Both the adult insects and larvae may be predators. Predator population corresponds to the population of pests. They lay more eggs when prey is abundant.

Parasites are those organisms that live and develop inside other insects. Parasites of tomato are Trichogramma, braconides (Braconidae), ichneu-

mon wasps (Ichneumonidae) and flies. The parasites attack only one type of insect or their close relatives. Larvae only are parasites. One or more parasitic larvae develop on or inside the host. Parasites are often smaller than their hosts. Some parasites (e.g. Trichogramma), lay their eggs in pest eggs, others lay their eggs in the body of caterpillars or larvae as most of the ichneumon – gold wasps and tachina flies – do. Caterpillar continues to live and eat, together with the egg and later larvae, which ripen it.

Pathogens are fungi, bacteria or viruses that infect and kill the insect. For breeding, they require special conditions (such as high humidity, some sunlight). Most pathogens are specific for certain groups of insects, or even for a particular life stage of the insect. The most well-known pathogens are Bacillus thuringiensis (Bt) and virus NPV.

Nematodes are very small worms. Some types attack plants like root nematodes. Others, so-called entomopathogenic nematodes attack and kill insects. Entomopathogenic nematodes are usually effective against pests living in the soil or in wet conditions. The nematodes like Steinernem are also useful in pest control.

The most famous entomophages are ichneumon wasps, lacewing flies (Chrysopidae), tachina flies, earwigs, snakeflies, assassin bugs, and ground beetles.

Prerequisites

Role of entomophages in nature can be enhanced by use of plant resources. Plants serve as a shelter and a source of additional food for insects like flower pollen and nectar, which are absent in monoculture systems (cotton, wheat, rice, etc.).

For successful wintering of entomophages the presence of certain trees is of particular importance. A cracked bark of mature trees like mulberry, plane trees, apricot, is a place where insects gather for wintering. Feeding on nectariferous plants increases the life expectancy and fertility of many entomophages.

Insects are closely related to forage crops: it is both a habitat and a food source for them. Therefore, through plants it is possible to change the relationship with the different types of entomophages and thus enhance the effectiveness of the biological plant protection.

The natural enemies, besides food, need in sun-protected, shady, wet habitats and plants, suitable for egg laying.

Advantages

In future, biological control takes an important place in the integrated pest management system. As compared with the chemical method, it

has a number of advantages: lower energy costs; helps reduce chemical impact on the environment; does not lead to contamination of agricultural production and the environment; does not disturb the ecological balance; harmless to humans and farm animals, and bees and other natural enemies; high number of entomophages and entomopathogens able to independently reduce the number of pests to a level so as they do not cause considerable damage to crops; long lasting effect.

Disadvantages

The ecological foundations of biological control are poorly studied. The studies of the biogeocenosis are difficult, time-consuming, costly, and require the precision instruments. Relationships in ecosystems are very complex and multifaceted. Thus, there are still many unsolved problems in this area of science. Currently the biological control research focuses on conditions that determine the effectiveness of natural enemies of pests and methods that regulate relations between them.

Principles

Pesticides destroy a life cycle chain and create favorable conditions for uncontrolled reproduction of pests. The natural enemies-predators are killed at first: they live openly and do not hide as pests do. When applying pesticides, farmers kill their own allies and then face the problem of protecting their gardens and fields.

The live fences, plantings around the canal, and tree plantations are the habitat for a large variety of pests and natural enemies, where they live in equilibrium. Natural enemies kill the pests, thus preventing them to multiply out of control, but at the same time, they never kill them completely, maintaining its own population at a high level.

If pests become suddenly abundant in the garden, entomophages are ready to move to the crop plants and help the farmer to cope with this disaster. First, the number of pests increases, and only 2–3 weeks after, the number of predators and parasites grows in response to an increased amount of food, i.e. pests have 2–3 weeks for uncontrolled reproduction.

Text 3. Additional Techniques in Biological Control and Pest Management

Источник: http://www.cacilm.org/en/technologies/section/ipm/recommendations

In addition to the biological method, there are other methods to control the population of pests. For example, the mechanical control can be applied.

The Net House

Cultivation under the ”net house” is of great interest. The net house, or cell for insects, is a wooden frame covered with netting, and which is slightly higher than the height of tomato plants. Though the mesh prevents insects from flying inside, it cannot however protect against soil-living insects, e.g. turnip moth. Typically, the grid house is placed above the greenhouse to protect from caterpillars, aphids or whiteflies. The net house can be of 2–3 meters in height. It can be used both in greenhouses and in the open field. For stronger protection the net house should be correctly installed and completely sealed. The technology requires considerable initial costs, but it reduces the use of pesticides and implies multiple use when carefully and properly installed and maintained.

Using the Traps

There are several types of insect traps. Most traps are intended for adult insects.

Pheromone traps contain adhesive flat dish and a small tube with a chemical solution – pheromone. Pheromone is a secreted or excreted chemical, a small amount of which has a strong influence on the behavior of individuals. It is usually secreted by females to attract males for mating. Males fly to pheromone traps and get into a sticky dish. There are pheromone traps designed for specific pests, e.g. Spodoptera sp. and the cotton bollworm Helicoverpa.

Deep traps are plastic or glass jar, half-filled with soapy water and placed in the soil. These traps are good for catching crawling insects such as earth beetles. The traps are designed to observe the degree of insects' activity at night or daytime.

Yellow sticky traps are the plates, painted in yellow and smeared with a sticky or greasy substance. They can be made of yellow plastic bottles from the engine oil and lubricant. The yellow color attracts moths, aphids, leaf beetles and whiteflies. This trap is used more for monitoring population density and, to a lesser extent for control.

Light traps usually have light bulb and adhesive flat bowl or jar with water or other liquid. Insects, especially active at night, fly to the light and stick to the adhesive dish or fall in a bowl with water and die.

The Use of Mineral-based Pesticides

Ash is a traditional means to combat and control insect pests. It protects the leaves from chewing insects. For this ash is crushed and spread evenly. In greenhouses ash is used against ants.

In addition, after watering, ash acts as a fertilizer. Wood ash is known as a source of potassium and is often used to fertilize the soil. Unleached wood ash contains about 5% potassium in the form of potassium carbonate, which is alkaline, and helps raise the pH level of the soil.

Use of Insecticidal Plants

Because of chemical compounds – alkaloids, glycosides, esters and essential oils – so called insecticidal plants have the toxicity for insects and causative agents of disease.

Numerous wild and cultivated plants can be used for protection: marigolds, black henbane, hemlock spotted, white mustard, Datura ordinary, Calendula, potatoes and tomatoes (tops), Burdock, onion, Taraxacum officinale, field sow thistle, cayenne pepper, Parsley sown, Wormwood, camomile, Tobacco, Yarrow, horseradish, garlic, sorrel.

You must take precautions against when working with insecticidal plants!

Text 4. ATTRACAP®: Protection against Wireworms in Potato

Источник: http://biocare.de/attracap-e/

ATTRACAP® are granules aimed at limiting the infestation of wireworms (Agriotes spp.) in potato cultivation in the event of low and average infection. ATTRACAP® has been approved in Germany for distribution and use in accordance with art. 53 of the Regulation of the European Parliament and the European Council (EC) no. 1107/2009 in the period from 15 February 2017 to 14 June 2017. The product is intended to be used for potato cultivation only in areas threatened with infection on approx. 5,000 ha.

In recent years there has been a significant increase of economic losses caused by Agriotes spp. infection in potato cultivation. Agriotes spp. larvae bite deeply into potatoes. Apart from feeding damages, their susceptibility to fungal and bacterial infections, such as Dry Core, is increased. Quality is decreased to an extent that makes marketing of the crops partially impossible. A low damage threshold, at the level of 5% in the case of fresh market potatoes, results in high economic losses for the farmer even at a low level of infestation.

ATTRACAP® manufactured by BIOCARE is a modern biological insecticide developed within the BLE ”ATTRACT” project (project no.: 2814702011) and EU ”INBIOSOIL” research project (project no.:

282767) with participation of Prof. Dr. Vidal, Uni Göttingen, and Prof. Dr. Patel, FH Bielefeld, and their research teams. ATTRACAP® contains both an attractant (CO2) for Agriotes spp., and a fungus isolated in Germany – Metarhizium brunneum – with entomopathogenic properties. This fungus occurs throughout the world in the soil and it is commonly applied in biological control agents. After the granules absorb moisture from the soil, the production process of the attracting agent and the growing of the fungus spores out of the granules begin. Attracted Agriotes spp. are infected after contact with the fungus and they die after several days depending on temperature and soil conditions.

Capsules are spread directly during planting using a spreader for granules checked by JKI and mixed into an open furrow. Depending on weather and region this takes place between March and the beginning of May.

Text 5. Tomato Diseases Guide – Bacterial Wilt

Источник: https://seminis.co.uk/information/disease-guides/tomatoes/bac terial-wilt-3/

Causal Agent

Ralstonia solanacearum. Five races have been reported.

Distribution

It is distributed worldwide (subtropical and tropical areas).

Symptoms

Symptoms begin as drooping of the lower leaves, followed soon after by wilting of the entire plant. No foliar yellowing is associated with this wilt disease. When the stem is cut a slimy, gray exudate oozes from the cut end. A longitudinal section of the stem reveals a yellow to light brown vascular discoloration which later turns darker brown and/or hollow as the disease progresses. A quick aid to diagnosis is to place a freshly cut stem piece in water. A white, milky stream of bacteria will ooze from the cut stem.

Conditions for Disease Development

This bacterium has a host range of greater than 200 plant species, which it can infect and survive on. It can also survive in the soil where it infects roots through natural wounds caused by the formation of secondary roots, or through wounds caused by transplanting, cultivation practices or nematode feeding. Chewing insects may also transmit the bacterium. It can be spread in irrigation water, in soil on cultivation equipment and in

diseased transplants. Warm (29–35 °C, 84–95 °F) weather and high soil moisture levels favor the development of this disease.

Control

The use of disease-free transplants, soil fumigation, weed control and crop rotation can all reduce the incidence of this disease. Grafting onto resistant rootstocks or using tolerant varieties can be effective in minimizing losses from bacterial wilt.

Text 6. Tomato Diseases Guide – Fungal Diseases – Fusarium Wilt

Источник: https://seminis.co.uk/information/disease-guides/tomatoes/fusa rium-wilt-2/

Causal Agent

Fusarium oxysporum f. sp. Lycopersici. Three races (1, 2 and 3) have been reported.

Distribution

It is distributed worldwide.

Symptoms

Infected seedlings are stunted and their older leaves and cotyledons turn yellow and wilt. Severely infected seedlings frequently die. On larger plants the symptoms begin with a yellowing of the older leaves. Entire branches turn yellow, producing a ”yellow flag” appearance in the field. Symptoms are often characterized by a yellowing on only one side of a leaf or branch. The affected leaves wilt and die, though they remain attached to the stem. The plants will show diurnal wilting during sunny days and their growth is often stunted. When the stem is cut diagonally, or when branches are snapped off the main stem, a characteristic red-brown discoloration of the vascular tissue is evident. This discoloration may extend far up the plant.

Conditions for Disease Development

The fungus can survive in the soil for several years and can be spread in soil, on farm machinery, infected plant debris and irrigation water. Infection takes place through root wounds caused by cultivation, secondary root formation and nematode feeding, and the disease develops quickly when soil temperatures are warm (28 °C, 82 °F). Fusarium wilt is enhanced by high levels of micronutrients, phosphorous and ammonia nitrogen.

Control

The use of resistant varieties is generally the most effective way to control this disease.

Text 7. Tomato Diseases Guide – Nematode Diseases – Northern Root-Knot Nematode

Источник: https://seminis.co.uk/information/disease-guides/tomatoes/nor thern-root-knot-nematode/

Causal Agent

Meloidogyne hapla.

Distribution

It is distributed worldwide.

Symptoms

The first above-ground symptom is a general lack of vigor by the plants. Eventually the foliage becomes chlorotic with a progressive dying of the older leaves, and the plants are stunted. When diseased plants are pulled up, irregular swellings, called galls or knots, can easily be seen on the roots. These galls tend to be small and uniform in size compared to those caused by Meloidogyne incogmta, which tend to be large and compound. When this disease is severe, the entire root system will be covered with small galls and have a branched appearance as a result of secondary root formation adjacent to the developing galls.

Conditions for Disease Development

This nematode has a very wide host range, including many vegetable crops and weeds on which it can grow and overwinter. It may be introduced into fields or greenhouses on infected transplants, in infested soil on cultivation equipment or through irrigation water. Once present in a field or greenhouse, it can spread from its alternate hosts to tomato through typical cultivation practices. Although this nematode can cause disease in many soil types, root damage is most serious on lighter, sandy soils. Moderate (16–20 °C, 61–68 °F) soil temperatures favor nematode reproduction and disease development.

Control

No commercial varieties are currently resistant to Meloidogyne hapla and therefore cultural and chemical controls should be used to control this disease. Soil fumigation or pasteurization should be used when feasible. Also, the use of certified disease-free transplants and rotating to a non-host crop can help reduce losses.

Text 8. Tomato Diseases Guide – Non-Infectious Disorders – Blossom-End Rot

Источник: https://seminis.co.uk/information/disease-guides/tomatoes/blo ssom-end-rot-2/

Causal Agent

Calcium deficiency in the distal end of the fruit.

Distribution

It is distributed worldwide.

Symptoms

The diagnostic symptom is a light tan lesion turning to a dark brown sunken area at the blossom-end of the fruit. The lesion typically enlarges and becomes more sunken and leathery, and is often accompanied by a dry rot. A black mold may grow on the surface of the lesion. Sometimes there is an internal black rot of tissue in the center of the fruit with little or no external symptoms. Normally, fruit that are about half developed are the first to show symptoms.

Conditions for Disease Development

In general, any soil or growing condition affecting the uptake of calcium may result in this disorder. Blossomend rot often occurs during alternating periods of high and low soil moisture as well as rapid plant growth. Other conditions that could cause blossom-end rot include excessive soil salinity and root damage.

Control

The use of tolerant varieties may help reduce the occurrence of this disorder. Applications of lime or calcium fertilizers before planting are commonly used to reduce the incidence of blossom-end rot. Irrigation during dry weather or applications of mulch to provide a constant moisture supply to the plant can help prevent this problem. The use of excessive nitrogen, especially in the ammonium form, should be avoided since this increases the demand for calcium by the plant and reduces the availability of calcium in the soil. Fields that are difficult to irrigate uniformly or those with high salinity should be avoided. Root injury caused by mechanical damage or disease can exacerbate this condition and should be avoided.

Text 9. Tomato Diseases Guide – Non-Infectious Disorders – Nutrient Deficiencies

Источник: https://seminis.co.uk/information/disease-guides/tomatoes/nut rient-deficiencies/

Causal Agent

Insufficient nutrients cause this disorder.

Distribution

It is distributed worldwide.

Symptoms

The following symptoms are indicative of nutritional deficiencies. However, soil and foliar fertilizer analyses should be conducted to verify nutritional needs.

Nitrogen: The oldest leaves turn chlorotic and eventually senesce, while the younger leaves turn a yellowish-green. The plants may be stunted.

Phosphorus: Leaves develop a dull green color and grow slowly. The underside of the leaves eventually turns a reddish-purple. Older leaves are affected first and may senesce in severe cases.

Potassium: The foliage will show a burning of the leaf margins. The older leaves may develop interveinal chlorosis while the veins remain green. The symptoms begin on the older leaves and progress to the younger ones as the disorder becomes increasingly more severe. Fruit disorders such as puffiness, graywall and ripening diseases can result from a potassium deficiency.

Calcium: Interveinal chlorosis and leaf margin necrosis occur at the growing point, which eventually dies. The fruit develop blossom-end rot.

Magnesium: Leaves develop interveinal chlorosis, starting on the older and progressing to the younger leaves. The midrib of the leaf remains green while the interveinal tissue becomes necrotic.

Sulfur: The older leaves turn light green, and the stems and petioles may turn purple and become spindly.

Boron: The older leaves turn yellow and brittle, and the growing point becomes necrotic and dies. The margins of older leaves and the leaf tips become necrotic. The fruit may also be affected and may develop scattered corky areas.

Copper: Initially, the younger leaves wilt and then may turn bluish-green and curl upwards. Severely affected plants are stunted and chlorotic.

Iron: The younger leaves develop interveinal chlorosis followed by a general yellowing. The midrib of the leaf usually remains green.

Manganese: The younger leaves develop interveinal chlorosis followed by necrosis while the midrib of the leaf remains green.

Molybdenum: The older leaves develop a yellowing and marginal necrosis that eventually progresses to the younger leaves. This deficiency is rare in tomato.

Zinc: The leaves become thickened and curl downward. Their petioles may become twisted and the older leaves exhibit an orange-brown chlorosis.

Conditions for Disorder Development

Nutrient deficiencies are most common in acid or alkaline soils due to the immobilization of nutrients at the lower and higher soil pHs. Some soils are naturally low in specific nutrients due to their compositions. The excessive, or unbalanced, use of fertilizer may also cause some nutrients to be less available. Low temperatures, compaction or excessive soil moisture may also affect nutrient availability.

Control

Use a balanced fertilizer program. Soil and foliar nutrient analysis can give valuable information on nutritional deficiencies. Altering soil pH and using nutrient sprays can help correct some deficiencies.

Text 10. Tomato Diseases Guide – Parasitic Plant – Dodder

Источник: https://seminis.co.uk/information/disease-guides/tomatoes/ dodder-3/

Causal Agent

Cuscuta species.

Distribution

It is distributed worldwide.

Symptoms

Dodder is a whitish-yellow parasitic plant that lacks chlorophyll, leaves and roots, and therefore must derive its nutrients from other plants. It first becomes noticeable as a yellow thread-like vine that winds around the stem and branches of the infected plant. Later, it can spread down the row, covering other plants with a mass of vines and giving a yellowish color to the affected area of the field. Dodder produces small, inconspicuous flowers (often white), which mature and produce thousands of small seeds. When the seed germinates, the emerging vine twists in a counter-clockwise fashion until it comes into contact with its host. Attachment to the plant is by sucker-like projections (haustoria), through which the dodder extracts nutrients from its host plant.

Conditions for Development

Dodder has a very wide host range, including many weed and crop species, and its seed can survive in the soil for up to 10 years. Dodder seeds can be spread on cultivation equipment and in irrigation water be-

tween and within fields. Conditions favorable for tomato plant growth also favor dodder growth and parasitism.

Control

Removal and destruction of dodder along with infected plants reduces subsequent spread by seed. Herbicides, either contact or pre-plant, along with crop rotation can help reduce losses from dodder parasitism.

Text 11. Tomato Diseases Guide – Phytoplasma Disease – Big Bud

Источник: https://seminis.co.uk/information/disease-guides/tomatoes/big-bud/

Causal Agent

Phytoplasma causes this disease.

Vector

Brown Leafhopper (Orosius argentatus).

Distribution

It is distributed in Australia, Brazil, India, Israel, Russia and the USA.

Symptoms

The primary symptom of this disease, and the one for which it is named, is the enlargement and abnormal development of the flower buds.

Sepals may not separate as the flower opens, and the buds will be swollen and green.

Other symptoms include a thickening of stems, proliferation of small side-shoots and aerial root initials.

Shortening of the internodes, an erect growth habit and the development of an overall yellowish appearance of the plant may also occur.

Fruit may be small and deformed.

Conditions for Disease Development

This phytoplasma can survive in crops such as hot pepper, lettuce, eggplant and potato, as well as weeds such as dock, lamb's-quarter, nightshade, sowthistle and jimsonweed.

It is readily transmitted to tomato by the common brown leafhopper. Transmission occurs when leafhoppers carrying the phytoplasma migrate to tomato and feed.

Control

Big Bud is generally only of occasional importance. Removing host weeds adjacent to tomato plants and controlling the leafhopper vectors with an insecticide program are usually sufficient.

Text 12. Tomato Diseases Guide – Virus Disease – Tomato Mosaic (Synonym: Tobacco Mosaic)

Источник: https://seminis.co.uk/information/disease-guides/tomatoes/toma to-mosaic-syn-tobacco-mosaic/

Causal Agent

Tomato mosaic virus (ToMV). Several strains have been reported.

Vector

Mechanically transmitted.

Distribution

It is distributed worldwide.

Symptoms

Typical symptoms include a light and dark green mottling of the leaf tissue and stunting of the plant. Foliar symptoms can vary from a chlorotic mottling to necrosis to upward leaf rolling and stem streaking, depending on which strain of ToMV infects the plant. During cool temperatures, leaves may develop a ”femleaf” appearance where the leaf blade is greatly reduced. During high temperatures, foliar symptoms may be masked. Occasionally the fruit will show disease symptoms, which vary from an uneven ripening to an internal browning of the fruit wall (brown wall). Brown wall typically occurs on the fruit of the first two clusters and appears several days prior to foliar symptoms. Under certain environmental conditions, some varieties with resistance (heterozygous) to ToMV will show necrotic streaks or spots on the stem, petiole, and foliage as well as on the fruit.

Conditions for Disease Development

ToMV has a wide host range including many agricultural crops and weeds, all of which can serve as inoculum sources. It is readily transmitted by machinery or workers from infected to healthy plants during handling. Infested debris from a previous crop can lead to infection when the roots of the new tomato plants come in contact with the debris. Chewing insects can transmit the virus, but are not considered a source of infection. Tomato seed can carry the virus, but actual infection is thought to occur when plants are thinned or transplanted.

Control

The use of ToMV-resistant varieties is generally the best way to reduce losses from this disease. Avoid planting in soil from previous crops that were infected with ToMV. Steam sterilizing the potting soil and containers as well as all equipment after each crop can reduce disease inci-

dence. Before handling containers or plants, be sure all workers wash with soap and water. Sterilizing pruning utensils or snapping off suckers without touching the plant instead of knife pruning helps reduce disease incidence. Direct seeding in the field can help reduce the spread of ToMV.

Text 13. Cracking in Tomatoes

Источник: http://www.agrisupportonline.com/Articles/cracking_in_ tomatoes.htm

What is cracking?

Cracking is the splitting of the epidermis around the calyx or stem scar. There are two types of fruit cracking in tomatoes:

– Concentric cracking, which is a splitting of the epidermis in circular patterns around the stem scar.

– Radial cracking which is a splitting of the epidermis from the stem scar towards the blossom end.

Why does cracking occur?

Cracking depends on the ability of the epidermis and its cells to stretch. Some varieties have an epidermis that stretches well and will have very little or no circular cracking. Other varieties can have the opposite situation where they do not stretch well and have a lot of cracking.

When does cracking occur?

Cracking occurs as the tomato nears maturity. More susceptible varieties crack in the mature green stage and more tolerant varieties at later stages. The earlier the cracking then the deeper and longer the crack becomes. The problem is usually more severe on the lower trusses. Circular cracking often occurs on ripe tomatoes that are on the vine too long.

Causes of cracking

1. Alterations in the growth rate. Plants have periods where they might have very fast growth followed by slow growth and then fast again. These changes can cause fruit nearing maturation to crack. If the cells have ”hardened” during the last slow growth then in the next fast growth period they may not be able to stretch enough and the epidermis cracks.

2. Fast growth. Some varieties have periods of very fast fruit growth with high temperatures and moisture levels.

3. Fruit temperature fluctuations and leaf removal. Wide fluctuations in temperature can also induce cracking. This is true especially when plants have been de-leafed too early leaving fruit without protection. The exposed fruit heats up dramatically in the sun. At night it cools relatively

quickly and the differential is bigger than it would have been had the leaves covered the fruit. The expansion and contraction of the epidermis and its cells can result in cracking.

4. Succulent plants. Succulent plants that are high in nitrogen and low in potassium are more susceptible to cracking.

5. Rain and irrigation. Rain and excess irrigation will often cause cracking and if the fruit lacks leaf cover then the effect is even more dramatic. Tomato crops that do not receive water at regular intervals but rather receive it periodically at large intervals are likely to have cracking. This problem is related to the Conductivity Factor (CF) of the soil solution.

Control of Cracking

1. A good fertilizer programme that will avoid overly succulent plants.

2. Proper pruning and leaf removal. Excess removal will result in fruit being exposed too much to the sun.

3. A good preventative spray programme to control foliar diseases and reduce the loss of leaves. More leaves give the fruit better protection.

4. Proper water management: do not over irrigate; water at fixed intervals and increase or decrease quantities as needed. Use tensiometers.

5. Constantly monitor the CF levels of the soil solution, using soil extractors, CF meters and equipment to measure nutrient levels in the soil solution.

The CF levels should remain fairly constant in the different stages of the crop. Big fluctuations in the CF levels mean that the plant will probably absorb too much water when the level suddenly decreases.

When it rains then the rainwater entering the soil will dissolve the nutrient elements and take them down deeper into the soil. This causes the CF levels in the root zone to fall to a lower level and water moves more easily and quickly into the plant. The epidermis of the fruit cannot stretch enough to absorb all the extra water and the result can be cracking. To control the CF in rain, it is recommended to give potassium chloride (5 kg/ha more or less depending on the situation) to the crop while it is raining or when this is not possible, immediately after the rain. This will help restore the CF without adding extra nitrogen.

NOTE: Some growers also believe that Greenback varieties are more tolerant to cracking, russeting and wind marking, compared to the uniform green, non-greenback types. Greenback types at this stage seem to have a tougher, more resilient outer skin, which may combat a wider range of environmental conditions.

Text 14. Potato Pests – The Colorado Potato Beetle

Источник: https://entomology.ca.uky.edu/ef304

The Colorado Potato Beetle

The common black and yellow-striped ”potato bug”, a very familiar insect, is the most serious pest of potatoes. Both the adult, or beetle, and the black-spotted, red larva feed on potato leaves. Their damage can greatly reduce yield and even kill plants.

In addition to potato, Colorado potato beetles can be a serious pest of tomato, eggplant, and pepper.

Colorado potato beetles overwinter in the soil as adults. The Colorado potato beetle is a yellow insect with alternating black and white strips down its back. They become active again in the spring and feed on weeds and volunteer on early planted potatoes. They will even enter the soil to attack emerging foliage. Female beetles lay batches of about two dozen orange-yellow eggs on the underside of the leaves. Each female can lay 500 or more eggs over a four to five week period. The eggs hatch in four to nine days and the larvae begin to feed on potato foliage. The larvae are humpbacked with two rows of black spots. The larvae usually feed in groups and damage can be severe. The larval stage lasts two to three weeks.

Full grown larvae move to the ground and change into an inactive or pupal stage. In five to 10 days the new adult beetles emerge. This insect can go from egg to adult in as little as 21 days. They feed for a few days, before egglaying begins. There are two full and occasionally a partial third generation each year. If foliar sprays are used, an effort should be made to treat after most eggs have hatched but before serious plant damage occurs.

This insect is notorious for development of resistance to insecticides over short periods of time. A rotation among different classes of insecticides is recommended to discourage resistance. There is a new commercially available strain of Bacillius thuringiensis (var tenebrionis) that is effective against small larvae (less than 1/4 inch) and should be applied at egg hatch or when larvae are first seen. A premature treatment may lose much of its effectiveness before the eggs hatch. An insect growth regulator, called Align, has also been released for control of this insect. It is an extract of the neem seed that prevent the insect from developing normally.

The Colorado potato beetle, Leptinotarsa decemlineata, can be easily confused with its close cousin the false potato beetle, Leptinotarsa juncta.

While these two insects look nearly identical, only the Colorado potato beetle is a serious pest. While the adult false potato beetle has alternating black and white strips on its back as well, one of the white strips in the center of each wing cover is missing and replaced by a light brown strip. The eggs are slightly larger and fewer found in a cluster. The humpbacked larva is similar, but with only one row of dark spots on each side. False potato beetles are frequently found feeding on some solanaceous weeds, such as horsenettle, but do no growth and reproduction occurs when feeding on potato.

Colorado Potato Beetle Resistance Management

The Colorado potato beetle is notorious for its ability to rapidly develop resistance to insecticides that are used repeatedly to control it. This has been a serious problem on the east coast for some time, and is becoming more of a problem in Kentucky. With a more limited number of available insecticides, some homeowners feel they have exhausted their control options.

Resistance develops more rapidly to an insecticide when that insecticide is used repeatedly as the only control measure. Often over use of one insecticide may favor the development of resistance to other insecticides in the same chemical class. Insecticides in the same chemical class usually have the same mode of action, i.e. the same method of killing the insect. Consequently, to delay or prevent resistance it is important to avoid repeated usage of one particular insecticide by rotating the insecticides used. Rotation needs to be among different classes of insecticides.

Other control measures such as hand picking of adult beetles and immature stages will also aid to delay the development of resistance. Resistance by Colorado potato beetles should be managed on a field to field basis. While they may be resistance to one insecticide in a particular field, those in other fields within the same county may not have developed resistance to that insecticide.

Text 15. Soil and Above-Ground Potatoes Pests

Источник: Источник: https://entomology.ca.uky.edu/ef304

The market for potatoes from Kentucky has resulted in increased interest in the crop by potential growers. Growing a new crop often means dealing with a different pest complex. This publication was prepared to provide information on the biology, identification and control of potato pests. More on specific information on insecticides is available from ID-36, ”Commercial Vegetable Crop Recommendations”.

Soil insects

Soil insects, primarily wireworms and white grubs, can severely damage seed pieces and tubers. These insects feed on grass roots and should be considered as a serious threat when potatoes are to be grown in ground immediately following sod. In these situations, a pre-plant broadcast application of a soil insecticide should be considered. For best results, treat after soil temperature at the six inch depth has reached 50 °F. By this time soil insects should be active and nearer the surface.

The threat of damage by soil insects is lessened with time out of sod. Because some wireworms and grubs spend two or more years in the soil a problem may still occur. A planting-time soil treatment should be sufficient in these cases.

Above-Ground Potatoes Pests

Aphids

Winged aphids may move into potato fields in significant numbers. These migrants settle on the leaves and begin to remove plant sap. During this period they are also capable of producing large numbers of wingless aphids that in turn place an even greater stress on plants.

Distorted leaves and ”sticky” leaf surfaces are signs of aphid infestation. Natural enemies and diseases can often keep aphid populations under control. Limiting the use of insecticides other than Bacillius thuringiensis products will conserve predators and parasites that help keep aphid populations under control.

Potato Leafhopper

Potato leafhoppers are wedge-shaped, 1/8-inch long, green, active insects. They use their piercing-sucking mouthparts to remove sap from the potato leaf. These small insects fly readily.

Because of their small size and habit of feeding on the underside of the leaf, they are easily overlooked.

The symptom of leafhopper activity is more apparent – a triangular brown spot at the tip of the leaf. Similar triangles may appear at the end of each lateral veinlet or the entire margin may roll upward as though scorched. These symptoms are known as ”hopperburn”. Other conditions may produce similar symptoms. Check the underside of leaves for the tiny leafhoppers to confirm that they are the cause of the problem.

Potato leafhoppers do not overwinter in Kentucky. Winds carry them into the state each year from the Gulf Coast. They generally appear between May 25 and June 5. Within a few days after mating, females lay

their eggs in the stems and larger leaf veins of succulent plants. The eggs hatch in about 10 days into the immature or nymphal stage. The light green, wedge-shaped nymphs are smaller than the adults and do not have wings. Both stages are very active. Adults jump or fly readily when disturbed while the nymphs run sideways across the leaf and over the edge.

Development from egg to adult takes about three weeks in warm weather. Very large leafhopper populations can build up in a short time during the summer.

Occasional Pests

A variety of other insects may be numerous at times. Control decisions should be based on the extent of the infestation in the field and the severity of damage.

Blister beetles are narrow, elongate insects. They may be found feeding in clusters on potato leaves. Infestations are usually localized within fields and treatment of an entire field is seldom necessary. Rarely do blister beetles do enough damage to cause any yield loss.

Hornworms are easily identified and will feed on potato foliage. These worms can consume large amounts of foliage but severe infestations are not likely to occur. Hormworms can easily be controlled using any of the insecticides containing Bacillus thuringiensis var kurstaki. Rarely do hormworms cause losses to potato yields.

Flea beetles cause the small shot-hole damage to leaves. These tiny beetles overwinter as adults and may appear in fields very early in the season and cause serious damage to young plants. Sevin (trademark for carbaryl) provides very good control of flea beetles when they are numerous on small plants.

ПРОФИЛЬ: Защита растений – программа ”Биологическая защита растений”

Text 1. The Importance of Plant Protection

Источник: https://www.quickcrop.ie/blog/2013/02/the-importance-of-plant-protection/

Plant protection is the practice of managing weather, weeds, pests and diseases that damage or inhibit the growth of fruit, vegetable and other horticultural crops.

Proper crop protection is important to produce higher quality crops with minimal wastage. This increase in productivity leads to less land, water and labour being required for food crops. With less land being used biodiversity is preserved and less greenhouse gases are emitted. It also ensures more food reaches the shops and markets in good condition, which helps to keep the prices down.

If we were to stop using some of the more common protection methods with our fruit and vegetable crops, there would be a lot less choice in the food available to buy on a local level. Global yields would drop by approximately one third. Vegetables we have become accustomed to or have taken for granted would only be readily available in certain regions. They would be available at exorbitant prices and questionable freshness and quality in others.

Methods of Plant Protection

There are four main approaches to successful plant protection, each with varying degrees of success: pesticide based measures, biological pest control, barrier methods and animal psychology. Here is some brief information on each.

Pesticides

Pesticide based measures are used to attract and/or destroy garden pests. There are three main methods in common practice; herbicides are used to kill unwanted plants and weeds, insecticides are used to kill insects, and fungicides are used to kill fungi, some of which can cause serious damage to agriculture.

Biological

Biological pest control is the practice of controlling insects, weeds and diseases by using other living organisms. A ladybird population can be ”grown” or maintained to control aphids in the garden. Aphids are the most destructive pest to vegetable plants. Having a good population of

beneficial insects will take a lot of the hard work and heartache out of pest control.

Barriers

Barrier methods are anything that effectively creates a barrier between plants and pests, weather or diseases. These include butterfly and bird netting, micromesh, garden fleece, plant collars and garden cloches. Electronic pest deterrents also fall under this category as they create an invisible barrier.

Psychology

An animal psychology methods include anything that deter pests, animals or birds using psychological methods. The most common example of this is the good old fashioned scarecrow, there are a wide variety of more modern bird scarers available.

Top 10 Plant Protection Products

Easy Lantern Cloches for Plant Protection

Moveable and reusable lantern shaped garden cloches available in polythene, micromesh and fleece.

Grow Grid Weed Suppressing Barrier

Grow Grid Mats are made from a semi permeable weed control fabric with heat sealed planting holes for growing a variety of crops. They help warm the ground and prevent weeds from growing around plants.

Butterfly and Bird Protection Netting

This is a lightweight and strong mesh netting. It is a humane and natural barrier method offering excellent bird and butterfly control.

Micromesh Pest and Wind Barrier

A fine mesh netting used to create a barrier around plants or sections of the garden. The mesh is fine enough to keep out pests like the carrot fly, while still allowing in sunlight and water.

Horticultural Fleece

This garden fleece is a garden cover that insulates plants from cold temperatures; it is very light so it won't damage tender young plants.

Bell Shaped Plastic Cloches

A pack of 3 bell shaped plastic garden cloches for giving young plants extra protection against cold, wet or windy weather and pests. They are also perfect for over wintering crops.

Grow Your Own Ladybirds

Everything you need to start a good ladybird population in your garden. These are one of the most beneficial insects to have as they feed on aphids (whitefly).

Animal & Pest Deterrents

Here we have a selection of electronic and non-electronic pest and animal deterrents. For fast, safe and humane control of foxes, rats, mice, rabbits, deer, pigeons, household pets and more.

Copper Slug Barriers

Slugs and snails are a complete nuisance in the garden. There are many non toxic methods of slug control but these are the most common and genuinely work every time. Copper gives slugs an electric shock and they turn right around.

Plastic Tunnel Cloche

This is a professional style polytunnel style cloche for vegetable plants. It is designed to fit over raised beds to give all the growing plants some extra protection and extend the growing season.

Text 2. Cultural Practices – Crop Rotation

Источник: http://www.oisat.org/control_methods/cultural__practices/crop_rotation.html

Crop rotation is one of the oldest and most effective cultural control strategies. It means the planned order of specific crops planted on the same field. It also means that the succeeding crop belongs to a different family than the previous one. The planned rotation may vary from 2 or 3 year or longer period.

Some insect pests and disease-causing organisms are hosts' specific. For example, rice stem borer feeds mostly on rice. If you don't rotate rice with other crops belonging to a different family, the problem continues as food is always available to the pest. However, if you plant legume as the next crop, then corn, then beans, then bulbs, the insect pest will likely die due to absence of food.

Advantages of Crop Rotation

Crop Rotation has a number of advantages because it:

– Prevents soil depletion.

– Maintains soil fertility.

– Reduces soil erosion.

– Controls insect/mite pests. Crop rotation as a means to control to insect pests is most effective when the pests are present before the crop is planted have no wide range of host crops; attack only annual/biennial crops; and do not have the ability to fly from one field to another.

– Reduces reliance on synthetic chemicals.

– Reduces the pests' build-up.

– Prevents diseases.

– Helps control weeds.

Useful Tips in Planning Crop Rotation

1. Know the family where your crops belong to make sure that you plant on the next cropping a crop that belongs to a different family than the previous one.

Table 1

Crop groups

Family	Common names
Allium	Chive, garlic, leek, onion, shallot
Cucurbit (Gourd family)	Bitter gourd, bottle gourd, chayote cucumber, ivy gourd, luffa gourd, melons, pumpkins, snake gourd, squash, wax gourd
Crucifer (Brassica)	Bok choy (petchay), broccoli, Brussels sprouts, cabbage, Chinese cabbage, cauliflower, collard, kale, kohlrabi, mustard, radish, turnip, watercress
Legume	Common beans, black bean, broad bean (Fava), clover, cowpea, garbanzo, hyacinth bean, kidney bean, Lima bean, mung bean, peanut, pigeon pea, pinto bean, runner bean, snap pea, snow pea, soybean, string bean, white bean
Aster	Lettuce, artichoke
Solanaceous (Nightshade family)	Potato, tomato, pepper, eggplant
Grains and cereals	Corn, rice, sorghum, wheat, oat, barley, millet
Carrot family	Carrot, celery, dill, parsnip, parsley
Root crops	Cassava, sweet potato, taro, yam, water chestnut
Mallow family	Cotton, okra

2. Make a list of the crops you want to grow by also taken into consideration the market's demand of your produce. For example, plant leafy vegetable on the first cropping season, next fruit vegetables, then root crops, then legumes, then small grains.

3. Grow legumes before grains or cereals.

4. Practice green manuring.

5. Always keep farm records.

Text 3. Cultural Practices – Intercropping and Trap Cropping

Источник: http://www.oisat.org/control_methods/cultural__practices.html

Intercropping

Intercropping is the cultivation of two or more crops simultaneously on the same field. It also means the growing of two or more crops on

the same field with the planting of the second crop after the first one has completed its development. The rationale behind intercropping is that the different crops planted are unlikely to share the same insect pests and disease-causing pathogens and to conserve the soil.

Types of Intercropping Practices

– Mixed or multiple cropping is the cultivation of two or more crops simultaneously on the same field without a row arrangement.

– Relay cropping is the growing of two or more crops on the same field with the planting of the second crop after the first one has completed its development.

– Row intercropping is the cultivation of two or more crops simultaneously on the same field with a row arrangement.

– Strip cropping is the cultivation of different crops in alternate strips of uniform width and on the same field. It has two types; contour strip cropping and field strip cropping. Contour strip cropping follows a layout of a definite rotational sequence and the tillage is held closely to the exact contour of the field. Field strip cropping has strips with uniform width that follows across the general slope of the land.

Advantages

– Reduces the insect/mite pest populations because of the diversity of the crops grown. When other crops are present in the field, the insect/mite pests are confused and they need more time to look for their favorite plants.

– Reduces the plant diseases. The distance between plants of the same species is increased because other crops (belonging to a different family group) are planted in between.

– Reduces hillside erosion and protects topsoil, especially the contour strip cropping.

– Attracts more beneficial insects, especially when flowering crops are included the cropping system.

– Minimizes labor cost on the control of weeds. A mixture of various crops gives often a better coverage of the soil leaving less space for the development of weeds.

– Utilizes the farm area more efficiently.

– Results in potential increase for total production and farm profitability than when the same crops are grown separately.

– Provides 2 or more different food crops for the farm family in one cropping season.

Trap Cropping

Trap cropping is the planting of a trap crop to protect the main cash crop from a certain pest or several pests. The trap crop can be from the same or different family group, than that of the main crop, as long as it is more attractive to the pest.

There are two types of planting the trap crops; perimeter trap cropping and row intercropping.

Perimeter trap cropping (border trap cropping) is the planting of trap crop completely surrounding the main cash crop. It prevents a pest attack that comes from all sides of the field. It works best on pests that are found near the borderline of the farm.

Row intercropping is the planting of the trap crop in alternating rows within the main crop.

Advantages of Trap Cropping

– Lessens the use of pesticide.

– Lowers the pesticide cost.

– Preserves the indigenous natural enemies.

– Improves the crop's quality.

– Helps conserve the soil and the environment.

Tips for Successful Trap Cropping

1. Make a farm plan. This will guide you on where the trap crops are to be sown or planted.

2. Learn to know and identify the pests.

3. Select a trap crop that is more attractive to the pest than the main crop. Ask for assistance from your local agriculturist.

4. Monitor your plants regularly.

5. Immediately control the pests that are found in the trap crop. Prune or remove the trap crops once the pest population is high, otherwise they will serve as the breeding ground and the pests will attack the rest of your farm.

6. Be ready to sacrifice your trap crop as an early crop and destroy them once pest infestation is high.

7. Always keep farm records.

Text 4. Cultural Practices – Composting

Источник: http://www.oisat.org/control_methods/cultural__practices/composting.html

Composting is the biological decomposition (rotting and decaying) of plant residues, farm animal manures, and kitchen scraps under

controlled conditions. Once these materials are completely decayed, the end product is called compost. Compost is a decayed organic matter that is earthy, dark, and crumbly.

Pile or Heap Composting

What to Prepare

1. A semi-shaded 3 ft × 3 ft area (90 cm × 90 cm).
2. Composting materials:

– Green materials that are rich in nitrogen (freshly cut grasses, twigs, branches and barks that are cut into small pieces, kitchen scraps, farm animal manures).

– Brown materials that are rich in carbon (dried leaves, straws, corn-stalks and other dried plant residues, and cut old newspapers.

– Garden soil.

– Water.

3. Garden fork or shovel.

Step by Step Procedure

1. Spread a layer of several inches thick (about 6 inches; 15 cm) of the brown materials on the surface soil. This is the first layer.
2. Add for the next layer, the green materials, about 6 inches thick (15 cm).
3. Top this with a thin layer of garden soil.
4. Sprinkle enough water to make the layers moist but not wet or soggy.
5. Repeat the steps 1–4, until your pile reaches the height of 3 feet (90 cm).
6. Turn the pile after 2 weeks to heat it up. Use a garden fork or shovel to turn the pile. To mix, move the decomposing materials at the middle towards the outside and the outside materials towards the center of the pile. Then you can mix it every 5–7 days, thereafter. If your compost has a strong odor, turn it more often as your pile is tightly packed and is poorly aerated.
7. Ensure that the pile is heating up. When you first turned the pile, you may see steam rising from it. This signals decomposition. You can cover the pile to keep the heat in.
8. Add nothing to the pile once the composting process has begun.
9. The compost is finished when the pile is no longer heating up and the original materials turn earthy and black.

Pit composting

What to Prepare

1. Compost pit that is; 1–1.5 m length × 1–1.5 m width × 1 m deep.

2. Composting materials:

– Green materials that are rich in nitrogen (freshly cut grasses, twigs, barks and branches cut into small pieces, kitchen scraps, farm animal manures).

– Brown materials that are rich in carbon (dried leaves, straws, corn-stalks and other dried plant residues, and cut old newspapers.

– Garden soil.

– Wood ash.

– Water.

3. Long, sharp, pointed sticks.

4. Farm implements such as wheelbarrow, watering can, hoe, ma-chete/bolo.

Step by Step Procedure

1. Dig the compost pit in a semi-shaded and non-water logged area.

2. Place dry plant materials as the first layer. This should be about 20–25 cm thick. Sprinkle enough water to make the composting materials moist but not wet.

3. The next layer will be composed of green materials, either fresh or wilted grasses or weeds. Twigs and branches can also be added unless they are chopped into smaller pieces. This layer should also be 20–25 cm thick.

4. Top this with a mixture of animal manure, soil, and ash. This layer should be 10–15 cm thick.

5. Repeat the steps 1–3 until the pile reaches a height of 1 m. You make the pile thicker in the middle (than the sides) to create a dome-shaped pile. This makes turning the pile easier.

6. Place the stick/s vertically into the pile to allow the air to circulate into the various layers.

7. Cover the pit with broad leaves plants like banana leaves, taro leaves, etc.

8. Turn the pile every two weeks. The compost is ready after 3–4 months.

Tips for Better Composting

1. Keep the pile moist and well-aerated.

2. Maintain a balance of the green and brown materials. Too much of one slows down decomposition. The best ratio is 1 part green to 1 part brown material. Shredding and chopping these materials into small-er pieces will help speed the composting process and increase the pile's surface area.

3. Do not add diseased plants, human wastes, cats and dogs feces as the harmful pathogens found in these waste products may not be killed in the process of decomposition.

4. Do not add matured weeds as their seeds may not be killed in the process of decomposition and may germinate once you use the compost in your field.

Uses of Compost

– An excellent source of organic matter that has plenty of beneficial organisms.

– Adds soil nutrients necessary for plant growth.

– Improves plant growth.

– Controls plant disease pathogens.

– Controls soil borne pathogens.

– Improves the soil condition and texture. It breaks up clay soil, helps sandy soil retains moisture, and relieves compaction.

– Improves soil drainage.

– Reduces soil erosion.

– Helps rehabilitate infertile soils.

– Makes the soil easy to cultivate.

Text 5. Cultural Practices – Field Sanitation and Green Manuring

Источник: http://www.oisat.org/control_methods/cultural__practices.html

Field Sanitation

Field sanitation is an important and highly effective farm practice to keep most pests under control.

What to do?

Use sterilized or diseased-free seeds for sowing. Properly select healthy plants for transplanting. Keep weeds under control at all times. Keep the surroundings of your farm free of weeds, unless they are maintained and intended as habitat for natural enemies. Make yourself ”clean”. Always bear in mind that you might be the carrier of the pests while you move from one plant to another. Pull plants that are heavily infected with insect pests and those that are showing heavy symptoms of disease infection. Prune the plant parts where insect pests are found congregating and those that are showing heavy symptoms of disease infection. Properly dispose all the infested plants. Do not put them on compost pile. Pick rotten fruits and collect those that dropped. Diseased and pest infested fruits

must be properly disposed. Do not put them on compost pile. Plow-under the crop residues and organic mulches. This improves the soil condition and helps disrupt the pest's lifecycle. The pest is exposed to extreme temperature, mechanical injury, and predators. Maintain cleanliness on the irrigation canals. When possible, remove all the crop residues after harvest. Add these to your compost pile. Make your own compost. Your compost pile is where you can place your plant trimmings and other plant debris. Clean your farm tools. Wash plows, harrows, shovels, trowels, pruning gears, bolos after use. Lightly oil pruning gears.

Green Manuring

Green manuring is the plowing under or soil incorporation of any green manure crops while they are green or soon after they flower. Green manures are forage or leguminous crops that are grown for their leafy materials needed for soil conservation.

Advantages of Green Manuring

– Improves the soil fertility.
– Adds nutrients and organic matters.
– Improves the soil structure.
– Improves soil aeration.
– Helps to control insect/mite pests, nematodes, and diseases.
– Helps to control weeds.
– Promotes habitat for natural enemies.
– Increases soil's biodiversity by stimulating the growth of beneficial microbes and other soil organisms.

Criteria for the Selection of Green Manure Crops

– Fast growing.
– Produce abundant and succulent tops.
– Well adapted to the local condition.
– Can fix nitrogen in the soil.

Reminders

– Broadcast or sow the seeds after harvest.
– Cut the greens after flowering and plow them.
– Sow or transplant the next crops 1–2 weeks after the incorporation of the green manure.

Text 6. Importance of Natural Enemies' Identification

Источник: http://www.infonet-biovision.org/PlantHealth/Natural-enemies

A key factor in protecting and conserving farmers' friends is being able to tell friends from enemies. Various studies have shown that many

farmers (and also many agricultural professionals) are not good at insect identification and know little about insect biology and behaviour.

In vegetable pest management, if farmers cannot distinguish between pests and friends, they will be likely to use pesticides against any insect observed in the field. They do not want to risk having living things crawling over their crop and so resort to spraying.

Although proper identification of pests and beneficials is important it is not always easy. Take for instance ladybird beetles, which are one of the most talked about and valuable farmers' friends because of their ability to eat large numbers of plant sucking aphids. But some ladybird species do eat plants and can cause crop damage! These species usually look dusty or slightly hairy – as compared with the very shiny species which are usually farmer's friends.

To make matters more difficult, most insects look very different at different stages in their development. For example, ladybird larvae look like tiny spotted crocodiles and are very different from the adults, but they also eat many aphids, scales and young caterpillars. This highlights the importance of being able to identify that "good and bad" on the crop no matter what life cycle stage is present.

Insect Life Cycles

Most crop pests are arthropods which means they have external skeletons and jointed legs. Within this group, there are insects which have 6 legs as adults and mites which have 8 legs as adults (but 6 legs when younger).

Arthropods are usually considered to be pests if they eat any part of the crop plant (chewing pests) or if they suck crop plant juices (sucking pests). The damage may be caused by adults or by the younger stages called larvae or in some cases nymphs.

Other serious pests of vegetables include nematodes, tiny worms that live in and feed on plant roots (plant parasites) and larger animals such as rats, monkeys and even hippos.

Life Stages of Arthropods

Arthropods can look very different at different stages in their life cycle. It is useful to understand these different forms so that pests can be identified regardless of the stage they have reached in their life cycle. Arthropods go through a process called metamorphosis which means change of form. Some have complete metamorphosis where the young stages look completely different from the adults. Others go through in-

complete metamorphosis where the young look a little like small versions of the adult, but without fully developed wings.

So, How to Make a Correct Identification?

One good source of information is the local extension office which should have field guides and pest and disease identification guides on local problems. Sometimes such guides are also available at universities or colleges and more and more such information is available through the Internet. If you know of any good ones be sure and share the information with other stakeholders, particularly farmers. It is also possible to find out whether an organism is a friend or a pest by setting up an insect zoo to investigate what the organism is doing on the crop. This involves putting the insect in a small jar together with leaves from that plant and any known pests which were also on that leaf. If it eats or sucks the leaves, it is a pest and if it eats the pests it is a natural enemy.

Text 7. Important Natural Enemies or "Farmers' Friends" – Predators

Источник: http://www.infonet-biovision.org/PlantHealth/Natural-enemies

There are many other natural enemies, such as spiders, bugs, predatory wasps and mantids which play a vital role in regulating pest numbers.

Predators

Ladybird beetles

Description: The adults and larvae of ladybird beetles are important predators of aphids. A single ladybird can eat 200–300 aphids over its lifetime. Adult ladybirds are 7–10 mm long, oval to nearly spherical in shape with short antennae. They are often brightly coloured with black margins, black with bright spots or shiny black. Eggs are elongated, usually yellow to orange in colour and are laid in clusters of 10–50 eggs near the prey (e.g. aphid colonies).

The larvae are soft bodied, wingless, and vary considerably in appearance. They look quite different and are usually longer and thinner (a little like tiny spotted crocodiles), coloured black or dark brown with various types of light markings. Their colour varies from black to dark brown with various types of markings or spots. Some larvae are covered with white wax resembling mealybugs. Larvae are usually very active moving around in search of prey. The pupae are oval-shaped and are glued to the leaf surface.

Main prey: Ladybird beetles are generalist predators. Both adults and larvae prey on aphids, leafhoppers, mealybugs, mites, scales and whiteflies. The larvae eat more pests (particularly aphids) than adults. A single ladybird can consume approximately 200–300 aphids over its lifetime of 1–3 months.

Note that not all ladybird beetles are predators. There are several plant-feeding species such as Epilachna beetles also commonly known as melon bugs. Both the larvae and the adults feed on leaves and fruits. Epilachna beetles are pests of tomato, potato and cucurbits. The pest ladybird beetles can be distinguished from the beneficial ladybird beetles by their appearance. The wing cases of the adults of pest ladybird beetles are covered with short hairs giving them a non-glossy matted appearance. The larvae are pale yellowish in colour and covered with long spines.

Conservation: Ladybirds can be encouraged by growing non-crop plants which support aphid species which do not attack crops. Grow strips or groups of non-crop flowering plants such as fennel, thistles, coriander, carrots and/or milkweed. They can also be brought in by hand from outside the crop. Spraying with pesticides should be avoided wherever possible in order not to kill the ladybird adults and larvae but if it is necessary, selective pesticides and methods should be used.

Lacewings

Description: Lacewing adults have net-like semitransparent wings, large eyes and rather soft, fragile-looking bodies. They are greenish (green lacewings) or brownish (brown lacewings). Brown lacewings are smaller than green lacewings, measuring about 6–12 mm. The eggs of green lacewings are laid on characteristic fine silk stalks. Eggs of brown lacewings are laid singly on the side on plants without any attaching stalk. Lacewing larvae are greyish-brown, wingless and crocodile-like. They have long sickle-shaped mouth parts and some carry the skins of their prey on their backs. Larvae are very active. The pupae are whitish and spherical, resembling spider egg sacks.

Main prey: Larvae and adults of brown lacewings are predacious. They feed on mites and soft-bodied insects, especially aphids, mealybugs, scales whiteflies, small caterpillars, and insect eggs. Some green lacewing adults are predaceous, while others only feed on nectar from flower or honeydew from aphids. Lacewings are among the fiercest predators in the insect world. They can eat more than 200 pests or pests' eggs a week. Older larvae can consume 50 aphids a day. However, if no other prey is available, they become cannibalistic.

Conservation: Make sure flowers (e.g. dill, sunflower, carrots) are present in the field or close to the crop to ensure food supply for adult lacewings. Populations can be maintained on a non-pest aphid species and other hosts outside crop area (in weedy areas on field margins).

Hover-flies

Description: Hover-fly adults are usually brightly coloured with yellow-brown or black stripes. They are sometimes confused with wasp and bees, but flies have only one pair of wings, while wasps have to pairs. They owe their name to their ability to float or "hover" in the air, like a helicopter. They can often be seen on or close to flowers, where they feed on nectar and pollen. Although adults help to pollinate plants, it is the larvae which are most useful since they are natural enemies of aphids and small caterpillars.

The eggs, despite their small size, are easily seen on leaves, especially where aphids are present. They are white, cylindrical and 1–2 mm in size.

The larvae are usually greenish or brown with one to three white stripes along the body. They are 1–13 mm long, depending on the larval stage. They are often mistaken for caterpillars, although they do not have a distinctive head or legs as do caterpillars.

They can also be distinguished by their slug-like appearance. The pupae are pear-shaped and maybe green or brown.

Main prey: Hover-flies mainly prey on aphids and small caterpillars.

Conservation: Hover flies can be encouraged by allowing non-crop plants to grow around fields – these support non-pest species of aphids that hover fly larvae can feed on. They are attracted to all flowering plants but especially to fennel, milkweed, sun hemp, flowering brassicas or wild mustard, thistles, sunflower, coriander and dill. In rape and kale, some of the previous crop can be left to flower (provided the pest and disease levels are low) or a small number of plants from the current crop can be encouraged to bolt and flower by stopping watering. Avoid spraying with pesticides whenever possible but if it is necessary, use selective pesticides and methods.

Text 8. Important Natural Enemies or "Farmers' Friends" – Parasitoids

Источник: http://www.infonet-biovision.org/PlantHealth/Natural-enemies

Parasitic Wasps

Description: There is a wide range of parasitic wasps with a wide variation also in size (1–6 mm long). Parasitic wasps attack eggs, larvae,

pupae and sometimes adults of many other groups of insects. They usually lay their eggs within or on the body of the host. Eggs hatch into tiny yellow-creamy larvae that feed on the body fluids or the body tissues of their host. The mature larvae of the parasitic wasp pupate in or outside the host body. The number of wasps that can develop within a single host varies with the parasitoid species and the host. In aphids, leafminers, mealybugs, usually one single parasitic wasp develops on a single host. In the case of caterpillars, a single wasp, a small number, or a large number of wasps (sometimes more that 100) may develop within each caterpillar, depending mainly on the species of parasitoid. Larvae of some wasps pupate in the host, while others emerge from the host when feeding is completed and pupate nearby. Adult parasitic wasps feed on pollen, nectar, honeydew and other sugary substances, but some are predacious feeding on the host contributing to mortality caused by their larvae.

There may be few or no symptoms of parasitoid presence within its insect host. In other cases such as aphids, mealybugs and some caterpillars the host insect may become swollen and/or permanently paralysed. When the larvae of the parasitic wasp pupate, the parasitised aphid or mealybug turns brown and hard and remains stuck to the leaf. In this stage they are known as mummies and can be easily recognised.

The parasitic wasps emerge through a round hole in the aphids or mealybug abdomen a few days later. Parasitised whiteflies nymphs can be distinguished from healthy ones. Parasitised nymphs are dark while healthy nymphs are usually yellowish greenish.

Field collection and rearing of immature stages (eggs and larvae) of pests to check if any parasitoid emerges is often a useful method to determine whether parasitism has occurred.

Main prey: Parasitic wasps are important natural enemies of moth and butterfly eggs, bug eggs, caterpillars, leafminers, aphids, mealybugs, and whiteflies. They play an important role in natural control. In cases where the naturally occurring natural enemies do not provide satisfactory control, or in cases where an exotic pest has been introduced without its natural enemies, parasitic wasps have been introduced and released. Some examples of parasitic wasps introduced for control of important pests are: Diadegma semiclausum and Cotesia plutellae for control of the Diamond back moth on crucifers, Cotesia flavipes for control of cereal stemborers, Apoanygyrus diversicornis for control of the cassava mealybug, Gyranusoidea tebygi and Anagyrus mangicola for control of

the mango mealybug; Diglyphus isaea for control of leafminers, Cales noacki for control of the woolly whitefly on citrus and Encarsia formosa for control of whiteflies.

Commercial availability: Parasitic wasps commercially available in some countries: Aphidius transcapicus (Aphitec®) for control of aphids, Trichogrammatoideasp. (Grammatech®) for control of moth and butterfly eggs, Diglyphus isaea (Diglytech®) for control of leafminers and Encarsia formosa (Encartec®) for whitefly control. These parasitic wasps are available from Dudutech (K) Ltd. Eretmocerus eremicus (Ercal®) for whitefly control is available from Koppert Biological Systems (K) Ltd.

Conservation: Adult wasps feed on nectar, honeydew, or pollen before laying eggs. Keeping flowering plants close to, around and/or within the crop may attract parasitic wasps and provide good habitats for them. Some flowering plants that have been recommended are dill, fennel, coriander, nasturtiums, flowering crucifers, sunn hemp, clover, alfalfa, parsley, sunflower, and marigold.

Parasitic Flies

Description: The most important are tachinid flies. The adults look like the common house flies, but are larger (8–12 mm in length) and have more stout, bristly hairs on the abdomen. They are usually grey in colour with some markings. Female flies lay tiny whitish oval eggs on their host, and sometimes on leaves. Upon hatching the fly larvae (maggots) burrow through the body and feed on the prey. With species that lay eggs on leaves, eggs are ingested by caterpillars or larvae of beetles while feeding on foliage. Pupation occurs either within or outside the body of the host. Some species pupate in the soil. Adults feed on nectar and pollen.

Main prey: Tachinid flies are important parasitoids of caterpillars, beetle larvae and adults, and earwigs, bugs and grasshoppers.

Conservation: Provide sugar containing food sources for the adult such as flowers or honeydew. Encourage habitat diversity. Avoid spraying pesticides. When necessary select a product and application method that is less harmful to natural enemies.

Text 9. Important Natural Enemies or ”Farmers’ Friends” – Pathogens

Источник: http://www.infonet-biovision.org/PlantHealth/Natural-enemies

Fungi

Description: Fungal strands (hyphae) enter the insect body through openings. The fungal hyphae (mycelia) develop and consume the insect

from inside. Insects and mites killed by fungi become stiff and, under sustained wet or humid conditions, become covered with whitish, cream, green, red or grey coloured fuzz, the mycelia growth. Spores are transferred on insect bodies, wind, rainwater or wind. Fungi commonly found attacking insects include Beauveria bassiana, Metarhizium anisopliae, Verticillium lecanii, Zoophthora spp. and Entomophtora spp.

Some fungi are natural enemies of plant pathogens. They are antagonistic, that is, they compete with and /or suppress the development of pathogens which cause diseases to plants, and some are used in the biological control of plant diseases.

Commercial availability: Some fungal-based commercial products for control of pests and diseases are available in some countries: e.g. Beauveria bassiana (Bb Plus®) for control of aphids, thrips, and whiteflies available from Juanco SPS Ltd.; Trichoderma asperelum (Trichotech®) available from Dudutech (K) Ltd. and Trichoderma spp (Rootgard®) available from Juanco SPS Ltd. for control of Fusarium wilt; Pochonia chlamydosporia (Klamitech®) available from Dudutech (K) Ltd. and Paecilomyces lilacinus (Pc Plus®) available from Juanco SPS Ltd. for control of plant parasitic nematodes.

Viruses

Description: A wide range of viruses has been identified attacking insects, and some of them have been used as biological pesticides. Viruses are commonly found among caterpillars and sawflies. The most common types are granulosis viruses and nuclear polyhedrosis viruses. They are species specific. Viruses need to be ingested (unlike fungi) in order to enter and replicate within the insect body. Caterpillars or sawflies infected by nuclear polyhedrosis viruses become flaccid, die rapidly, and hang limply by the abdominal legs from leaves. At the slightest touch the insect body ruptures spilling the virus particles onto leaves infecting other insects. Other viruses act more slowly; infected caterpillars appear pale or have a chalky colour, become swollen and the development is retarded. Insects infected with viruses usually die prior to reaching adulthood and may turn black or brown after death due to secondary infection with bacteria.

Nematodes

Nematodes are long, thin round worms, so tiny that they usually can only be seen under the microscope. Insect-infecting nematodes are found in the soil, and infect many different types of insects living or foraging

in the soil or on the ground such as the larvae of some moths, butterflies, beetles and flies, as well as adult crickets and grasshoppers.

The most commonly studied nematodes belong to the groups Steinernematidae and Heterorhabditidae, and have been used in the biological control of insect pests. These nematodes are associated with bacteria, which are released from the nematode into the body cavity of the insect, where they multiply, killing the insect within 48 hours. The nematodes then feed on the insect liquefying tissues, develop and reproduce for several generations inside the cadaver. When the food supplies run out, juvenile nematodes move into the soil to find new hosts. The bodies of insects killed by nematodes are yellow, orange or bright red in colour.

In some cases, farmers can produce homemade microbial pesticides by collecting diseased larvae and crushing and mixing them with water in a blender. They then filter out the large tissue masses to leave the liquid for spraying the crop. The pathogen will infect and kill other pests in the crop.

Text 10. Biopesticide Markets: Agriculture

Источник: http://www.bpia.org/biopesticide-markets-agriculture/

Biopesticides bring many advantages to growers in a wide range of crops and crop production practices. They can be used by themselves, or can be incorporated into programs with other conventional crop protection products giving growers new tools to manage pests and diseases that can reduce the productivity of their farms, while offering new value propositions to their crops in the areas of quality and marketability.

Biopesticides are used in horticulture crops (fruit and vegetables), broad acre or row crops (corn, wheat, soybeans, etc.) and greenhouse production.

Horticulture Crops – Fruits & Vegetables

Biopesticides are used more prevalently in fruit and vegetable production than in any other crop group. Global sales of biopesticides in the fruit and vegetable segment represent more than 80% of the global market in 2016. A variety of factors lead to the success of biopesticides in this crop sector.

As many fruits and vegetables are eaten without processing, consumers are more demanding about how these crops are grown. Pesticide residue concerns are typically much higher for consumers in these crops than in row crops that are not consumed in the raw form. This leads to greater pressure on grocery store chains and food marketers to compete on the basis of effectively managing pesticide residues. As a result, growers seek

out products like biopesticides that can be used without contributing to pesticide residue concerns.

Managing the development of pest resistance is a bigger concern for fruit and vegetable producers. As many of the pests and diseases require multiple treatments over the course of the season, growers need to avoid relying on products with similar modes of action. Biopesticides possess complex modes of action which make them excellent tools to prevent or delay the emergence of resistant populations of pests.

Many fruit and vegetable crops, such as berry crops, annual vegetables, and some tree fruit are harvested multiple times in one growing season as all the fruit and vegetables do not mature at the same time. Combining this with the fact that most of these crops are hand harvested leads to situation where pest control late in the season is challenging. Growers cannot use products with long re-entry periods or pre-harvest intervals without interfering with harvest operations. Biopesticides offer growers a solution to this dilemma, based on their inherent safety and short restriction periods on their labels.

And from a performance perspective, incorporating biopesticides into a pest management program together with conventional chemical pesticides has often been demonstrated to lead to better efficacy than if chemical pesticides are used exclusively. This means growers can obtain the multiple benefits listed above from biopesticides and also see equal or better pest or disease control.

Broad Acre or Row Crops

Biopesticide use in row crops is a small, but rapidly growing segment. Global sales of biopesticides in the row crop segment, split between seed treatment and foliar/soil uses, represent between 10% and 15% of the global market in 2016. A variety of factors are driving further adoption of biopesticides in row crops.

With increasing cost of seed germplasm, particularly in countries where GMO crops are present, seed treatments are becoming more important to growers as insurance to ensure this investment is protected. Seed treatments that offer protection from soil-borne pathogens and pests and lead to better stand establishment are becoming the norm for most growers. Biopesticide seed treatments have become more common as better formulations with extended storage stability and field performance have been developed by a range of manufacturers.

Foliar and soil uses of biopesticides are also gaining acceptance, particularly as growers experience positive results from seed treatments with

biopesticides. Pesticide residue concerns also can lead growers to choose a biopesticide option.

The main challenge for the foliar use of biopesticides in row crops is that that in many cases, row crops are only treated once per growing season for a pest or disease problem. This means the efficacy achieved with a biopesticide must be consistent and dependable. As biopesticide manufacturers have improved production practices and quality control, this challenge is being met successfully, leading to increasing use of biopesticides in row crops.

Greenhouse Production

Protected greenhouse production operations are particularly well suited to biopesticides. The intensive management of these ornamentals and vegetable crops require multiple applications over extended periods of time to control pests and diseases, making the risk of pest resistance development extremely high. Biopesticides are optimal for use in resistance management programs, providing greenhouse growers with effective products that, due to their complex modes of action, are unlikely to lead to pest resistance.

Equally important in greenhouse environments is user and bystander safety. Greenhouse employees spend all day working in the greenhouse, where crop protection products must be applied. In addition, in many cases, customers are also often present in greenhouses in nursery and ornamental operations. These factors cause greenhouse production managers to place a high value on the user safety of biopesticides, with short or zero-hour re-entry periods being highly desirable traits.

Many greenhouses also employ predatory insects and mites as part of their insect control programs. It is essential that any product applied to the crop does not harm these beneficials. Biopesticides, in general, have a high safety margin for non-target organisms, making them desirable to use in situations where beneficial predators are also being utilized.

While ornamental greenhouse crops are not used for food, these flowers are often brought into your home and displayed in close proximity to family members and pets, which makes the lack of pesticide residue a key benefit of biopesticides in this market as well. And of course, where the greenhouse crop is a food crop, like tomatoes or peppers, biopesticides do not contribute to undesirable pesticide residues on the harvested product.

Text 11. Biochemical Biopesticides – Plant Growth Regulators

Источник: http://www.bpia.org/biochemical-biopesticides/, http://en.sibbio. ru/catalog/crop/gibbersib/

Biochemical biopesticides are naturally occurring compounds or synthetically derived compounds that are structurally similar (and functionally identical) to their naturally occurring counterparts. In general, biochemical biopesticides are characterized by a non-toxic mode of action that may affect the growth and development of a pest, its ability to reproduce, or pest ecology. They also may have an impact on the growth and development of treated plants including their post harvest physiology. Biochemical biopesticides are divided into several different subcategories of products, including:

Plant Growth Regulators

Plant Growth Regulators (PGRs) include a category of both natural and manufactured versions of natural substances that affect major physiological functions of plants. PGRs can promote, inhibit, or modify the physiological traits of a range of fruit, vegetable, ornamental and agronomic crops.

Once considered a rather esoteric practice, use of PGRs in mainstream agriculture has steadily increased as their benefits have become better understood by growers. From a crop production perspective, PGRs are used to maximize productivity and quality, improve consistency in production, and overcome genetic and abiotic limitations to plant productivity.

There are five major classes of natural plant hormones. Under each class there are a number of PGR products that play specific and very important roles in optimizing crop yield and quality.

– Gibberellins play a role in cell elongation, stem growth, bolting in long-day plants, induction of seed germination, enzyme production during germination, fruit setting and growth, and induction of maleness in dioecious flowers.

– Cytokinins are involved in growth promotion through cell division, fruit abscission, growth of lateral buds, leaf expansion, delay of leaf senescence, enhancement of stomatal opening, and chloroplast development.

– Abscisic acid can influence water relations via stomatal closure, inhibit shoot growth, inhibit alpha-amylase synthesis in seeds affecting dormancy, increase fruit coloring, and promote leaf and fruit abscission.

– Ethylene can stimulate lateral growth in stems, stimulate defense responses to injury, break dormancy, abscise leaves, flowers and fruit, induce flowering, and stimulate fruit ripening.

– Auxins can promote growth through cell enlargement, release apical dominance, and influence rooting, leaf senescence, flowering, fruit set and growth, fruit ripening, and leaf and fruit abscission.

In addition to the major five classes of plant hormones, there are other plant compounds with suggested PGR activity that are involved with cell division, maturation, cell enlargement, plant defenses and plant resistance. These compounds include a variety of secondary metabolites produced by plants and some plant-associated microbes. Examples include polyamines, brassinosteroids, jasmonates, salicylic acid and signal peptides. There are a variety of concrete examples of how PGRs meet the needs of growers in the fresh produce market. These include:

Improved Fruit Quality

Gibberellins reduce russet on apples. Gibberellic acid improves firmness in cherries, and abscisic acid improves red color on red grapes. Ethylene is used to ripen fruit crops.

Improved Yield

Gibberellins increase fruit set on citrus and many other crops. Gibberellins increase leaf expansion on vegetable crops and cytokinins increase berry size on table grapes.

And, ethylene modulation by aminoethoxyvinylglycine increases nut set on walnuts.

Overcoming Genetic Limitations

Gibberellic acid improves seed germination on dwarf rice varieties and increases berry size on seedless table grapes.

Gibberellins and cytokinins can also increase fruit size in small apple varieties.

Reduce Labor Costs

Cytokinins and auxins induce thinning of flowers and fruits. Ethylene modulation by aminoethoxyvinylglycine allows growers to manage the timing of fruit maturity and, thus, the harvest process.

Expand Post Harvest Life

Ethylene modulation by aminoethoxyvinylglycine and ethylene receptor blockage by 1-methylcyclopropene can enhance fruit storageability. And, gibberellic acid extends the green life of bananas during transit and storage.

Plant Growth Regulator ”Gibbersib”

Gibbersib is a natural plant growth regulator produced by Sibbiopharm Ltd., Berdsk, Novosibirsk Region, Russia. The active substance is a complex of sodium salts of highly active gibberellins A3, A7, ISO A3, ISO–A7. Gibberellins are the most extensive and important group of phytohormones belonging to the class of terpenoids.

Gibbersib increases the yield and quality of vegetable, fruit and berry crops by: stimulation growth and development of plants, increasing number of ovaries, accelerating ripening harvest, increasing resistance to diseases and adverse weather conditions and formation of parthenocarpic fruit.

Gibbersib is produced on the basis of microbial cultures of Fusarium moniliforme.

Text 12. Biochemical Biopesticides – Insect Growth Regulators

Источник: http://www.bpia.org/biochemical-biopesticides/

Biochemical biopesticides are divided into several different subcategories of products, including:

Insect Growth Regulators

Biopesticide Insect Growth Regulators (IGRs) have a unique mode of action separate from most chemical insecticides. Generally speaking, these products prevent insects from reaching a reproductive stage, thereby reducing the expansion of pest populations. The direct impact of IGRs on target pests combined with the preservation of beneficial insects and pollinators aids growers in maximizing yield and product quality.

IGRs can be divided into two broad categories; i.e. those that disrupt the hormonal regulation of insect metamorphosis, and those that disrupt the synthesis of chitin, a principal component of insect exoskeletons. Agricultural applications currently focus on the first category of compounds, products which are also known as ”hormone mimics”.

Azadirachtin is one of the most widely used botanical insect growth regulators. Because of its structural resemblance to the natural insect molting hormone ecdysone, azadirachtin interrupts molting, metamorphosis, and development of the female reproductive system. Immature insects exposed to azadirachtin (mainly by ingestion) may molt prematurely or die before they can complete a properly timed molt. Those insects that survive a treatment are likely to develop into a deformed adult incapable of feeding, dispersing, or reproducing.

Since beneficial insects, predators, and pollinators do not feed directly on the treated foliage, biopesticide insect growth regulators are con-

sidered ”soft” on beneficial insects such as honeybees, lady bugs, green lacewings, and the parasitic wasps. Due to their unique mode of action, biochemical insect growth regulators have played an important role in integrated pest management systems and as an effective resistance management tool. A good example is the use of azadirachtin IGR in aphid population management programs for lettuce crops in the Salinas Valley, Calfornia. Due to restrictions placed on certain crop protection products, the lettuce industry has relied on the use of contact and systematic control measures – some with overlapping modes of action – which creates concern for pesticide resistance. Integrated use of azadirachtin provides control by impacting the larvae and nymphs of multiple aphid species, breaking the life cycle before they become reproducing adults.

Another azadirachtin success story is its use for pear psylla control on pears in the Pacific Northwest Region of the US, where growers integrate traditional control products, azadirachtin, and kaolin clay for a effective pest management with significantly reduced use of harmful chemical insecticides.

Text 13. Biochemical Biopesticides – Organic Acids and Pheromones

Источник: http://www.bpia.org/biochemical-biopesticides/

Biochemical biopesticides are divided into several different subcategories of products, including:

Organic Acids

Peracids are highly effective sanitizing agents used for control of pathogens and algae. Peracids, also called activated peroxygen, use hydrogen peroxide (H2O2) as their base component. Hydrogen peroxide is a well-known chemical compound that can be found in most people’s medicine cabinets for disinfecting cuts and bruises, among other uses. Peracids combine hydrogen peroxide and organic acids, typically acetic acid, to form a new compound called peroxyacetic acid, abbreviated as PAA. This new compound is an activated form of hydrogen peroxide and produces a much more stable and powerful oxidizing compound to treat pathogens and algae in water.

The mode of action of peracids is by oxidation of cell membranes and penetration into cell structures of algae, bacteria and fungi. More specifically, peracids form free hydroxyl radicals (OH), which oxidize and disrupt thiol groups in proteins and enzymes.

Several features make peracids an excellent choice for agricultural and horticultural water treatment. First, peracid products that have been specifically formulated for horticulture offer a high degree of safety with regard to phytotoxicity. With formulated peracids, the grower can easily adjust the concentration of active ingredient in the treated water to account for increased biological loading. This is important since some organisms are easily susceptible even at low levels of peracids whereas others such as Pythium require higher active ingredient levels. Peracid products can be used for sanitation of greenhouse surfaces, shock applications for tanks and piping, continuous application at a low concentration, and also as a bactericidal or fungicidal application to plant foliage or roots. A further advantage is that when peracids degrade, the by-product is oxygen, which is safe and beneficial.

Pheromones

Pheromones are chemical signals that trigger a natural response in another member of the same species. Insects release pheromones to serve many functions. These include secretion of pheromones to to indicate the location of food sources, to warn others around about potential dangers, or locate a potential mate for reproduction. For example, female moths release a sex pheromone into the air to attract male moths. Male moths detect the pheromone ”scent” and then follow it to locate and mate with the female. In agriculture, the problem is that a mated female insect pest lays eggs and the emerging larvae damage crops.

Synthetic pheromones can be used in a number of ways to disrupt pest ecology and reduce crop damage. The first approach is to place small amounts of the female pheromone in lures to attract males into traps. By measuring trap counts, technicians can use that data to predict insect populations and decide when to implement the appropriate control methods.

Another, more common, use of synthetic pheromones is mating disruption. Growers saturate the environment with a sex pheromone so the male moths cannot easily locate females, disrupting their ability to mate. No insect mating means no fertilized eggs, and no larvae to damage crops.

Each year, over one million acres worldwide are treated with pheromones to control insect damage through mating disruption. Like many biopesticides, synthetic pheromones are very specific, so they help maintain beneficial insects. They also provide additional benefits such as no re-entry intervals, no pre-harvest intervals, labor and harvest flexibility, worker safety, and environmental safety.

Text 14. Biochemical Biopesticides – Plant Extracts

Источник: http://www.bpia.org/biochemical-biopesticides/

Biochemical biopesticides are divided into several different subcategories of products, including:

Plant Extracts

Plants are, in effect, natural laboratories in which a great number of chemicals are biosynthesized. Many plants have developed natural, biochemical mechanisms to defend themselves from weed competition and animal, insect and fungal attacks. Some of these chemicals discourage feeding by insects and other herbivores. Others provide protection or even immunity from diseases caused by some pathogens. Still others help plants compete for resources by discouraging competition among different plant species. By studying the diverse chemistries of many different plant species, scientists have discovered many useful compounds that can be used as biopesticides.

Plant extracts have long been used to control insects. Dating as far back as 400 B.C., children were deloused using a powder obtained from the dried flowers of the pyrethrum plant (Tanacetum cinerariifolium). The first botanical insecticide dates back to the 17th century, when it was shown that nicotine from tobacco leaves killed plum beetles. Today, there are a number of biopesticide plant extracts being marketed as insecticides. These products fall into several different classes.

Insect Growth Regulators

Plant extracts that prevent insects from reaching the reproductive stage.

Feeding Deterrents

A compound, that once ingested by the insect pest, causes it to stop feeding and eventually, to starve to death. Crop damage is inhibited and the insect eventually starves to death.

Repellents

Typically compounds which release odors those are unappealing or irritating to insects. Examples include garlic or pepper-based insecticides.

Confusants

Confusants can be compounds that imitate food sources and are used as traps or decoys to draw damaging insects away from crops. Confusants can also be formulated as concentrated sprays designed to overwhelm insects with so many sources of stimuli that they cannot locate the crop.

Not only are plant extracts used directly as insecticides, but they are used also as a source for synthetic insecticides based on analogues de-

veloped in the laboratory. Scientists have modified molecules found in plants to be more toxic or more persistent. Common examples of this can be found in the pyrethroid and neonicitinoid families of insecticides, derived from molecules isolated from plants like pyrethrum (T. cinerariifolium) and tobacco.

Plant extracts can also be used as bioherbicides, and are based on several different modes of action.

Plant Allelopathy

A term used to describe the biochemical interaction that inhibits the growth of neighboring plants by another plant. Black walnut trees (Juglans nigra), for example, produce the allelochemical juglone, which is toxic to many other plants. Many recently discovered allelochemicals have potential for development as natural product herbicides.

Plant Growth Regulation

Some plant oils can act as effective contact herbicides through a variety of mechanisms such as disrupting cell membranes in plant tissue, inhibiting amino acid synthesis, or precluding production of enzymes necessary for photosynthesis.

Mechanical Control

Some plant extracts are powerful natural agents which act directly on weeds. D-limonene, for example, is an effective degreasing agent which strips the waxy cuticle from weed leaves, causing necrosis, dehydration and weed death.

Plant extracts are also used in commercial agriculture as fungicides and anti-microbial tools in food safety applications. They rely on the following modes of action.

Fungicidal Control

Some plant extracts act as contact fungicides. Some disrupt cell membrane integrity at different stages of fungal development, while others inactivate key enzymes and interfere with metabolic processes.

Induced Resistance

Crops treated with some plant extracts produce and accumulate elevated levels of specialized proteins and other compounds which inhibit the development of fungal and bacterial diseases. In effect, the crop's immune system is triggered to defend against destructive diseases.

Using plant extracts as biopesticides offers growers many unique benefits. Generally, plant-based compounds degrade rapidly, reducing the risk of residues on food. Many of these products have very short prehar-

vest intervals. Most products show wide windows of crop safety and resistance to these compounds is not developed as quickly as with synthetic pesticides due to multiple modes of action. Many plant extracts used as insecticides are fast-acting, quickly inhibiting insect feeding and additional crop damage. And, because they act on the insect's gut and rapidly decompose in the environment, many plant extract insecticides are more selective to insect targets and safer to beneficial insects.

Text 15. Natural Pest Control – Solarisation

Источник: http://www.infonet-biovision.org/PlantHealth/Solarisation

Solarisation can be used against the following pests: Cowpea seed beetles, Late blight, leafminers, damping-off diseases, Storage pests of seeds and grains (Grain borers, Grain weevils, Grain moths).

General Information on Soil Solarisation

Soil solarisation is a method of controlling soil-borne pests (soil-borne fungi, bacteria and nematodes) without application of pesticides by placing plastic sheets on moist soil during periods of high ambient temperature. The plastic sheets allow the sun's radiant energy to be trapped in the soil, heating the upper levels. Transparent plastic allows a more effective heating of the soil than black or coloured one. Also, the thinner the plastic the greater the heating will be, though the plastic should be resistant to wind and or puncture by animals should be avoided.

Soil solarisation is most applicable and viable in arid and semi-arid conditions where hot temperatures prevail during day time. However, poor-resourced smallholders may not have financial resources to invest in buying plastic mulches nor leaving their restricted land units for a month without cropping.

Solarisation during hot months can increase soil temperature to levels that kill many disease-causing organisms (pathogens), nematodes, and weed seed and seedlings. It leaves no toxic residues and can be easily used on a small or large scale. Soil solarisation also improves soil structure and increases the availability of nitrogen (N) and other essential plant nutrients.

How to prepare the soil:

Soil to be solarised must be well prepared by tilling and should be crumbled to a depth of 30 to 40 cm. Solarisation is effective only if done in moist soil. The field must therefore be irrigated until a depth of 50 to 60 cm before mulching. Solarisation is most effective if the plastic is laid

as close to the soil surface as possible. Remove weeds, stones and other debris that could puncture the plastic.

Laying the plastic sheet:

Sheets can be laid by hand. The edges of the sheet should be buried in small trenches around the field. Plastic can be laid either in complete coverage where the entire field to be planted is covered or strip coverage where only beds or parts of the field are treated.

Strip coverage effectively kills most pests and eliminates the need for deep cultivation after solarisation. It is especially effective against weeds, since the furrows are cultivated. Strips should be a minimum of 75 cm wide; beds up to 1.5 m wide. Strip coverage can be more economical because less plastic is needed. With strip coverage, however, longterm control of soil pathogens and nematodes may be lost because pests in the untreated soil in the rows between the strips can contaminate and reinfest treated areas.

Duration of treatment:

The plastic sheets should be left on the soil for 4–6 weeks to allow the soil to heat up to the highest temperature possible. Then, the plastic can be removed. If the soil must be cultivated for planting, the cultivation must be shallow, less than 5 cm, to avoid moving untreated soil to the surface.

Solarization of Seeds and Grains

Dry grain and seed that has been attacked by grain weevils, borers or moths can be treated as follows:

1. Put affected grain in a black plastic bag and close tightly, closing in at least 50 % air space.

2. Put the bag in the sun. If the seeds are to be used for planting, insert a thermometer to be sure temperature inside the bag does not exceed 50 degrees Celsius (above this temperature the seeds will quickly loose capacity to germinate).

3. Leave for a day.

4. Check at the end of the day if any insects are still alive. If the sun has been hot enough the insects will have died at the end of the day. If a few are still alive, repeat the treatment. The grain can then be stored using good storage practices as described under storage pests.

ПРОФИЛИ: Селекция и генетика сельскохозяйственных культур, Селекция и генетика сельскохозяйственных культур – программа "Генно-технологические основы селекции сельскохозяйственных культур"

Text 1. Plant Breeding Techniques – Selection. Part 1

Источник: http://sciencegroup.org.uk/ifgene/breedap4.htm

Genetic variation is the source of all biodiversity in the world. New genes, gene combinations and gene frequencies result from mutations, from selective advantages of one genotype compared to other genotypes and from recombination by pollination and fertilisation. Plant breeders have homed in on these basic principles, creating (crossing) and finding genetic variation, followed by the selection of the most desirable genotypes. Characteristics for optimal processing and consumption are selected, but also traits which enable the genotype to be maintained (stability) and propagated.

The three main factors in plant breeding are:

– selection;

– creating new varieties and combinations;

– maintenance and propagation.

Selection

The purpose of selection is to point out the most promising genotypes in a group of plants. However, variation in plants is determined to a large extent by environmental factors such as growing conditions, therefore statistics and indirect selection methods are often used to account for the influence of these factors.

Mass Selection

How It Works

Mass selection is based on the ability to recognise desirable or undesired characters in plants of a population. What appear to be the best plants are maintained in bulk (positive mass selection), while plants with too little of the desired characteristic are eliminated (negative mass selection). The selected plants flower simultaneously and are harvested in bulk for the next generation, i.e. next selection. In positive mass selection, only a small part of the initial population passes to the next round, while in negative mass selection the greatest part passes through.

Preconditions

Mass selection does not require special facilities or techniques. Since selection is based on phenotype alone, the technique is particularly effective for those characteristics which are barely influenced by environmental factors and which are not inherited as dominant or recessive traits but rather as complementary traits.

Consequences

The technique is mostly applied during the early stages of a breeding programme, when there is not enough representative plant or seed stock for repeated testing, when seed stock needs to be improved at short notice, or when little capital is available for a breeding programme for a certain crop.

However, breeding based only on mass selection is a lengthy process. This is the selection method that most resembles natural selection.

Pedigree Selection

How It Works

In pedigree selection, a plant is maintained or eliminated on the basis of the performance of its progeny. It often follows mass selection in a population. Each selected plant is then harvested separately. In the next generation the seeds from each are planted as distinct lines. Lines will only be maintained following a favourable assessment of performance throughout the line. The best plants of the line will be identified and their seed will again be harvested separately for the next round.

By splitting into lines a general view of the parent plant's genotype is gained. Negative recessive characteristics, for example, often crop up with this method. The selection is made on the basis of general impressions (phenotype) and heredity of the desired characteristics (genotype).

Preconditions

Pedigree selection requires a sound infrastructure and administration, since seed is not harvested and processed in bulk but in small quantities, per line and per plant.

Consequences

Pedigree selection enables selection for phenotype and progeny and thus provides new cultivars sooner than mass selection. The method is particularly appropriate for self-pollinators. In cross-pollinators, some cross-pollination between selected plants and other plants in the line or between selected and non-selected plants is bound to occur in the trial plot. This can be a problem when the most important characteristics (for example, grain formation or crop quality) cannot be assessed until after flowering.

Site-determined Selection

How It Works

This method is applied especially in organic breeding programmes for cereals such as wheat, barley, rye and spelt. However, in theory it is also suitable for use with other crops.

The goal of this selection method is to select varieties, usually population varieties, which are optimally adapted to specific regional conditions. The parent lines are also selected with the final growing site (region) of the crop in mind. Crosses are carried out at a central location, where the F1 is also sown. The F2 and F3 plants are assessed and selected at different locations by means of pedigree selection. This is a combination of natural selection and artificial selection.

In other words, environmental factors determine which characteristics are expressed and which are not and this may influence the breeder's selection of promising phenotypes.

Preconditions

Suitable trial plots must be available in each region where varieties are to be developed.

Consequences

This method ensures that natural and artificial (human) selection works towards the same goal, namely, a variety with optimal ecological stability (Kunz & Karutz, 1991).

The method differs from conventional methods because the seed stock is assessed and selected at different locations at a relatively early stage in the breeding programme.

The goal is to find optimal types for specific locations. Conventional breeders usually select plants that perform acceptably at all locations.

Change in Surroundings

How It Works

In this method, subsequent generations are grown in vastly different environments in alternate years; for example, on sandy soil one year and on clayey soil the next; or in different climates, dry-wet, mountain-valley, coastal-inland etc. Thus, types with adaptability to extreme conditions are selected within a variety or population. Subsequent selection and variety development of these types is performed at one location.

Preconditions

Breeders must have trial plots in vastly different environments. The seed stock/variety should still have considerable variation in characteristics which are expressed in the different surroundings.

This method depends on a breeder's knowledge of the plant in all its facets, otherwise specific types will not be identified.

As with any selection method, the breeding goal should be clearly defined.

Consequences

This method appears to work best with cross-pollinators, since plants which are fertilised in the open maintain considerable genetic variation. This method makes the most of the potential qualities of a variety.

The method was first developed for breeding biodynamic rye. However, if only existing varieties are used in the selection process, the different types may differ in appearance but will have a similar genetic make-up.

In the long term, genetic erosion of the cultivar could creep in unnoticed. To prevent this, new crosses will occasionally need to be made.

Text 2. Plant Breeding Techniques – Selection. Part 2

Источник: http://sciencegroup.org.uk/ifgene/breedap4.htm

Change in Sowing Time

How It Works

A change in the sowing time is usually applied in organic breeding to improve quality characteristics in cross-pollinating winter wheat. Sowing in the autumn (September-October) appears to improve the nutritional quality (baking quality), while sowing towards the beginning of winter (late November-early December) improves seed quality. The morphology and quality of the plant are influenced by the sowing time in subsequent years.

Preconditions

No special preconditions apply.

Consequences

Sowing time may be varied per crop and per goal. It is vital that a breeder knows his plant and his goal from years of experience. For example, in winter rye, three years of late-spring sowing results in a tall and limp plant with small ears containing many small grains. By contrast, late-autumn sowing results in a much stockier plant with few leaves. Alternating late-spring sowing with late-autumn sowing yields a long-straw plant with plenty of vigour. According to Spiess (1996), winter wheat varieties are best maintained by always sowing in late-autumn.

Ear-bed Method

How It Works

This organic breeding method was developed especially for cereals, but it may also be used for other crops. An ear bed is a seedbed in which

the grains from one ear are sown in the same sequence in which they were arranged in the ear. Thus the plants in the seedbed (ear-bed) reflect the quality of the original ear. The plants' vigour, nutritional quality, resistance, production etc. will differ depending on whether the plants are grown from grains from the middle, upper or lower part of the ear. To induce additional variation, the plants originating from the upper part of the ear are selected in one year and plants from the lower part in the next year. The ear-bed method may also be used in the early stages of variety development. In this case, plants are not selected from the different ends of the ear but from the middle.

For plants with a different form of inflorescence, such as podded crops, seeds from the pod are planted in order, also taking into account the order of the pods. Thus the bed starts with the seeds from the lowest pod and ends with the seeds from the highest pod.

Preconditions

This method demands an accurate trial plot design and administration.

Consequences

This method utilises the variation between plants as well as intra-plant variation.

Indirect Selection

How It Works

Some characteristics are not easily identified. Sometimes this is because of great variability in the crop, requiring repeated testing with large numbers of plants, a procedure which is only feasible with a limited number of selections during the advanced stages of a breeding programme. In all other cases, testing is expensive, complex or bound to restrictions (such as testing for a notifiable disease). In these cases, the solution may be to use indirect selection markers. Markers are identified more easily and are strongly linked to the desired characteristic. Thus selecting for the marker characteristic will also improve the plant with respect to the desirable characteristic. In some cases, linkage is due simply to the proximity of genes on the chromosome; these genes have little else in common but almost always occur simultaneously, for example flower colour and resistance to disease. In other cases, it is not clear whether the linkage has a genetical or a physiological basis.

Biochemical and molecular techniques are often used in indirect selection. Isozymes have a slightly different composition from common en-

zymes and can be shown as a banded pattern on a gel. A certain band links up with a desirable characteristic. For example, the gliadin and glutenin bands in wheat are linked to baking quality. Isozyme analyses in seedlings can largely replace extensive testing for disease and baking trials.

Preconditions

Before indirect selection can be carried out, a linkage must be found between a marker and the desired characteristic through genetic research. Only then can it be incorporated in a breeding programme. When a marker is an easily identified qualitative characteristic of the plant, no special facilities are needed.

Consequences

Indirect selection can contribute considerably to breeding programmes.

Test Crosses

How It Works

In breeding, it is not enough merely to select the best cultivars, but parents with good crossing ability must also be available, so that a number of important characteristics are combined and passed on to progeny. This is especially crucial for asexually propagated plants and hybrids.

Promising parent genotypes are crossed with a number of other known genotypes. Progeny is grown separately and assessed for the desired characteristics. The measurements are used to determine General Combining Ability (GCA) and Specific Combining Ability (SCA), and these are needed if effective crosses are to be made. The most extreme type of test cross is the diallel, in which a range of genotypes is intercrossed in all possible combinations, both as female and as male parent. Diallel crossing schemes are not much used in the later stages of breeding practice, but are limited more to the research phase.

Preconditions

A lot of time goes into test crosses and extensive testing facilities are needed. New cultivars are rarely to be expected directly after a cross, but these crosses do provide valuable information about a genotype's potential in future crosses with other promising genotypes. More than anything, test crosses are an investment in the future.

Consequences

Building up sound knowledge about the value of parent lines in a cross-breeding programme is typically a long-term investment, especially with self-pollinating and cross-pollinating plants. Often, only the larger

breeding programmes will be able to afford such an investment in knowledge, on top of the required working capital. However, the investment pays back in the end, with a solid cross-breeding programme based on in-depth knowledge of the seed stock.

Text 3. Plant Breeding Techniques – Inducing Variation. Part 1

Источник: http://sciencegroup.org.uk/ifgene/breedap4.htm

One is only able to select if there is variation in a plant population. Variation can be stimulated by various means. The methods below induce variation at crop and plant level.

Combination Breeding

How It Works

Most plant breeders start their selection programme by crossing two genotypes of the same species, for example two accepted cultivars. Generally, these are easy crosses and since the two genotypes in the cross have already proven their worth as cultivars, interesting new genotypes are to be expected in the next generation. Depending on the plant, whether it is asexually propagating, self-pollinating or cross-pollinating, various generations are propagated and selected after the cross. Usually one of the selection methods described above is used.

Preconditions

No special facilities are required for combination breeding. It is crucial that both pollination and fertilisation are affected only by the intended paternal plant. The cross may be carried out by hand, for example after emasculation, or by pollinator insects caged in with the plants.

Consequences

The recombination of characteristics through cross-breeding is a generally accepted technique and requires no special skills.

Species Crosses

How It Works

Sometimes a desired characteristic is not found in existing, regionally adapted cultivars but it may be found in cultivars from other climate conditions, in wild relatives of the cultivar, or in other, similar species. Common examples of such characteristics are disease resistance and the more extreme forms of stress tolerance. Breeders often come up against the limitations of crossing when wild plants or other species are used. Basically, there is a limit to the ability of one plant to fertilise a plant of another species. There are several biological explanations for this which we will not go into here.

Breeders have developed a number of methods to get around these cross limitations. Below, we describe methods which involve the plant as a whole and which are carried out in the greenhouse. These methods usually have mediocre success rates.

Bridge Crosses

How It Works

In effect, a bridge cross is an interim cross which is made if a cultivar cannot be crossed directly with its wild relative. The wild plant is first crossed with another (wild) species, its progeny is selected for the desired characteristic and these are then crossed with the cultivar.

Many combinations are possible with bridging crosses, all of which should lead to the incorporation of the desired characteristic in the cultivar.

Preconditions

Breeders must have access to a large collection of wild relatives and must have considerable knowledge of how they respond to intercrossing. The desired characteristic must be relatively easy to select.

Consequences

Making bridge crosses is a time-consuming process. Once the characteristic has been incorporated in the cultivar, a number of backcrosses are needed to rogue out as many undesirable ”wild characters’ as possible.

Temperature Treatment of the Style

How It Works

Some barriers in the style may be broken down by exposing the plant or the style to higher temperatures for a certain period of time.

After the temperature treatment, the pollen may succeed in working its way down the style to the ovary.

Preconditions

A special temperature-controlled space is needed for temperature treatment.

Consequences

A previously impossible cross is made possible without a major intervention.

Cut Style

How It Works

This method is used when the pollen does germinate on the stigma, but cannot work its way far enough into the style, so that the ovary is never fertilised. Sometimes fertilisation can be achieved by cutting (part of) the style of the female plant and mixing the pollen with stigma juice

exuding from the cut. The pollen tube now has only a short distance to grow, increasing the chance of fertilisation.

Preconditions

No special facilities are needed for this method. It can be carried out in the greenhouse. This method is suitable for only some plants, such as ornamentals with a long style. It is likely that seed is formed only if the two species are closely related.

Consequences

This method is particularly suitable for crossing short-style flowers with long-style flowers. Pollen is helped partly down the long road to the ovary. Subsequent fertilisation and seed formation proceed naturally.

Grafting on the Style

How It Works

This method can be used when pollen fails to germinate on the stigma of the female plant. Germination is a positive response reaction. When pollen and stigma fail to ”recognise” each other, pollen will not germinate. Grafting was developed for plants with long styles (such as lilies). Pollen is first applied to the stigma of a plant of the same species, so that it germinates effectively and the pollen grows some way into the style. The style is then cut off, just below the point reached by the pollen germ tubes, and grafted on a cut style of the female plant. When the two styles have joined, the pollen germ tubes continue down the style of the female plant and fertilise the ovary.

Preconditions

These are the same as for the cut style method. For practical reasons, the method is only feasible for plants with a fairly long style.

Consequences

This is a more drastic method than cutting the style, since the response mechanism is bypassed. However, fertilisation and seed formation then proceed naturally.

Text 4. Plant Breeding Techniques – Inducing Variation. Part 2

Источник: http://sciencegroup.org.uk/ifgene/breedap4.htm

Mentor Pollen Technique

How It Works

The mentor pollen technique can be used to solve recognition and growth problems. To this end, pollen from the chosen male parent is mixed with pollen from the same species as the maternal plant. The lat-

ter's pollen has been partially inactivated by irradiation; it still germinates but does not fertilise. The mentor pollen germ tubes "guide" the pollen germ tubes from the male parent to the ovary, which is fertilised by pollen from the male parent. Mentor pollen which has not been irradiated, and which has thus retained its vigour, may also be used but is less efficient.

Preconditions

Pollen radiation must be outsourced. Otherwise, no special facilities are needed.

Consequences

For this technique, the species' own pollen is first inactivated by means of irradiation. Fertilisation and seed formation proceed naturally. When untreated mentor pollen is used, many more crosses are needed to achieve the desired cross. The numerous seedlings resulting from such crosses must all be assessed, a daunting task. Selection with DNA markers might be an option here.

Repeated Backcrossing

How It Works

Species crosses may yield progeny that have so many exotic or wild characteristics as to make direct selection for valuable genotypes impossible. Sometimes, the genetic distance between cross parents results in instability in progeny, for example through polyploidy, aneuploidy, abortion of seeds, fertility problems. In these cases, repeated backcrossing with a well-adapted cross-parent may eliminate some of the wild and/or exotic traits, finally producing a genotype that is highly similar to the well-adapted parent but with the additional desired characteristic. A breeder must usually make three or four backcrosses before being able to switch to pedigree selection.

Selection is focused on the presence of the desired characteristic and minimal "wild" characteristics.

Preconditions

Repeated backcrossing is time-consuming. Seed formation and fertility problems may yet crop up in later backcrosses.

Consequences

Repeated backcrossing is most suitable when a desirable new characteristic must be incorporated in an existing variety. The new character should not alter the genotype's suitability for cultivation. Molecular markers can help speed up the process of selecting a new characteristic while at the same time testing for the absence of other genetic donor ma-

terial (marker assisted backcrossing). Gene constructs can also be transferred into an existing variety. However, traditional backcrossing is by no means outdated, having already proven its worth for a great many varieties which have gained a high tolerance to biotic and abiotic stress.

Hybrid Breeding

How It Works

Selecting new cultivars is particularly difficult in cross-pollinators as a lot of intra-varietal variation is inevitable. Inbreeding becomes a risk when propagation between selection cycles is limited to the selected lines only. Moreover, both cross-pollinators and self-pollinators show greater vigour when there are two different alleles for a gene (heterozygous), rather than if the plant is homozygous for that allele. A plant that is heterozygous for a single-factor pair is a genetic hybrid and its increase in vigour is called hybrid vigour, or heterosis. Hybrids are produced by crossing two homozygous (inbred) lines. This breeding method is particularly popular for cross-pollinators. Parent lines must be artificially inbred to obtain sufficiently homozygous lines. This can reduce the vigour of the parents. Breeders select for the most vigorous inbred lines so as to produce the most vigorous F1.

Since the F1 progeny are the new cultivar, large quantities of F1 seed must be produced. Emasculating and pollinating by hand has only limited feasibility. In monoecious plants, where the male and female inflorescences are distinct, it pays to manually emasculate the male inflorescence. An example of this is maize. Dioecious plants and self-incompatibility (S-alleles, which prevent selfing, such as in cabbage), too, allow for the production of F1 hybrid seed. In many crops, naturally occurring cytoplasmic male sterility (cms) is incorporated in the maternal line by crossing or protoplast fusion. So-called male-fertile B-restorer lines which have the same genetic make-up as the maternal line are used to maintain the female line. In seed-forming plants, these restorer genes are also found in paternal lines, so that the resulting F1 can produce fertile pollen and form seed.

As yet, few hybrids have been produced from self-pollinators, although hybrid vigour has been shown. Developing and maintaining inbred lines is not a major problem in self-pollinating crops, since inbreeding is a natural consequence of selfing. It is seed production which forms the crux of the problem here. Deactivating the pollen of maternal plants is no easy matter; besides, the structure of the flower is rarely conducive

to large-scale pollination by paternal plants with the aid of wind and/or insects. In some crops, such as tomatoes, female lines are emasculated and subsequently pollinated manually. Each pollination produces large quantities of seed which sells for a good price, so that this labour pays off.

Preconditions

Hybrid breeding requires a sound system for large-scale production of F1 seed. The usual system is based on cytoplasmic male sterility and the presence of restorer genes. In addition, during seed production, plants must be protected against pollination by stray pollen to produce pure hybrid seed. Next to manual emasculation and male-sterility, use is made of gametocides and gene constructs to regulate the production of fertile or sterile pollen.

Consequences

Hybrid vigour usually yields a uniform and highly productive plant. However, it is not usually possible to produce progeny since the characteristics of the hybrid, an F1, will be split up. In effect, this is the hybrids' natural protection against propagation and it is one of the reasons why they are so popular with breeders, especially in countries without breeders' rights. As a result, the breeding of seed-forming varieties has often been neglected.

In cross-pollinators, the inbred parent lines of hybrids have reduced vigour. Some lines are maintained through tissue culture techniques. If cms is used, maternal lines – and in seed forming plants, also the F1 generation – can be maintained with a restorer line. Thus, some specialisation in reproduction has occurred at the plant level. When no restorer line is available, the maternal line is literally the end of the line as far as breeding goes.

In theory, breeders keep their own inbred lines for themselves. They are not available for other breeders or other breeding programmes. This contributes to the genetic erosion of the cultivar.

The gametocides and gene constructs mentioned above are secrets of industry and/or are protected by patents, which restricts their use to a small number of licensed breeding firms.

Parthenocarpy and Cucumber

How It Works

Parthenocarpy is the ability of certain plants to form fruit without prior fertilisation. This quality is strongly familial and thus fairly easily incorporated in cross-breeding. Parthenocarpy is used in cucumber. Cu-

cumber was originally a monoecious plant with male and female inflorescences. However, some varieties had hermaphrodite inflorescences or a combination of hermaphrodite and male inflorescences. In short, flowers of all types occur in cucumber.

Today, cucumber breeding is aimed at the production of true female hybrids, combining the female character with the character for parthenocarpy. Breeding has taken this route since fertilisation leads to small, round cucumbers full of seeds. These are not the cucumbers we want to eat. Naturally, seed formation remains necessary for the production of hybrid seed and maintaining parent lines. When the young plants of true maternal lines are treated with silver nitrate or silver thiosulfate, they grow male flowers. The resulting hybrid is female, so that there is no risk of ending up with seed balls which reduce production.

Preconditions

The tendency to form only female flowers is strongly determined by the surroundings. A climate-controlled greenhouse is necessary for this purpose.

Consequences

Highly toxic silver nitrate is applied to force a female line to produce male flowers for seed production. Female lines must also be treated in other ways to produce male inflorescence. The plants are subjected to stress, for example by placing them too close to each other, by denying them food and/or water or by growing them in poor light. Favourable results (number of male flowers) are by no means certain. The method might technically form a feasible alternative for organic farming; however, it is not an economically sound solution.

Alternatively, a hermaphrodite line could be used as the paternal line, but at the moment this is still a theoretical solution since existing hermaphrodite lines are impossible material. Because they form seed, their shape cannot be assessed and the lines have many undesirable characteristics. These could be incorporated in a hybrid if a hermaphrodite line were to be used as paternal line. Many more years of breeding might possibly result in this approach becoming a feasible alternative to the silver nitrate method.

Synthetic Varieties

How It Works

The term synthetic variety is often used for cross-pollinating varieties for which components have been individually selected for good com-

bining ability with pollination in the open. In other words, the components have a good general combining ability, or GCA. Synthetic varieties are a good solution for crops with a strong inbreeding depression.

The term may also refer to so-called self-pollinating ”multi-lines”. Repeated backcrossing may yield purebred lines of varietal quality which differ from each other in only one gene, for example a resistance gene. By combining these lines in one variety, a mix of characteristics is obtained which meets breeders' uniformity requirements while at the same time the variation in resistance genes creates a barrier for pathogens.

Preconditions

Before synthetic varieties can be bred, research must be carried out on the GCA of the components through series of pair crosses and testing sample combinations. Such activities require considerable investments of time and effort. Multilines are obtained through repeated backcrossing with the basic parent line of the multiline variety.

Consequences

Synthetic varieties often have heterosis. The progeny of a synthetic variety may have a poorer quality, although this effect is not as marked as with hybrids. Breeding according to the multiline concept requires long-term investment. The basic variety is selected first and only then can component lines be obtained through repeated backcrossing followed by selfing. The risk of multilines is that the cultivar might be outdated by the time it is introduced on the market. Moreover, it would appear that each distinct component line needs to be registered separately for breeders' rights; merely registering the multiline offers inadequate protection. This, too, is a costly affair.

Mutation Breeding

How It Works

New alleles might be considered desirable, in addition to existing alleles for a gene. New alleles often arise through mutations, or changes in DNA. Mutations may occur spontaneously, for example by exposure to sunlight, cold or heat, radicals, and sub-optimal conditions during cell division. Mutations are an interesting and valuable source of genetic variation and may be provoked by exposing plants to irradiation or chemical mutagens. Most mutations are recessive and as such are not directly visible in the treated plant. However, after selfing, the mutated genotypes may be identified in progeny. Some examples of genetic variation through induced mutations are: flower colour, trueness to type and the elimination of undesirable secondary metabolites.

Preconditions

There is a large selection of tried and tested mutagens on the market. Suppliers of irradiation are also fairly easy to find. Mutagens and irradiation should be applied by skilled personnel and safety guidelines should be complied with. The plants are usually safe after treatment, so that the selection methods described above can be carried out.

Consequences

Induced mutations occur at random; it should be kept in mind that only a handful of mutations contribute positively to the expression of the desired characteristic compared to the original seed stock.

Text 5. Plant Breeding Techniques – Propagation and Maintenance

Источник: http://sciencegroup.org.uk/ifgene/breedap4.htm

How It Works

When a new variety has been selected out of the new genetic variation, it must be propagated and maintained as a purebred. In self-pollinating and cross-pollinating plants, the selected genotypes flower in isolation. Positive mass selection ensures that the elite parent lines are of high quality and meet all the requirements of a variety. Diseases in parent plants are not usually passed on to seed. Most seed can be stored for long periods of time.

In asexually propagated plants, such as beets, bulbs or grafted plants, extra care must be taken to avoid deterioration in the health of the seed or plant stock. Stock often does not keep well, thus these lines are maintained through a continuous process of propagation. However, the advantage of vegetative propagation is that the progeny has exactly the same genotype as the parent, whether heterozygous or homozygous. Generative propagation through seed demands a much greater degree of homozygosity.

Seed can also be propagated asexually, however. This phenomenon is called apomixis and it occurs in cultivars (oranges, tropical plants) and wild plants alike. Seed is formed from the tissues of the maternal plant, often the embryo sac or the ovule. There are obligate apomicts, whose seed contains apomictic embryos, and facultative apomicts, whose seed forms both sexual and apomictic embryos.

Apomixis has caught breeders' interest because it combines the advantages of seed propagation – health and keeping quality – to the identical reproduction of the maternal genotype. However, we still have a limited understanding of this process. The fact that apomixis is a devi-

ation of sexual reproduction makes a study ofthe genetic principles of this occurrence difficult. Moreover, apomixis occurs only in polyploids. It would appear that apomixis is a dominant trait expressed by only a small number of genes.

Preconditions

The propagation and maintenance of cultivars requires great accuracy and attention to health aspects. Isolated propagation plots and positive mass selection of elite parent plants are often essential. This applies even more strongly to vegetatively propagated plants.

Apomictic propagation appears a promising method to maintain varieties. Unfortunately the technique is potentially suitable for only a limited number of species.

Consequences

Maintaining varieties requires considerable knowledge of plants and technical expertise. The use of tissue culture techniques is almost inevitable to ensure the health of stock material in the propagation of vegetative plants. Apomixis is an interesting alternative, but, at the moment, it is suitable for only a limited number of species. Moreover, the advantages gained in propagating and maintaining a variety through apomixis are almost entirely undone by the problems that such varieties typically give in cross-breeding (which is sometimes made impossible), recombination and selection.

Text 6. Plant Breeding Techniques – Molecular Techniques

Источник: http://sciencegroup.org.uk/ifgene/breedap4.htm

With molecular breeding techniques a single gene from a plant, animal or micro-organism can be integrated in the plant genome. A single characteristic can thus be incorporated in the plant. Several steps are necessary to produce a transgenic plant. Most of these steps are common, regardless of the exact transformation method. The steps are named below.

How It Works

Transgenic plants are obtained by following these steps:

1. Collect, isolate and clone the DNA fragment (from plant, animal or micro-organism) with the genetic code for the desired characteristic.

2. Determine the gene's DNA sequence, necessary for a patent application.

3. Construct a DNA chimera with a promoter, the gene and a terminator to guarantee sufficient expression in the plant if this is not possible with the plant's own means.

4. Clone in a vector suited for transfer to the plant and for the selection of transgenic plants (e.g. antibiotic resistance, herbicide resistance).

5. Carry out transformation using one of:

– natural genetic transfer" – Agrobacterium tumefaciens, Agrobacterium rhizogenes, viral vectors.

– direct DNA transfer – Electroporation, PEG mediated, particle bombardment.

6. Regenerate and select transgenic plants using tissue culture methods and antibiotics/herbicides (that is why resistance needs to be incorporated in step 4).

7. Check transgenic plants for ploidy level and phenotype using molecular methods and practical selection criteria.

8. Introduce the transgenic line into the cross-breeding programme.

Preconditions

Modern laboratories are necessary for research into and application of these techniques. Setting up and running such laboratories is expensive. In addition, licences are usually required for the commercial application of these techniques since many of them are patented. Patents may apply to any or all of the following steps:

– a gene's DNA sequence;

– the use of a transformation method;

– the use of an Agrobacterium vector;

– the use of a plant promoter;

– the use of an antibiotic/herbicide resistance gene.

To produce a transgenic plant, these molecular techniques are applied with tissue culture techniques such as protoplast culture and/or regeneration. This means that suitable techniques must be available for the plant concerned.

Consequences

Contrary to the situation with crosses and some tissue culture methods in which genetic material is combined, DNA fragments are incorporated randomly in a plant. This will always affect the structure of a plant's DNA and may result in a visible mutation. Such mutations will be expressed after selfing, in the S1 generation (homozygous transgenic plants). The chance of such mutations varies between 5 and 50 per cent, depending on species, transformation method, tissue culture method and the DNA construct used. Many more mutations without any visible effect may have occurred. It is assumed that further selection of transgenic plants in a crossing programme will eliminate all undesirable mutations.

Since DNA is a universal code for genetic character, DNA from any organism can be used to incorporate new qualities in a plant, such as bacterial herbicide and insecticide resistance. As molecular techniques become more advanced, plants are increasingly treated as bioreactors. For example, the processing industry is able to set specific requirements for plants, which are achieved by changing the plant's genome so that it will produce foreign substances.

Text 7. How to Breed Tomatoes for Organic Agriculture – Introduction

Источник: https://ru.scribd.com/document/239446405/How-to-Breed-To matoes-for-Organic-Agriculture

Tomatoes (Solanum lycopersicum) are an excellent crop to do plant breeding work with and can be used to clearly demonstrate the steps of breeding with a self-pollinated crop species. Not only do tomatoes readily self-pollinate, performing hand pollinations for controlled crosses is relatively easy. Tomatoes are also capable of producing prolific amounts of seed as each individual fruit can yield several hundred. Tomato varieties also span an abundant array of colors, shapes, sizes, and flavors, creating an exciting palette for the aspiring breeder to work with.

Although tomatoes are not impressively high in nutrients, they make up a significant amount of the U.S. diet. While North Americans consume tomatoes mainly in processed form, most often in sauces or pastes, the consumption and popularity of fresh market tomatoes is on the rise. This may be due to improved varieties and an increasing interest in the wide range of tomatoes available, such as grape, specialty, heirloom, and greenhouse types.

Modern tomatoes span a number of distinct market classes. These classes include cherry types with round, grape, and pear shapes; saladette types that are similar to cherry types but larger and round; large, round slicer types; paste or plum types that have thick walls with high total solids, mainly used for processing; and heirloom types. There are also wild species, such as Solanum pimpinellifolium, that will readily cross with domesticated types.

Breeding projects can be done within or between any of these market classes. For example, if improving flavor in a slicing type is the goal, then one approach is to cross a modern slicer and an heirloom type known for superior flavor, such as "Brandywine". If the goal is to create something

novel, making a cross between two distinctly different tomato types from two different classes will provide abundant genetic variation from which to select. In general, if you are seeking to improve a variety for only one or a few traits, making crosses within a class will be most effective and efficient. On the other hand, if you want to create something novel or improve a number of traits, you may want to consider making crosses between two different tomato classes.

Several decades ago, it was common for a single tomato variety to serve multiple purposes and markets. Today, tomatoes are bred for specific markets, such as processing, fresh market, green-house, or home garden use. This change occurred largely because the combination of quality and cultural requirements for each of these four markets has become quite distinct, driving a relatively new and unprecedented specialization within the tomato breeding industry. To develop new varieties that thrive under the pressures and challenges of specific conditions, and to incorporate traits most important to each market, it is vital that breeding work use the same cultural practices and environmental conditions in which the finished variety will be produced.

Text 8. How to Breed Tomatoes for Organic Agriculture – Introduction to Breeding

Источник: https://ru.scribd.com/document/239446405/How-to-Breed-Tomatoes-for-Organic-Agriculture

All good breeding projects need a foundation of intimate familiarity with the crop. And good breeders start with good material. Take time to investigate which varieties and other germplasm resources are available to you before beginning a breeding project. A legacy of breeding precedes you, and it will benefit you to take advantage of the products of this experience and expertise. Finding good breeding material will save you time and potential frustration. In brief, the steps involved in breeding will be to:

– Develop and define your breeding goals.

– Identify parent material or varieties you'd like to work with or cross.

– Make crosses.

– Grow out and select over multiple generations, potentially making more crosses.

On-farm plant breeding involves making the best use of limited resources. The breeding plan for any crop will be based on a few key factors:

– Determining how much time, space, and resources you have to devote to breeding work.

– What your breeding goals are and how likely they are to be achieved.

– How much genetic diversity is available or created at the beginning of the project.

The combination of these factors will determine how many plants you will need to evaluate, particularly in the early stages of your work. For example, a cross between two genetically similar varieties with the goal to enhance eating quality may require relatively small populations. On the other hand, larger populations will be needed for crosses between two genetically distinct varieties with the goal to create a novel variety with good agronomic and culinary qualities.

We offer examples of Organic Seed Alliance's (OSA) approach to breeding self-pollinated crops in addition to a commercial pedigree breeding scheme. You can perform an interesting and successful breeding project without following an established commercial breeding procedure. OSA's approach allows you to incorporate a greater degree of genetic diversity into your breeding work while still achieving stability and an acceptable level of uniformity in a new variety. Incorporating and retaining diversity in your breeding work is good insurance against failure and environmental challenges. Retaining diversity is an especially good idea if you are new to plant breeding, because it keeps you from narrowing genetic material too much and too quickly, and buffers against making poor choices due to inexperience.

Text 9. How to Breed Tomatoes for Organic Agriculture – Breeding Goals

Источник: https://ru.scribd.com/document/239446405/How-to-Breed-Tomatoes-for-Organic-Agriculture

It is important to set clear and attainable goals for your tomato breeding work. Do you want to create a tomato variety that combines your favorite qualities from two varieties? Do you want to enhance or create disease, pest, or insect resistance in your favorite variety? Do you want to improve eating quality in an existing variety? Or do you want to create something entirely new? Are you breeding for your own use or do you intend to share, sell, or even license your creation? The goals and intended outcomes of your work will help you identify where to start and how to develop, create, and implement a successful breeding plan. While it is not necessary to be a trained geneticist to do good plant breeding, it is extremely valuable to understand basic genetic concepts and how they affect your breeding work.

Below there is a list of traits commonly included in tomato breeding work.

Agronomic Traits

Growth habit: Indeterminate varieties grow continuously with three leaf nodes occurring between each inflorescence. Determinate varieties express a finite amount of growth with only one leaf node between inflorescences. Semi-determinate varieties express intermediate growth with two leaf nodes between each inflorescence.

Plant stature: Tall plants are most common, dwarf varieties are less common.

Leaf shape: Heirloom types often express potato leaf shape whereas most modern standard varieties have regular shaped leaves. Potato leaf types commonly have exerted stigmas.

Canopy cover: Minimal leaf coverage can contribute to sunscald. However, minimal leaf coverage can also enhance color in purple types that have light responsive compounds in the skin.

Maturity: Maturity is related to the intended production environment. For example, early maturing varieties are needed in colder climates with short growing seasons.

Pedicle attachment: Fruit breaks off at the calyx in jointless pedicle types. In plants with jointed pedicles, fruit breaks off with a bit of stem. This is of particular significance for processing tomatoes where attached stems can puncture fruit and reduce quality.

Defensive Traits

Disease resistance: Some varieties have single gene resistance, also known as vertical resistance, for certain races of the following diseases: leaf mold, Septoria, late blight, Alternaria, Stemphylium, and verticillium and fusarium wilts, Dominant resistance to tobacco mosaic virus and nematode resistance is also available. Other forms of complex, polygenic (multi-gene) resistance, also known as horizontal resistance, exist and are extremely beneficial to robust breeding work. Wild tomato types are often used in breeding work as sources of disease resistance.

Drought tolerance: Complex and polygenic, little is known about the specific components of drought tolerance. Selection for this complex trait needs to be done under drought conditions.

Fruit Quality

Fruit color: This trait involves the combination of skin and flesh color. Skin is either yellow or color-less and flesh is red, yellow, orange, green,

or purple/brown. Color is an indication of the dominant compounds in the fruit, with lycopene dominant in red types, beta-carotene in orange types, delta-carotene in yellow types, and phytoene in green types. There are a number of genes that control and con-tribute to flesh color in tomatoes. Modifying genes may cause gradations in expression and production of color compounds. The particular combination of skin and flesh color result in the following colors of tomato fruits:

– Red types have red flesh and yellow skin.

– Pink types have red flesh and colorless skin.

– Yellow types have yellow flesh and skin (colorless skin and yellow flesh results in cream to pale yellow fruits).

– Orange types have orange flesh and either yellow or colorless skin.

– Green types have green flesh and either yellow or colorless skin.

– Black and brown types have red/green flesh with yellow skin.

– Purple types have red/green flesh with colorless skin.

Fruit stripe: This trait refers to dark green radial stripes that occur opposite the locules. Stripes tend to fade as the fruit matures.

Green striping: This trait refers to irregular longitudinal green striping on the fruit. Stripes will either stay green or turn yellow at full maturity.

Skin texture: Most tomato varieties have smooth skin, but peachy, fuzzy textured skin also exists.

Flavor: Flavor is a complex and polygenic trait. Locule size and number, as well as texture, are significant contributors to a tomato's flavor profile.

Texture: Heirloom types are known for their "meaty" flesh texture. This is often a desirable trait in tomato breeding work.

Shape and size: There are numerous possibilities for fruit shape and size as a large diversity exists in tomato germplasm. Your market will likely be the largest determining factor in what size and shape is most desirable.

Fruit ripening: Green shoulder types have dark green shoulders when immature whereas fruit of uniform ripening types are entirely light green when immature. Green shoulder types have recently been associated with superior flavor to uniform ripening types. Uniform ripening types are associated to some extent with crack resistance and are desirable for paste tomatoes.

Parthenocarpy: This trait refers to a plant's ability to set seed under limited pollination, which is important for setting fruit under hot or cold

conditions when pollen cannot function normally. Obtaining a specific combination of traits can be challenging in self-pollinating crops. Each generation of self-pollination increases homozygosity within the plant (i.e., the state in which the two alleles at a gene location are the same). Once the two alleles become the same at a given gene location, the trait it controls or contributes to, is considered to be fixed and will no longer segregate in successive generations. As the gene combinations sort out and the degree of homozygosity increases, specific combinations of traits become more settled. If the desired combination of traits is not achieved after five or more generations of self-pollination, then additional crossing and genetic recombination may be necessary. Because of this phenomenon, growing and retaining as large a population as is practical in the first few years is critical to optimizing your success.

A short discussion on yield: Although it is tempting to make selections for higher yield, selecting directly for yield is seldom very effective. Yield is strongly influenced by environmental factors and cultural practice. Instead, it is advised to base your selections on component qualities and characteristics that contribute to robust yields. This may mean placing emphasis on other traits, such as disease resistance, maturity, growth habit (determinate, semi-determinate, or indeterminate), concentration of fruit set, resistance to cracking, and other factors that contribute to a high percentage of quality, marketable fruit rather than focusing solely on the relative abundance of fruit. It is important to recognize and make selections based on favorable genetic combinations that are heritable, and thus can be passed on from one generation to the next. Just because a plant looks excellent in the field does not mean that it has excellent genetics. The plant may look good because it was placed in a superior location that had added fertility, or was subjected to very few stressors, such as disease, pest pressure, or lack of water. Incorporating family-based selection, also known as progeny selection, is the best way to minimize the chance of selecting plants that look good but may in fact be harboring unfavorable or weak genetic combinations.

Fortunately, there is no right or wrong way to do plant breeding. There exists boundless genetic variation and potential both in nature and in our work to intentionally cross one tomato to another. There is more genetic variability and potential than you could possibly capture in a single life-time. You will certainly miss or discard excellent genetic combinations, but you will capture others. Plant breeding requires a certain

amount of ruthlessness and a lot of decisiveness. Combined with an artistic eye and openness to unexpected results, plant breeding can become a dynamic and engaging lifelong passion.

Text 10. How to Breed Tomatoes for Organic Agriculture – Sourcing Germplasm

Источник: https://ru.scribd.com/document/239446405/How-to-Breed-Tomatoes-for-Organic-Agriculture

There are essentially two ways to begin a tomato breeding project: either create genetic variability or begin with genetically diverse material. To create genetic variability, you will need to make a controlled cross, create the opportunity for a natural cross to occur, or wait for an off-type or mutant variant to arise. What type of material you start with and where you source it from will depend on your objectives and how much time and energy you are willing to invest.

One place to begin is by acquiring a population of material that is known to be genetically diverse. This material is sometimes referred to as ”breeders’ mixes’ or collections. If you start with a diverse population, be sure to acquire the material from a reputable breeder, seed producer, or seed company. Some genetically diverse material is available in an unimproved or wild state. There may be some good material in these collections but it will likely take many years to tease it out.

You can also start by saving seed of a variety you know and love. This can be done with either a standard (non-hybrid) or a hybrid variety. Older standard varieties and heirlooms often contain surprising amounts of genetic variation. Standard varieties will give you less genetic variability and diversity to work with than a hybrid variety. Hybrid varieties of tomatoes are highly heterozygous (having different alleles at a number of gene locations across the genome), whereas standard varieties are much more homozygous (alleles are the same at most gene locations). However, nature is dynamic, and a new genetic variation is always arising. By paying attention to this genetic variation, you can identify variation that may be useful in a breeding project.

A common way to initiate a breeding project is to create genetic variability by making a cross. Controlled crosses are made by hand pollination, transferring the pollen from one desirable plant to the flower of another. Planting two varieties in very close proximity to each other can generate natural crosses. Natural crossing will most readily occur with

older standard and heirloom varieties or cherry types with exserted stigmas that facilitate and encourage cross-pollination. Nearly all commercial tomato breeders base their programs on controlled crosses followed by pedigree selection. Pedigree breeding follows a single line derived from a single cross to create a new variety.

You can also begin a breeding project by making a controlled cross between one or two quality F1 hybrids, which will create a plethora of genetic variability to select from. However, it will be difficult at best to predict what kind of variability you will get and if any of it will be useful or valuable. If you choose to start by crossing hybrids, we recommend that you grow out and observe the progeny of the hybrids you want to use as parents for at least one or two generations before making the crosses. This will allow you to see the variability and the genetic potential encompassed in each hybrid. It is not uncommon that the phenotypes of the parents of a hybrid are quite different from the phenotype of the hybrid itself. Knowing the genetic makeup and potential of your breeding material is important to any successful breeding project.

There are many sources for obtaining varieties or other germplasm to begin your breeding work. The USDA Germplasm Resources Information Network (GRIN) system is a great resource for sourcing both wild and cultivated tomato material. It is a searchable database housed within the USDA Agriculture Research Service. Tomato collections are housed at the Geneva, New York, and UC Davis, California, locations and material from them is available for free by request. The Seed Savers Exchange houses a large collection of heirloom and older standard varieties that have a wealth of potential for breeding work. Public universities, particularly land grant institutions, often have advanced breeding material that can be licensed or shared for breeding work. North Carolina State University, Cornell University, and Oregon State University have excellent tomato breeding programs. Local, regional, and national seed companies and seed libraries are also good places to source varieties for breeding work.

Once you have sourced potentially useful germplasm, conducting variety trials can assist you in identifying promising breeding material. Variety trials are a way of observing and evaluating a number of different varieties, or sources of a single variety, in a side-by-side comparison. Spending at least one or more seasons conducting trials is a great way to get to know a crop and to see the variation available for breeding work. A variety trial can be set up as either an unreplicated observation trial or as a replicated trial

that will allow you to deter-mine if the differences you see between varieties are due to chance or to the varieties themselves. For more information on variety trials and how to conduct them, refer to OSA's On-Farm Variety Trials: A Guide for Organic Vegetable, Herb, and Flower Producers, which is available for free download at www.seedalliance.org.

A word of caution on intellectual property protections: Unfortunately, there are some very restrictive intellectual property protections on agricultural seed. It is critical that you know what, if any, restrictions exist for the material you want to use. You need to be aware of whether a variety is protected through the use of a certificate granted through under the Plant Variety Protection Act (PVPA), a Material Transfer Agreement (MTA), or a utility patent. These forms of legal protection all have varying degrees of restrictions that may affect your ability to use certain varieties or other forms of crop germplasm, so be sure to research any possible legal restrictions on your breeding material before you begin.

Text 11. How to Breed Tomatoes for Organic Agriculture – Reproductive Biology

Источник: https://ru.scribd.com/document/239446405/How-to-Breed-Tomatoes-for-Organic-Agriculture

Grown under optimal conditions, tomatoes have a 95 to 115 day lifecycle. The first flowers will appear and open 7 to 8 weeks after seeding and mature fruits will follow 6 to 8 weeks later.

Tomatoes have perfect flowers that contain both functional male and female parts. The male parts are known as the stamens and are each made up of an anther borne on a filament. The female parts are known as the pistils and are made up of a style and stigma positioned above an ovary.

Flowering can occur for weeks, a feature of tomatoes that facilitates the ability to make crosses between varieties with distinctly different maturities. Normally at least 4 to 8 flowers are borne on each inflorescence, and a single tomato plant may produce as many as 20 or more inflorescences over a season, giving you ample opportunities for making crosses.

Most modern tomato varieties are almost entirely self-pollinating. This is facilitated by the floral structure in which a tight, protective anther cone forms around the stigma, greatly reducing the incidence of natural cross-pollination. In older standard and heirloom varieties, and often in cherry types, the degree of natural cross-pollination can be much higher than the occurrence in modern standard varieties. Older standard and

heirloom varieties often have longer styles, pushing the stigma either flush with or sometimes beyond the tip of the anther cone. This arrangement facilitates higher rates of natural cross-pollination.

Bee and insect activity can also increase natural cross-pollination, which tends to be higher on organically managed land due to diverse cropping systems and a lack of pesticides. If you are working with two older standard or heirloom varieties, planting them right next to each other may result in a natural cross.

Domesticated tomatoes, including both modern and heirloom types, are biologically compatible with many of their wild relatives. Unlike the modern, domesticated tomato, many wild relatives have self-incompatibility systems that enforce cross-pollination. Wild species have played an important role in tomato improvement as they have been, and continue to be used as, critical sources of disease resistance in most modern breeding programs.

Text 12. How to Breed Tomatoes for Organic Agriculture – Pollination Techniques

Источник: https://ru.scribd.com/document/239446405/How-to-Breed-Tomatoes-for-Organic-Agriculture

Following is a description of how to perform controlled crosses using simple hand tools and techniques. Making a controlled cross entails emasculating immature flowers by removing the androecium, or male structures, of the chosen female parent (pollen acceptor) and collecting and transferring pollen from mature flowers of the chosen male parent (pollen donor).

The first step in making a hand pollination cross with tomatoes is to identify which flowers are at the correct maturity to serve as the male and female. Since tomato flowers are perfect, the age and maturity of the flower will dictate whether it can be used as a male or female in the intended cross. Flowers open progressively along the inflorescence, with the oldest and most mature flower on the basal end and the youngest on the terminal end. You can expect 1 to 2 flowers to open each day.

Flowers in the late bud stage are most appropriate for emasculation. At this stage the corolla (petals) and anthers remain tightly closed around the pistil, the sepals will have begun to open, and the petals will be changing from pale to bright yellow. If the petals have already opened, or have begun to open, it is too late. The pollen will have already dehisced (been

released from the anthers) and likely pollinated the stigma. There will often be more than one bud on an inflorescence that is appropriate for emasculation. The highest success rates for hand pollination are achieved when using buds near the basal end of the inflorescence.

Emasculation can be accomplished with the use of forceps (recommended) or a pair of needle nosed tweezers. The corolla and stamen cone are tightly folded up around the pistil at the late bud stage, forming a two-layered cone that can be removed in a single step. Insert one point of your forceps into the top of the cone, between the pistil and the anthers, and work it in all the way to the bottom of the cone. Place the other point between the calyx (sepals) and the corolla. Grasp and firmly, but gently, pull straight up, removing the entire cone and leaving the pistil exposed and unharmed. If the cone does not detach in one piece, carefully remove any remaining anthers and pieces of corolla. It is also possible to pull off each layer of the flower, starting with the corolla and then removing the anthers individually. This method will work, though it may be more difficult to avoid damaging the style and stigma. Successful emasculation takes practice. Don't be discouraged if it takes several attempts.

For pollen collection, choose a fully mature flower from the plant you have designated to be the male parent. Removing the petals can be helpful, but is not necessary. Look for the series of longitudinal slits that run along the anther cone, work your tweezers into one of the slits, and pry the cone open.

There are three ways to transfer pollen: 1) remove a set of anthers and rub them against the stigma on your emasculated flower; 2) pull the style out of the emasculated flower and rub the remaining anther cone over your emasculated stigma; or 3) collect pollen using a bell or other resonant tool held close to the flower and rung to shake pollen loose onto a collecting plate or slide, then dip your forceps into the pollen and paint it onto the exposed stigma of your emasculated flower. Multiple pollinations to the same flower can improve fruit set, and involves collecting and transferring pollen from several mature flowers of the male parent to the single emasculated flower of the female parent. Tomato pollen is long-lived and stores well in the event you need to collect it for future use. The pollen can remain viable for weeks at room temperature (out of direct sunlight), and if dried down and refrigerated can last for several months.

Label each cross with a tag identifying the female and male parents and the date the cross was performed. Small white merchandise tags

are effective and inexpensive for labeling crosses. It is also advisable to remove all other flowers from the inflorescence bearing the controlled cross. This step eliminates confusion at fruit set and focuses all of the plant resources for fruit development into that one fruit on that particular inflorescence.

It is important to rinse your forceps in rubbing alcohol when you move from working with one variety to another. This should be done both when you are doing emasculation and pollen collection. Rubbing alcohol will kill any pollen remaining on or sticking to your tool. This step is very important when you are making controlled crosses so as to avoid unintended self-pollination or contamination. Make sure to allow time for your forceps to fully dry before collecting pollen so that what you collect is not rendered useless by the alcohol still on your tool.

Emasculated flowers do not need to be covered to prevent contamination. At this point, the colorful and showy petals and anthers have been removed, so there is nothing left to attract potential pollinators. If you are conducting controlled pollinations outside in the field you may need to cover emasculated flowers with glassine bags to prevent them from drying out and desiccating under hot, dry, or windy conditions. Glassine bags are quite inexpensive and can easily be located with a quick Internet search. If possible, it is ideal to make crosses outdoors when the weather is cool and overcast with little to no wind.

Controlled pollinations can be effectively done in all daylight hours; however, some studies suggest a decline in effectiveness in the late afternoon. Each seed represents a separate act of pollination and fertilization and many varieties will set fruit if only a single seed is formed. Some varieties are parthenocarpic, meaning they can set seed without fertilization. Making crosses with these types of varieties is possible but may require multiple pollinations to ensure successful fertilization and seed set.

Text 13. How to Breed Tomatoes for Organic Agriculture – Breeding Methods

Источник: https://ru.scribd.com/document/239446405/How-to-Breed-Tomatoes-for-Organic-Agriculture

Whether you begin with a quality hybrid, a genetically diverse pool of material, or a controlled or natural cross, your breeding work will follow a similar course. In general, you will need to grow out the largest populations you can for the first several years followed by a few years of

single plant selections and family row evaluations. You will then bulk together the seed of desirable plants that meet your needs and goals. There is some debate about the minimum and ideal numbers of individuals per family that will maximize your chances of success. You will be better off planting fewer individuals from a greater number of families rather than planting lots of individuals from only a few families. Planting fewer than five individuals per family is not recommended. The more individuals you plant per family the more you will see the breadth of genetic potential and expression each family is capable of. Always keep some remnant seed in reserve each year so that all is not lost in the event of a crop failure or unintended cross-pollination.

The closer you can replicate the recommendations in this guide, the more grounded your work will be in the genetic foundations of plant breeding. That said, plant breeding is an art as well as a science, and the best plans are not immune to change and adaptation. Strive to maintain flexibility in your breeding work so you can adapt and change course in response to what you see in the field.

The pedigree method of plant breeding involves making a controlled cross followed by several successive generations of single plant selections. The goal is to develop at least one new variety from a single cross. Breeders and companies that employ this method are generally making many crosses each year and often have large programs. The fact that they are always working on multiple breeding projects simultaneously helps to ensure their success. The following example of a pedigree breeding method is based on the program at a public university that produces new tomato varieties for both the fresh market and the processing industry. This particular public program is relatively small in scale, so the numbers presented below may be smaller when compared to other commercial tomato breeding programs.

Although the pedigree method is a reliable and successful means to developing new tomato varieties, it can be genetically restrictive for on-farm and diverse system breeding work. A finished variety from a pedigree program is known as a pure-line, meaning the commercially released variety comes from a succession of single plant selections that result in a high degree of genetic uniformity. The development of multiline varieties is a more useful and genetically resilient approach to creating new varieties for organic and diverse farming systems. A variety released as a multiline is composed of several similar but genetically diverse pure-

line materials. This can be accomplished by following OSA's approach to breeding self-pollinated crops.

Our recommended population sizes and number of plants allow you to better observe the genetic expression of traits and make effective selections. As you modify numbers into smaller population sizes, your ability to distinguish between the genetic contribution to a trait versus the contribution of environmental effects diminishes. This does not mean you will not be successful, but rather the chance your selections will be based on non-genetic, and thus non-heritable, factors will increase. Strive to plant the largest populations of plants that you can practically handle.

It is also helpful to know if any of the traits of interest are dominant or recessive in nature. Once a recessive trait appears in a self-pollinated crop like tomatoes, you can be confident that it is fixed and will be carried on through future generations.

Dominant traits, on the other hand, require progeny observation to identify whether or not the trait is fixed or still in a heterozygous form. In this case, if the trait is fixed, the offspring will all express the dominant form of the trait; whereas, if the trait is not fixed most of the offspring (approximately 75 %) will express the dominant form of the trait and a few (approximately 25 %) will express the recessive form. For more on dominant and recessive trait expression and inheritance, refer to OSA's Introduction to On-Farm Organic Plant Breeding.

For a comprehensive list of known tomato genes, refer to the C. M. Rick Tomato Genetics Resource Center's list of gene names and symbols, found at http://tgrc.ucdavis.edu/Data/Acc/Genes.aspx.

Text 14. How to Breed Tomatoes for Organic Agriculture – Tomato Breeding Project. Years 0 and 1

Источник: https://ru.scribd.com/document/239446405/How-to-Breed-Tomatoes-for-Organic-Agriculture

Below we provide instructions for both the OSA method and pedigree method by breaking down the first six years of a tomato breeding project.

Year 0

Define your breeding goals and identify potential parent material. Use variety trials to help you evaluate and determine which varieties or other germplasm to use as parent material in your breed-ing work to best meet your breeding goals.

Year 1

OSA Method

Make crosses between several pairs of varieties; ideally between as many different parent varieties as is practical for you (shoot for 3 to 6). Increasing the number of parent combinations will increase the range of possible new genetic combinations to select from. It is more efficient to grow out and evaluate smaller populations of progeny from a number of different crosses than to look at a large population of progeny from a single cross. This approach increases the probability of finding your desired ideotype and combination of traits, and assumes you have promising parent material. Making crosses with inferior material just to increase the number of parent combinations will not be beneficial.

There are two approaches to making these crosses. The first is to make reciprocal crosses between the same set of parent varieties. The second is to make multiple crosses between different sets of parent varieties. A reciprocal cross uses two parent varieties as both the female and male in the cross: variety A crossed to variety B (A × B, the female plant is al-ways listed first in a cross) and variety B crossed to variety A (B × A). The second approach is to make multiple crosses between multiple sets of different parents. For example, if you plan to make six con-trolled crosses, you could either make reciprocal crosses between three different sets of parents or make crosses between six different sets of parents. Reciprocal crossing requires fewer plants and generally results in a narrower range of variation to select from.

Making multiple crosses between different types of tomatoes is the most efficient way to create a diverse pool of genetic material from which to begin your breeding work. For example, if you are interested in crossing an orange slicer with a red grape type, source three varieties of interesting orange slicers and three varieties of red grapes and make multiple crosses between them. These crosses would give you nine different combination options and 18 potential reciprocal crosses.

To ensure success, make controlled crosses between at least two sets of plants for each variety combination you are working with. Make crosses on at least 4 to 6 flowers on different inflorescences between every set of parents. Collect seed from two or more fruits from each cross. It is OK to combine seed collected from crosses between more than one set of the same parents, but keep seed from crosses between different sets of parents separate. If making reciprocal crosses, keep seed from each cross separate

(i.e., do not combine seed of A × B with seed of B × A). The following diagram illustrates this setup with crosses made between two sets of parents for each variety combination. The boxes represent where it is acceptable to combine seed. The two boxes on the right represent a reciprocal cross.

Pedigree Method

Make controlled crosses between three pairs of plants, using the same variety for the female and the same for the male in each cross. Make crosses on at least 4 to 6 flowers on different inflorescences between each set of parents. Collect seed from at least 2 or 3 fruits from each female parent plant. For example, say you have three plants (1, 2, and 3) from variety A that you have chosen to be your female plants, and three plants (1, 2, and 3) from variety B that are your male plants. Make four crosses on four different flowers on plant A1 using pollen from plant B1 (A1 × B1). Follow the same procedure using plants A2 and B2 in a cross (A2 × B2) and plants A3 and B3 in a cross (A3 × B3). When you collect, process, and clean the seed from these crosses, keep all of the seed from each cross together but separate from the rest (i.e., the seed from A1 × B1 is collected, processed, and cleaned separately from the seed from A2 × B2 and A3 × B3).

Text 15. How to Breed Tomatoes for Organic Agriculture – Tomato Breeding Project. Years 2–5

Источник: https://ru.scribd.com/document/239446405/How-to-Breed-Tomatoes-for-Organic-Agriculture

Year 2

OSA Method

The generation following your cross is known as the first filial, or F1, generation. All of these plants should look pretty identical, assuming the parent varieties were highly uniform. Plant 3 to 6 F1 off-spring from each cross you have made. The progeny plants should look distinctly different from the parent varieties. Planting out the parent varieties alongside the progeny can be very helpful as a visual comparison. If self-pollination has occurred instead of a cross, the offspring will resemble the maternal parent. Collect and bulk seed from several fruit of each original cross, keeping seed of each cross separate from the others.

Pedigree Method

Plant a half-dozen plants using the seed from one of your crosses. Keep the seed from the other two crosses as remnant seed in case of a crop

failure or unforeseen problem. Collect seed from several fruits from each plant and bulk the seed.

Year 3

OSA Method

This next generation is known as the second filial (F2) or first selfed (S1). This year you will begin to see the expression of genetic variability created in the cross. However, the genetic variability won't be fully expressed in this generation, so intensive selection should be avoided. Any selections should be based on highly heritable traits, such as growth habit, fruit size, shape, color, maturity, and disease or pest resistance. Plant several small populations from your multiple crosses, aiming for a total population size somewhere between 50 to 200 plants. Plant as many plants from each cross as you have the time and space for, as evaluation and selection will be minimal at this point. For example, if you started with three crosses, grow a population of at least 15 to 30 plants from each in this generation. However, consider that as you progress to family selection in the next several generations your total population size can substantially increase. If you are working with a cross between two distinctly different types of tomatoes (i.e., an orange slicer and a red grape) and/or are aiming to combine a suite of multiple traits, you will need to maintain large populations. If you are working with a cross between two similar tomatoes (i.e., two red slicers) and want to improve only a few traits, you can work with smaller population sizes.

Discard plants that are obviously or fatally flawed or easily succumb to disease. Taste test fruit from every plant and discard any plants with terrible or off tasting fruit. Strive to maintain the breadth of diversity and variability you see in this generation in your selections. Save seed from several fruits from as many of the remaining plants as you can practically handle, and keep seed from each plant separate. In the next season you will begin family observation. Each plant you save seed from in this season will become a family with five or more plants in the next season, so plan the number of your selections accordingly.

Pedigree Method

Plant a minimum of 100 plants, preferably 200, from the F1 seed. Selections are made to encompass the range of diversity expressed in the population. Select approximately 30% of the population: at least 30 individual plants from a population of 100. Save seed from 2 to 3 fruits on each. Keep seed from each plant separate. These plants now represent

30 or more distinct families. Depending on resources, time, and facilities, some public and private breeding programs will select more severely in this generation, keeping only 1 to 10% of plants in the population.

Selected plants from the F2/S1 generation are planted out to family rows the following year to create the F3/S2 generation. Each selection (plants that are circled) made from each of these families will become its own family in the following year to create the F4/S3 generation. Entire families can be eliminated in this generation and desirable individuals are selected. This cycle is continued for as many generations as necessary to arrive at material that reflects the desired ideotype and meets the breeding goals of the project.

Year 4

OSA Method

For the third filial (F3) or second selfed (S2) generation, plant each of your previous generation se-lections to single family rows with as many plants per family row as is practical. Since you potentially saved seed from 50 or more individual plants in the previous generation, plant 5 to 20 individuals from each of these families. At this point you still want to maintain a high degree of diversity and variability in your selections, and you still want to discard plants that are obviously or fatally flawed, taste terrible, or easily succumb to disease. Again, you only want to select for highly heritable traits. Collect seed separately from as many plants as you can reasonably work with as families in the next generation. Try to collect seed from the same number of plants as in the previous year so that your population size does not become unmanageable.

Pedigree Method

Plant 15 to 25 plants from each family into 30 separate rows. This generation will display the greatest range of expression of genetic diversity. In this round of selection the aim is to maintain the full range of variation in the population while striving to maintain the same approximate population size. Select 30 individuals and save seed from 2 to 3 fruits. Keep the seed from each plant separate.

Year 5

OSA Method

In this generation, F4/S3 individuals within each family should start to look similar and differences between families should start to become more obvious and distinct. Discard entire families that do not meet breeding goals or are performing poorly.

From each F3/S2 selection, again plant family rows with 5 to 20 individual plants per family. At this stage, you can begin a more rigorous

selection process. You can start to select for more quantitative traits, such as concentration of fruit set, yield, complex disease resistance, canopy cover and plant architecture, and quality traits, such as flavor, texture, and resistance to cracking. Select plants with favorable trait combinations and again save seed separately from each. Keep the number of selected plants similar to the previous two years.

Pedigree Method

Plant 10 to 20 plants from each plant selected the previous year into separate family rows. Make another series of single plant selections from within the most desirable families. Discard entire families that do not meet breeding goals or are per-forming poorly. Keep seed from each individual plant separate.

Year 6 (and beyond)

OSA and Pedigree Method

In the F5/S4 generation, begin replicated trials. Planting three randomized replications allows for analysis and evaluation of quantitative traits at this stage. Measurements can be taken and/or scores can be assigned to desirable traits. These numbers are then averaged over the three replications to illustrate and tease out the differences between families. If desired, basic statistical analysis can be performed at this point to deter-mine which, if any, of the families are statistically different (rather than different due to chance) from the others. An analysis of variance (ANOVA) is the most commonly used statistical test for this type of evaluation.

Plant three family rows of 5 to 10 plants from each F4/S3 single plant selection. Discard undesirable families that do not meet breeding goals. Base selections on quantitative traits, such as yield, productivity, fruit distribution, set concentration, and fruit quality. Families should be uniform enough to rouge out any underperforming individuals. Bulk the seed from remaining individuals within each family. Sometimes single plant selections are continued for a few generations past the F5/S4, depending on the stability and degree of uniformity in the material at this stage. Replicated trials are continued in the F6/S5 and F7/S6 generations to determine the most desirable and robust selection for an eventual variety release.

From this point on you can either maintain the variety by continuing to preserve the families separately and make composite mixtures when needed or maintain the variety as a single population. If you have not achieved the desired combination of traits and qualities at this point, consider making controlled crosses again using the most desirable plants.

35.03.03, 35.04.03 – АГРОХИМИЯ И АГРОПОЧВОВЕДЕНИЕ

ПРОФИЛИ: Агроэкология, Агроэкология – программа ”Эколог агроландшафтов”

Text 1. Soil Science

Источник: http://www.wisegeek.com/what-is-soil-science.htm

Soil Science is the study of the earth’s soil as a renewable natural resource. This field was originally made up of a conglomeration of several disciplines, most notably chemistry, biology and geology, but has since grown into a fully recognized field of study. The field has science broken into two main divisions: Pedology studies the soil as it exists in nature and Edaphology studies man’s utilization of soil as a tool. While the two areas study different things, they have the same overall goals: maintaining soil quality, slowing desertification and safeguarding human activities from both the human and soil standpoint.

The study of man’s impact on the soil has been around for a long time. From the basic concepts of agriculture to crop rotation to modern lab-mixed soils and fertilizers, all these ideas come from studying the soil and how humans use it. Even so, it wasn’t until the 20th century that the field of Soil Science became a recognized scientific discipline.

There are two broad categories of Soil Science. Pedology focuses on how soils develop naturally, including how they are influenced by their environment and how the environment affects them. This leads to the classification of different soils with different properties. The soil has a dramatic impact on what can and can’t grow in an area, allowing researchers to both predict future growth and decode past growth.

The Soil Science Edaphology focuses on man’s use of soil and impact on it. This division often gets the most coverage since it deals with areas such as increasing soil fertility for greater crop yield, managing sewers and landfills and anticipating water runoff during floods. Since this field covers all of man’s usage for soil, it is the much larger of the two main divisions.

Even though the field of soil science is broken into two areas, it is rarely that simple. There is a vast amount of overlap between the two spheres. For example, Pedology would have a greater understanding of the composition and morphology of soil over time, but an edaphologist would need that information to determine if the soil can support a man-

made structure. On the other hand, historical Pedology soil data is only valid when there is no human usage; to decode layers of inhabitation, an edaphologist would have to be consulted.

While many of the usages of Soil Science are well known, even to a layperson, some are less obvious. These fields work heavily with ground contamination remediation from landfills, toxic dumping and ecological accidents. A soil scientist is often consulted by paleontologists and archeologists to help decipher areas where specimens are found in highly disturbed areas. Lastly, the modern field of climatology is learning that soil contains vast amounts of information related to greenhouse cycles and carbon fixation.

Text 2. How to Become a Soil Scientist

Источник: http://www.wisegeek.com/how-do-i-become-a-soil-scientist.htm

Social scientists are tasked with carefully analyzing the top layers of the Earth's crust, known as soil, and then interpreting that data so as to better understand how soil functions as a resource. In particular, they want to know how soil affects agricultural production and environmental quality. To become a soil scientist, one must therefore have a thorough understanding of Soil Biology, Chemistry, and Physics that can often only be obtained via a bachelor's degree from an agricultural university.

To become a soil scientist, one should pursue a degree either in Soil Science or a closely related field, such as earth science or natural resources. If pursuing soil science, the two specialties from which to choose are Soil Science and Environmental Soil Science. Although closely related, they do differ in skills learned.

Soil Science provides students with the knowledge needed to evaluate soil resources and then act on it by land-use planning and other learned skills. Students who choose this option typically go on to work as farm advisers, crop consultants, or soil conservationists. Environmental Soil Science is more focused on the skill-set needed to handle soil quality concerns, such as soil decontamination, nutrient management, and soil degradation. Students of this program go on to obtain environmental positions related to removing contaminants, handling waste disposal, or dealing with water quality.

Students who want to become a soil scientist that either conducts research or teaches at a university must go on to obtain a master or doc-

torate degree as well. They should also pursue internships and work-study programs so that they can acquire direct field experience. Students also have the additional option of obtaining a certificate from the Soil Science Society of America (SSSA).

After finishing school, students who want to become a soil scientist should work with their college placement office to locate a job. Keep in mind that entry-level soil scientists typically start as assistants to a more experienced soil scientist. In due time, a young soil scientist can move on to become a team leader or supervisor. Management opportunities are often limited to those with a graduate degree.

Another thing to keep in mind is that some regions require a potential soil scientist to be licensed. Without a license, the individual cannot practice his or her craft. The process entails registering at the local licensing board and then completing one or more exams. Proper completion of the process earns one an official license or certificate.

Text 3. Soil Taxonomy

Источник: http://www.wisegeek.com/what-is-soil-taxonomy.htm

Soil taxonomy is the practice of describing, categorizing, and naming soils. Like the taxonomy of living organisms, soil taxonomy is designed to make it easier for people to communicate information about different kinds of soils, how they are used, their properties, and where they are found. The United States Department of Agriculture (USDA) has developed a complex soil taxonomy system which is widely used, and the organization publishes keys which can be used to identify soils, as well as mediating when disputes about the taxonomy of various soils arise.

Under the USDA's soil taxonomy system, soils are organized into orders, suborders, great groups, subgroups, families, and series, with orders being the broadest category, while series are the smallest. Some examples of the 12 orders in the system include: Gelisols, Oxisols, Vertisols, Aridisols and Inceptisols.

When soils are taxonomized, their composition is a key feature, but scientists also evaluate their location and factors like the climate where the soil is found. Features like permafrost can be important to taxonomy, for example, as can extreme dryness or humidity. Soil composition is based on a number of factors, including minerals in the area, decayed organic material, underlying geology, and so forth, and these influences can be quite diverse, with thousands of soil types recognized under the USDA system.

A number of functions are served by soil taxonomy. The ability to use taxonomic nomenclature is critical to people when they want to communicate with each other about soils, as rather than using a term like ”loose, loamy soil”, they can select the appropriate series using a key, precisely communicating the details of the soil type in a name. This is useful in the preparation of environmental reports and a wide variety of other documents, allowing someone anywhere in the world to immediately understand the soil conditions in a given area when they are described taxonomically.

Soil taxonomy is also important because it creates a framework which people can use to understand soils. The hierarchical organization can be used to examine the relationships between different types of soils, for example, and researchers can use this information to explore geology, agricultural techniques, and a wide variety of other topics. Soil scientists use taxonomy extensively in their work, to do everything from describing the soil in someone’s back yard and discussing the implications for gardening to exploring the loss of topsoil as a result of heavy winds, desertification, or flooding.

Text 4. Types of Soil

Источник: http://www.wisegeek.com/what-are-the-different-types-of-soil. htm

Soil is a broad term for the loose covering of earth that spreads across the planet. It is the result of the breaking up of rocks into constituent parts, which are then worked upon by a myriad of forces, including chemical interactions with salts and the physical workings of wind and water. Soil as a whole entity contains examples of three states of matter: the soil itself is solid, and both air and liquid exist in the pore spaces between individual particles of soil. There are many different types of soil on the planet, as every soil has a different composition of minerals and organics, and every soil has been subjected to different environmental constraints.

There are six main types of soil usually discussed in agriculture and basic soil science, distinguished by the size of the particle matter that makes up the soil. One of the types of soil, and the type with the largest particles, is sandy soil. Sandy soil is usually made up of granules of mineral and rock, and it has quite a bit of grit to it, and large spaces between particles, allowing for easy flow of water and minerals.

Clay soil is another of the types of soil, but clay has incredibly small particles. This means that clay has little space between individual parti-

cles, allowing for virtually no drainage. For this reason, clay soil is bad for growing things in, because water tends to not be able to escape, and it is difficult for root systems to break through the clay layer. Clay soils tend to be much older than sandy soils, since it makes many, many years for rock particles to break down to be small enough to form clay.

Silty soil is one of the most fertile of the many types of soil, with rich nutrients and good drainage. It is slightly smaller in size than sandy soil, but otherwise is very similar in composition, albeit with more nutrients and minerals. Silty soil is generally quite dark and pungent, and is excellent for planting almost anything.

Loamy soil is actually made up of a few different types of soil, with varying amounts of clay soil, silty soil, and sandy soil mixed together. Loamy soil holds water well because of the heavy grittiness given from the sand; it has exceptional drainage so that the water doesn't build up too much and rot plant roots, and is nutrient rich. Loamy soil is the ideal soil for gardening, and wide ranges of loam can be found at most supply stores.

Two other types of soil, chalky and peaty soils, aren't particularly good for easy growing, but are found throughout the world. Chalky soils are extremely alkaline, and usually have stones of varying size mixed in with them. Chalky soil stops plants from uptaking important minerals, and dries out very easily, making it less than ideal for planting. Peaty soils are high in organic matter, usually with large amounts of dead plants in them, but the organic matter is unable to decompose fully because of a high acid content in the soil. Peaty soil isn't particularly rich in nutrients, but if well handled can actually be an excellent soil for planting.

Text 5. Soil Analysis

Источник: http://www.wisegeek.com/what-is-soil-analysis.htm

A soil analysis is a comprehensive test that measures the level of nutrients in the soil. The analysis is used to assess the fertility of the soil and to determine ways to increase fertility levels. Soil samples are sent to laboratories that specialize in soil testing services. The laboratories provide sampling, shipping instructions and, sometimes, kits to help their customers obtain quality soil samples.

Soil analysis is a necessary tool for most professional farmers who want to maximize their crop yield. Home gardeners may also find the test useful, particularly if they are having difficulties growing food or plants on their property. The amount of soil needed for a complete report on the soil area will depend on the size of the garden or farm.

Soil samples may be collected for testing at any time of the year as long as the soil has not recently received a fertilizer application. Most laboratories recommend soil testing at least once a year. The results of the soil analysis will differ depending on when the soil was collected. Reports on early spring soil samples will show what types of nutrients remained in the soil over the winter; reports on spring soil samples will show what types of nutrients are needed for the next growing season.

The accuracy of the soil analysis will depend on the quality of the soil samples. Most laboratories advise against testing soil that has been exposed to prolonged drought or soil that has become so dry that plants cannot grow in it. The ideal soil sample is collected on flat, well-drained land that has been used strictly for planting purposes. Any contamination in the soil from past uses of the land will affect the accuracy of the soil test; for example, if a barn once stood on the land or if the land had been used for composting animal manure.

The soil sample will need to be collected in a clean container and properly labeled. Gardeners and farmers should keep a map of where they collected all of their samples. The laboratory may also require a report of the history of the soil, such as what types of crops are grown in the area, to enhance the accuracy of the soil report.

The complete soil analysis report will contain the percentages of micro and macro nutrients in the soil, including magnesium, phosphorus and nitrogen. The report will also include the pH of the soil and may include a measure of the amount of compost and manure in the soil. The recommendation of the report will provide specific information on the types of fertilizers, and amount of fertilizers, to apply to the soil to achieve optimum soil fertility.

Text 6. Soil pH

Источник: http://www.wisegeek.com/what-is-soil-ph.htm

Soil pH is the measurement of the acidity or alkalinity of garden soil. The pH in soil is typically measured on a scale of 1–14, with seven considered neutral. Anything below this is considered acidic, or sour, soil while anything above neutral is considered alkaline, or sweet, soil. Soil kits can be used to test pH levels in the soil and are available at most home garden centers. Oftentimes, local county extension agents will also provide pH testing when needed.

On average, plants can only retrieve specific nutrients when the soil pH falls into the neutral range. The acceptable pH level for most plants falls

somewhere between 6.2 and 7.0 on the pH scale. However, proper pH levels usually depend on the variety of plant, as preferences vary among plant types. For example, some plants, such as azaleas, actually prefer a more acidic soil. Still others, like lilacs, seem to appreciate a more alkaline soil.

The pH in soil is very important, as soil contains nutrients such as nitrogen, potassium, and phosphorus, which are required for healthy, vigorous growth. The pH levels in soil determine how much of these nutrients are present and can be readily absorbed by plants. Knowing whether the soil pH is acidic or alkaline can also play a factor when treating common problems in the garden.

For instance, the use of chemicals, such as pesticides, herbicides, or fungicides) applied to plants and soil can be harmful to the environment. This level of harmful effects increases even more based on the pH in soil. As an example, soil that is too acidic will not effectively absorb these products, making them much more likely to become runoff in rainwater. This leads to contamination of water resources.

Organic matter, such as compost, can help amend soil. Compost improves the soil's overall health by encouraging beneficial creatures, such as earthworms, which improves the absorption, drainage, and aeration quality of soil. It also adds vital nutrients, which are needed by plants. Improving the quality of soil can also help neutralize soil pH, which allows plants to easily access these nutrients. Many times, soil pH can be corrected by simply using organic matter to amend the soil.

However, there are other ways to improve the soil pH. For instance, applying lime to the soil is a good way to raise the pH in soil. Lime can be purchased at most home garden centers. Alternatively, soil pH can be raised in the garden by adding wood ashes. In order to lower the pH level of soil, sulfur or aluminum sulfate can be added. These can also be obtained from most garden centers.

Text 7. Soil Drainage

Источник: http://www.wisegeek.com/what-is-soil-drainage.htm

Soil drainage refers to the soil's natural ability to allow water to pass through it. Dense soil will hold water, while loose soil will allow water to pass through quickly. Soil drainage may determine which types of plants grow well in it.

Clay soil is a very dense type of soil. Its particles are closely packed together and clay generally does not allow water to drain through. This

type of soil slowly releases air and allows water to seep down into it. Clay soil generally sits on top of a solid rock bed.

Once water draining slowly through clay reaches the rock bed, it no longer has an outlet and pools within the soil. Plants that grow in it are at risk for root rot. Roots that sit in standing water for long periods of time will become prone to disease and fungus and may wilt and die.

Sandy soil is very loose. Its particles allow for the passage of both water and air. This soil drains water very quickly, which allows air to circulate around the plants within it. This can also cause the plants to dry out and some varieties grown in sandy soil may need to be watered more frequently for this reason.

Dense clay soil is typically acidic and loose, while sandy soil is typically basic and holds a low amount of nutrition for plants. A well-balanced soil with good soil drainage will contain a mixture of both clay and sand, allowing for a gradual passage of both water and air to circulate around plant roots. It will also add a valuable amount of nutrition to the soil to feed new plants.

To determine the quality of the soil in a garden, gardeners may wish to perform a pH test. Soil testing kits may be purchased in many home improvement stores and plant nurseries. A variety of sites within the lawn or garden should be tested.

Organic compost is a common additive used to improve soil quality and drainage. It generally consists of lawn clippings, shredded leaves, and kitchen food scraps, not including dairy or meat. Organic compost neutralizes the pH balance of soil, bringing either acidic or basic soils to a medium pH. It also incorporates loose particles into dense clay, and adds solidity to sandy soils.

Extremely dense soils that continue to hold water after the addition of organic compost may need to be manually drained. Drainage pipes and ditches may be dug around the garden area or site of poor soil drainage. These pipes and ditches will direct water flow away from the problem area and allow air to move through the soil.

Text 8. Planting Soil

Источник: http://www.wisegeek.com/what-is-planting-soil.htm

Planting soil is soil that has been specially prepared for planting. It contains the nutrients necessary for plants to thrive, and its pH balance has been adjusted to be suitable to the types of plants which will be grown

in it. It is possible to purchase planting soil from garden supply stores, and also to prepare your own.

There are a number of sources for planting soil. People with poor soil or contaminated soil may choose to bring in a load of planting soil from an external source, removing the top layer of bad soil and replacing it with the planting soil. This can be a good idea when starting a garden from scratch, to ensure that plants have healthy soil to thrive in. The fresh soil also reduces the risk of disease, by removing soil which may have been contaminated by plant pests and diseases.

Typically, planting soil is amended with compost and mulch to create a very rich, crumby soil which is highly suitable for growing plants. Additional minerals may be added to meet the needs of specific plants, and the pH is often neutral, unless it has been modified. Gardeners can sometimes order a specific planting soil mix for their garden, using the guidelines for the plants or crops they are growing to determine the correct blend of minerals and pH. It is also possible to use a neutral soil and make amendments to specific areas of the garden.

Gardeners can also work the existing soil in their garden to turn it into planting soil, in a practice known as soil preparation. When gardeners work the soil, they use gardening tools to turn the soil and break it up while blending in compost, mulch, and other materials to enrich the soil and make it better for growing plants. Many people work the soil every year when they grow crops, typically after the last harvest so that the soil has a chance to rest after it has been amended for the following year's crops. Soil preparation is also critical when establishing an ornamental garden, as plants will fail to thrive in poor or inappropriate soil.

Potting soil is a specific type of planting soil which is formulated for plants in pots. Potted plants have some specific needs which need to be addressed, such as good drainage and an ample source of minerals. Many potting soils are also fertilized so that potted plants will grow quickly. As a general rule, potting soil is not suitable for use as generic planting soil in the garden.

Text 9. Agroecology

Источник: http://pubs.iied.org/pdfs/14629IIED.pdf

The most commonly used definition of Agroecology is "the application of ecological concepts and principles to the design and management of sustainable agroecosystems". This definition best illustrates the concept of Agroecology today: it captures its evolution both as a conceptual

framework based on a set of principles and as a range of practices that can be used in different combinations to enhance the resilience and sustainability of farming systems.

The first agroecological studies (between the 1930s and 1960s) were rooted in the biological sciences – zoology, agronomy and crop physiology – and sought to observe the biological interactions between elements of the ecosystem and agriculture as part of agronomic research.

During the 1960s and 1970s, thanks to the emergence of ecologist movements – and partially in response to the negative impacts of the Green Revolution – the ecological analysis of agriculture within the agro-ecosystem gained momentum.

From the end of the 1970s and throughout the 1980s, the Agroecology began to be strongly influenced by a social component in the agronomic literature and by the new interest in traditional farming systems as important natural resource management systems.

By the 1990s, Agroecology had emerged as a scientific discipline with a conceptual framework and defined methodology for the holistic study of agro-ecosystems, including human and environmental elements". According to this holistic view, an area used for agricultural production is seen as a complex system in which ecological processes occur along with human activities (economic but also social and cultural activities): Agroecology focuses on the dynamics of their interrelationships. As a result of this new approach, the "ecological foundations of agriculture" – a series of principles that help achieve environmental sustainability and environmental services from agriculture – emerged and were consolidated.

In recent years, Agroecology as a scientific discipline has evolved from being a subcomponent of agronomic research to a science in its own right, focused on environmental sustainability. It has broadened its scope to include the whole food system and has become more interdisciplinary in the process.

Here are the core principles of Agroecology.

Planning:

– Use a holistic approach to the identification, the analysis and the resolution of issues related to farming – the agro-ecosystem is regarded as one and its health as a whole is valued more than the productivity of single crops.

– Harmonise the farming system with the productive potential and the physical limits of the surrounding landscape.

Resource use:

Recycle and optimise the use of nutrients and energy on the farm. In particular:

– Enhance the recycling of biomass, with a view to optimising organic matter decomposition and nutrient cycling over time.

– Minimise losses of energy, water, nutrients and genetic resources by enhancing the conservation and regeneration of soil and water resources and of agro-biodiversity.

– Avoid the unnecessary use of agrochemical and other technologies that adversely affect the environment and human health.

– Minimise the use of external, non-renewable resources (including fossil fuels).

Field and landscape management:

– Enhance beneficial biological interactions and synergies among the components of agrobiodiversity, thereby promoting key ecological processes and services, rather than focusing on individual species.

– Diversify species and genetic resources in the agro-ecosystem (i.e. at field and landscape level) over time.

– Strengthen the "immune system" of agricultural systems by enhancing functional biodiversity (natural enemies, antagonists, etc.); pests and diseases should be managed and prevented rather than controlled.

– Use local crop varieties and livestock breeds so as to enhance genetic diversity and adaptation to changing biotic and environmental conditions.

– Provide the most favourable soil conditions for plant growth, particularly by managing organic matter and by enhancing soil biological activity.

Text 10. Examples of Agroecological Practices

Источник: http://pubs.iied.org/pdfs/14629IIED.pdf

There are different agroecological practices that can be used nowadays.

Conservation tillage: no or minimum tillage improves soil structure – including aeration and water infiltration and retention capacity – and organic matter.

Mixing crops in a single plot, such as intercropping and poly-cultures: biological complementarities improve nutrient and input efficiency, use of space and pest regulation, thus enhancing crop yield stability.

Crop rotation and fallowing: nutrients are conserved from one season to the next, and the life cycles of insect pests, diseases, and weeds are interrupted.

Cover crops and mulching: reduce erosion, provide nutrients to the soil and enhance biological control of pests.

Crop-livestock integration, including aquaculture: allows high biomass output and optimal nutrient recycling, beyond economic diversification.

Integrated nutrient management, such as use of compost, organic manure and nitrogen-fixing crops: allows the reduction or elimination of the use of chemical fertilizers.

Biological management of pests, diseases and weeds, such as integrated pest management, push and pull methods and allelopathy: decrease long-term incidence of pests and reduce environmental and health hazards caused by the use of chemical control.

Efficient water harvesting (especially in dryland areas) such as small-scale irrigation allows to reduce the need for irrigation while increasing its efficiency.

Manipulation of vegetation structure and plant associations: improves efficiency of water use as well as promoting biodiversity.

Agro-forestry, especially the use of multifunctional trees: maintains and improves soil fertility through nitrogen fixation, enhances soil structure and modifies the microclimate.

Use of local resources and renewable energy sources, composting and waste recycling: allows a reduction in the use of external inputs as well diminishing pressure on the natural resource base.

Holistic landscape management: around field perimeters (windbreaks, shelterbelts, insect strips and living fences), across multiple fields (mosaics of crop types and land-use practices) and at the landscape to-regional scale (river buffers, woodlots, pastures and natural or semi-natural areas).

Text 11. What is Biodynamic Farming? Rudolf Steiner's Blueprint

Источник: http://www.countryfarm-lifestyles.com/biodynamics.html#.WW rvAhoVzIU

Biodynamics

Biodynamic farming was a concept put forward by Dr. Rudolf Steiner and is based around the following pivotal concepts:

– The importance of maintaining sustainable soil fertility.

– The relationship between plant growth and the rhythms of the cosmos.

Biodynamic farming places great importance on the rhythmic positions of moon, sun and planets when sowing seeds, transplanting, apply-

ing liquid fertilizers or spraying fruit trees and crops, i.e. Moon Planting as well as the concept of companion planting, crop rotation and composting. The basis of a healthy farm is the correct proportions of crops to livestock. The moment one is grown to excess the balance is disrupted. Monocultures are unhealthy and should be avoided.

Biodynamic farming uses a series of preparations which are based on various mineral, plant and animal substances. These will enhance all the bacterial and mineral processes that are found in the organic farming system and help the plants and soil. Therefore Biodynamics in a nutshell is the ”Biological” practices of organic farming that improve the quality and fertility of the soil. It is bringing a higher degree of life activity in the soil, plants and animals by using the dynamic methods of Mother Nature. ”Dynamic” practices are intended to influence the biological and metaphysical aspects of the farm.

Normal Organic Farming Practices

Organic farmers practice the following management techniques to maintain a sustainable system.

– They ensure plant nutrients are maintained by addition of animal manures, or green manures made into composts, and also use additional essential mineral elements.

– Animal manures are usually combined with plant materials, and are applied in the form of well made composts, in which the organic materials have been converted into stable humus through a fermentation process.

– Cover Crops in the form of green manures and quick growing legumes and/or grasses are plowed into the ground, mulched onto the top of the soil or used as compost-making material.

– Phosphorus may be used by top-dressing crops with natural rock phosphate, calcium by a light dressing of hydrated or agricultural lime. If magnesium is also deficient, dolomite may be used instead of lime.

– Crops are rotated to control weeds, fungi and insects and to promote healthier plants.

Text 12. Four Main Cover Crops for Organic Farming Green Manures – Rye, Peas, Corn and Clover

Источник: http://www.countryfarm-lifestyles.com/cover-crops.html#.WW swQRoVzIW

The four main cover crops invaluable as green manures: rye, field corn, field peas or cow peas, and crimson clover. When these plants are

grown for the sole purpose of slashing and returning to the soil, they are known as green manures.

Green Manures are grown primarily to prevent or reduce soil erosion or to provide nutrients to plants that will be grown in that space.

There are two types of green manures. They are:

– Nitrogen Gatherers that covert the nitrogen found in the air into the soil usually in the form of legumes.

– Nitrogen Consumers that cannot perform this function, but use whatever nitrogenous compounds are already in the soil.

Nitrogen Gatherers as Cover Crops and Green Manures

Nitrogen gatherers consist mostly of clovers and vegetables and are valued because they help fix large quantities of nitrogen from the air, making it available to plant roots. Examples of such a green manure would be alfalfa, clovers, soy beans and peas. When these crops are cut down and plowed into the soil they add nitrogenous material to the soil along with other organic compounds. If you want to increase the nitrate levels of your soil, then you should plant these cover crops.

For summer cover crops plant cow peas, soy beans or summer vetch in late spring early summer, and plow under during late summer, early fall.

For fall and winter cover crops, hairy or winter vetch which is frost resistant and crimson clover are most popular, along with field peas. As for crimson clover, sow this during mid-summer, winter vetch can be sown between July and September, and field peas are sown in August or September. These times are for the northern hemisphere.

Nitrogen Consumers as Cover Crops and Green Manures

Nitrogen consumers consist mostly of grasses and grains and are best used for the short-term production of organic matter for the garden. They are buckwheat, rye, turnips and rape. When these plants grow they do not add nitrogen to the soil. However, when these crops are plowed under, they then add the nitrogen back into the soil.

Often both types of green manures are grown together for mutual benefit, as one improves the nitrogen content, the other uses the nitrogen produced. Rye and winter vetch are two such crops grow together. Buckwheat and crimson clover is another option.

Sometimes all 4 of these are grown together during the summer month of July either after an early vegetable crop has been harvested or during the growing of the crop.

Use Cover Crops and Green Manures to Improve Your Soil

Impoverished soils can also be improved with the use of cover crops. If you have soils that are harvesting lots of weeds, by planting a grass cover crop the weeds will soon be choked out and the grass will replace the soil minerals that the weeds took out.

When the crop is incorporated in the soil, it will immediately start to break down and should be replanted with a follow-on crop as soon as possible. In warm, humid weather, decomposition can occur in less than six weeks.

Clover is one of the most valuable of cover crops to grow, although as you will see below, this is also used as a green manure.

The four main cover crops invaluable for green-manuring, even when the same spot must be occupied year in and year out are rye, field corn, field peas or cow peas and crimson clover.

Rye, as far as I am concerned, is one of the best cover crops that can be grown. It grows anywhere, even in chilly northern winters rye can be sown to resist erosion, control weeds and when turned back into the soil will provide very good organic matter. If you continue to grow rye over just a few winters, your soil structure will improve enormously and will encourage earthworms to take up residence.

If you want to plant rye as a cover crop sow 2–3 ounces of rye seed per 100 square feet of soil. Mow the rye in the spring and turn it under 2–4 weeks before planting your new plants or seeds.

When to Plant Cover Crops

After the 1st September, sow empty fields with winter rye. Sow all ground cleared during August with crimson clover and buckwheat, and mulch the clover with rough manure after the buckwheat dies down. Sow field peas or corn on any land that would otherwise remain unoccupied for 6 weeks or more. All these are sown broadcast, on a freshly raked surface.

Text 13. Organic Crops

Источник: http://www.wisegeek.com/what-are-organic-crops.htm

Organic crops are farmed without the use of pesticides and other petroleum-based chemicals and instead utilize natural methods that farmers have been using for thousands of years. These methods include crop rotation, cover crops, and compost to fertilize the land and natural methods to prevent or rid crops of insects and other pests. In addition, organic crops

are not grown from seeds that have been genetically altered. Farmers utilize methods to grow organic crops because they are considered better for the environment and safer to eat because they do not have traces of chemical residues on or within them.

As long as crops are farmed utilizing certain methods, they are considered organic crops. Designations for organic crops are created by various government entities, which define the regulations that must be followed to be included in this category. This means there can be organic fruits, vegetables, grains, flowers, and many other varieties of organic crops.

A major part of farming to grow organic products is the use of natural techniques to fertilize the land. Crop rotation is a planned use of land on a farm so that each part of the farm has some time to rest and rejuvenate without having any crops growing on it. Farmers have to consider the impact of growth on each area of the land, as well as their needs for growing a certain amount of crops per season. Cover crops are grown either in between crops that are sold, known as cash crops, or during crop rotation cycles. These plants help replenish the soil with nutrients, so cover crops are chosen based upon the needs of the soil and the abilities of the plants.

Compost helps to fertilize land naturally through the use of nutrient-rich waste products that eventually turn into soil. It also helps to keep pests away from crops naturally. Other methods of natural pesticide include the use of natural chemicals, planting barriers around crops, and planting naturally pest-deterring crops.

There are many benefits of growing and eating organic crops including land sustainability, increased nutrients in the soil and crops, and less pollution in water systems. Due to the fact that the soil, that organic crops are grown in, has more nutrients, this also means that the food consumed from the plants have increased nutrients. Organic crops typically do not have pesticides and chemicals on them that can be harmful to the bodies of humans and other types of animals.

Text 14. How to Become an Organic Farmer

Источник: http://www.wisegeek.com/how-do-i-become-an-organic-farmer. htm

Organic fruits and vegetables have gained in popularity over the past few years. If you want to get in on this healthy eating trend and become an organic farmer, there are several skills you should work on. Simply knowing how to farm is not good enough, because you also must know

how to get your crops certified as organic. You also need to know what the best crops are for your location and how distribution works.

Learning to farm is the first step if you wish to become an organic farmer. There are no educational requirements to raise fruits and vegetables, but many schools offer agricultural classes and clubs. Several major universities also offer degrees in agricultural technologies to help young farmers learn the latest techniques. Another way to learn is by working for a farmer. There are many jobs on a farm, and learning them could take several years, but the experience will help you run your own organic farm.

Knowing what classifies as an organic vegetable or fruit is essential if you want to become an organic farmer. Every country has different standards of what it takes for a piece of produce to be certified as organic, so you should consult your local government agricultural department. In the United States, for example, the U. S. Department of Agriculture limits what pesticides and fertilizers can be used on organic farms.

After you are familiar with the techniques and regulations of organic farming, it is important to do research about which crops grow well in your area. Climate, soil and growing season are all factors that dictate whether an organic crop of herbal plants, vegetables or fruit will survive. Just because lemons grow well in one area doesn't mean that asparagus also will grow well in that area. If you want to become an organic farmer, it is wise to consult local farmers and the government's agricultural office to determine the best crops for growing in your area.

After you have begun applying your farming skills to a select crop of organic produce, you must sell it somewhere in order to receive a return on your investment. To become an organic farmer, you should research the distribution channels of fruits and vegetables in your area. Many times, you can sell your goods directly to a supermarket, cooperative market or health food store. Other farmers can strike a deal with a distributor to handle the sale of their goods to retail markets.

Text 15. How to Choose the Best Organic Fertilizer

Источник: http://www.wisegeek.com/how-do-i-choose-the-best-organic-nitrogen-fertilizer.htm

An organic fertilizer is capable of delivering nutrients more effectively to plants than chemical fertilizers, by improving the soil conditions surrounding the plants, and a good organic fertilizer should be certified for production. Nitrogen should be one of the three main ingredients list-

ed on the label of commercially available fertilizers. In order to choose the best organic nitrogen fertilizer, carefully check the label for a high nitrogen content, organic certification, and fertilizer components.

Chemical fertilizers can wash out of the soil with rain and watering, strip the soil of other nutrients, or change the pH balance of the soil. Organic nitrogen fertilizer will not only add much-needed nitrogen to soils that are deficient, but they can also build up the soil structure and feed microbes, boosting oxygen and moisture retention. Healthy soil produces healthier plants and also reduces the number of weeds, pests, and diseases that can affect plants. A good organic nitrogen fertilizer will also have other trace nutrients like calcium and magnesium. Be sure to check that the three numbers on the fertilizer label add up to 15 or less because anything over 15 is likely to contain synthetic chemicals and is not truly organic.

There are two different definitions of the word ”organic” when it comes to choosing a quality organic nitrogen fertilizer. Technically, ”organic” means ”bound with carbon” but this does not necessarily mean that a fertilizer with this label is approved for the organic production of plants. In order for a commercial fertilizer to be sold for organic production, it must bear a label identifying it as certified for organic use. Most garden centers and home improvement stores should carry at least one type of commercially certified organic fertilizer, and some retailers may even carry organic fertilizer in bulk to help cut down on prices.

Non-commercial material can also make an excellent organic nitrogen fertilizer as well. Manures and guano usually have a very high nitrogen content, but they should be allowed to compost before they are used because the nitrogen might burn tender young roots. Blood meal, the powdered blood of slaughtered animals, is also high in nitrogen, acts as a natural pest repellent, and may be obtained from organic meat producers. Corn gluten meal, cottonseed meal, and soybean meal are all good nitrogen fertilizers, as well. Depending on local resources, it may be possible to obtain quantities of these natural fertilizers at better prices than commercial fertilizers, though it might be more difficult to verify the organic certification of these substances.

35.03.01, 35.04.01 – ЛЕСНОЕ ДЕЛО

ПРОФИЛЬ: Лесное дело, программа – ”Воспроизводство и рациональное использование лесных ресурсов”

Text 1. Silviculture

Источник: http://www.borealforest.org/world/innova/silviculture.htm

Forestry is a science. One of the most important of the many disciplines in forestry is Silviculture. Silviculture is the practice of establishing, tending, and reproducing stands of trees. It involves prescribing such cultural operations as weeding, thinning, pruning, and measures to protect the trees from insects, disease, and other natural elements.

Silviculture

To understand silviculture, one must first understand silvics. Silvics involves understanding how trees grow, reproduce, and respond to environmental changes.

Some tree species thrive in shade – sugar maple, red maple, hemlock and basswood are good examples. These species can live, grow, and reproduce in shade and semi-shade conditions. Many tree species prefer or require full sunlight – yellow poplar, walnut, some oaks, black cherry, yellow pine, and hickory are good examples. These species require full sunlight to reproduce, after which they grow best in full sunlight or as part of the overstory canopy of the forest. They also tend to be the fastest-growing species and, to a great extent, the most valuable species. Still other species such as white pine, white ash, and some oaks, elm, and birch are intermediate in their sunlight requirements. These patterns are easily noticeable in the woods. Normally, large overstory trees are oaks and poplar while seedling and sapling composition is generally maple, beech, and other oaks.

Silvics also is concerned with seeding requirements, elevation, and location. Different species will show up in different areas, on different soils, and at different elevations. If this sounds like ecology, then it can be stated accurately that silvics is the ecology of the forest.

Silviculture involves managing and handling the forest in view of its silvics.

Silviculture imitates a natural change – such as a wind throw, beetle infestation, or fire. However, silvicultural methods harvest forest products for human use rather than wait on nature to burn them, eat them, or blow them down. Silviculture can be practiced at any time in the life of a timber stand.

It is worthwhile to mention what silviculture is not. ”High-grading” a timber stand is not silviculture. High-grading is ”taking the best and leaving the rest”. Sometimes after high-grading, the remaining timber is of decent quality and the soil is productive, resulting in a future stand that is not noticeably degraded, except after a long-term look at growth. Sometimes the remaining timber is poor, and the poor-quality, poor-growth stand that results is apparent to everyone. High-grading is not a plot by loggers against landowners; simply, it is a purely economic practice. Loggers want to cut only what they can sell easily.

Silviculture looks not only at the timber crop currently available, but also at the effects of present day harvesting on the next timber crop. Foresters are in a unique business in that they commonly make management decisions that will affect crop quality and growth 40 to 80 years into the future.

Text 2. Common Silvicultural Harvesting Methods

Источник: http://www.borealforest.org/world/innova/silviculture.htm

Selection systems are partial removals of trees based on the silvicultural objectives of the landowner. This method is used when species of shade tolerance or intermediate tolerance are considered desirable. Each tree is assessed, determined to be cut or to be left, measured, tallied, and marked. Although economics always plays some part in determinations, it is not the only factor. Rate of growth, potential for further growth, health, quality, spacing, and species are some of the factors that also must enter each determination.

It is important that a landowner get a qualified forester to do this assessment; a so-called ”thinning” or ”select cut” can be offered by anyone with a saw in hand. A thinning based only on economic factors can easily become a high-grade. Furthermore, a small tree is not always a younger tree. Although many small trees in the woods are that size because of their youth, just as many are small because of poor genetics, stunted growth, or being a poor or inappropriate species for the site. It takes many years of experience to tell the difference.

It is important to combine some spacing and some weeding or cleaning while conducting a selection system harvest. Part of this method is manipulating the amount of sunlight on the ground to successfully regenerate desired species. Selection system harvesting has the advantage of allowing a timber stand to retain its forested appearance in the years immediately following harvest. It has particular advantages in higher eleva-

tions and farther north where shade-tolerant species are considered very desirable. It has disadvantages of providing for slower long-term growth, for allowing undesirable species to predominate, for allowing undesirable epicormic branching on future crop trees, for holding back valuable sun-loving species, and for being an easily and frequently abused method. Furthermore, it is very difficult to use successfully on steep ground due to high potential for heavy logging damage on residual trees.

Selection system harvests can be designed to suit each individual tract, each site, each timber type, and each individual landowner. Each type of selection system has a separate set of objectives for the manipulation of sunlight, reproduction, present crop, and future crop.

Seed tree cuts allow the harvest of all trees except 2 to 10 trees per acre. These remaining trees are chosen for their good form, genetics, species, and ability to produce seed crops. The job for these remaining trees is to rain down genetically good-quality seed on the freshly disturbed areas. Although this method leaves fewer trees per acre, these tend to have a pleasing appearance because their spacing is very consistent. This method is rarely used in hardwood management, but often used in pine management. It is used with hardwoods only in rare cases where the desirable species are wing-seeded (i.e., ash and maple). However, this is not a good method for oaks or other heavy-seeded species.

Clear cutting is also a silvicultural method. This much-embattled method is truly a viable silvicultural practice. It is most often prescribed where sun-loving species are desired for the future timber stand. It is also prescribed in poor-quality or problem stands which have been abused by fires or repeated high-grading. In pine management, a clear-cut normally is followed immediately by planting seedlings. However, where quality hardwoods grow, natural regeneration supplies more than enough seedlings from existing seed, existing seedlings (also called advance regeneration), root sprouts, and stump sprouts. Thankfully, natural regeneration of hardwoods is one of nature's strongest and most inevitable forces in our region. Where desirable hardwoods can be grown, natural regeneration is the proper plan; attempting to plant or artificially regenerate in such an area is neither necessary, wanted, nor advisable.

Text 3. Clear Cutting

Источник: http://www.borealforest.org/world/innova/silviculture.htm

The desired effect of a clear-cut is to start all regeneration at ground level so that the resulting timber crop is made up of desirable sun-loving

species, which are the fastest growing, straightest, healthiest, and most superior trees possible. A 20- to 60-year-old clear-cut is a textbook case of survival of the fittest. Because full sunlight is provided for future crop trees, rate of growth is at its greatest. Clear-cut areas show 1.5 to 2.0 times the growth rates per acre than in selectively cut areas.

Clear cutting is not ”cutting everything we want”. A clear-cut should truly be a clear cut. Clear cutting is cutting everything. The objective is to provide full sunlight – not partial sunlight, with a heavy dose of shade from runt, cull, and unwanted trees. Additionally, a truly clear-cut area looks uniform – immediately after the cut and after regeneration has begun. This uniformity is much more pleasing to the eye, not the ”hairy” look of a pseudo-clear-cut or a heavily high-graded stand.

Clear-cuts also require professional management. Streamside buffer zones should not be clear-cut to protect the temperature characteristics of that stream, or should buffer areas bordering towns or roads.

Obviously, clear cutting makes a lot of news. The method will arouse a tremendous amount of emotion and opinion.

Seven Conditions for Cutting Every Tree

Clear cutting is not a universally accepted practice. Opponents of the practice of cutting every tree within a specific area contend it degrades the environment. Forestry professionals and resource managers argue that the practice is sound – a complete clear-cut ”usually creates the best conditions for regenerating stands’ under certain conditions and should be used when those conditions occur.

This is opposed to a ”commercial” clear-cut where only trees of marketable species, size and quality are cut. ”Commercial clear cutting, sometimes called high-grading, is appropriate only where nearly all trees in the stand are marketable or where the harvesting process will knock down all the unmarketable trees.”

When Are Conditions Right to Consider Clear-cutting a Forest? Here are seven conditions:

– When regenerating tree species that need full sunlight to stimulate seed sprouting and seedling growth.

– When dealing with sparse or exposed or shallow-rooted trees that are in danger of being damaged by wind.

– When trying to produce an even-aged stand.

– When regenerating stands of tree species that are dependent on wind-blown seed, root suckers or cones that need fire to drop seed.

– When faced with salvaging over-mature stands and/or stands killed by insects, disease or fire.

– When converting to another tree species by planting or seeding.

– To provide habitat for wildlife species that require ”high-density, even-aged stands”.

Text 4. Methods of Thinning

Источник: https://www.bia.gov/cs/groups/xnifc/documents/text/idc-0225 36.pdf

Historically, foresters have recognized four distinct methods of thinning to determine which trees to favor and which to remove. A fifth method, free thinning, can be any combination of the other four methods applied simultaneously in a single operation, usually in stands of irregular structure. For the first three, foresters select trees to cut or leave based largely on crown position. While each method is briefly mentioned below, it is recommended that a silviculture text be consulted for further information on the intricacies how each method influences natural patterns of growth, development, structure, and yield.

Crown Thinning

The removal of trees from the dominant and co-dominant crown classes in order to open the canopy to favor the best trees of those same classes. This is usually applied where intermediate and suppressed classes are minimal or their removal would provide little benefit to the upper crown classes. Remove dominants with poor crowns or stem form to prevent dysgenic effects. In any crown thinning, it is usually best to identify the final-crop trees and then eliminate the most vigorous competitors of each to prevent dysgenic effects.

Low Thinning

The removal of trees from the lower crown classes in order to favor those in the upper crown classes. This method simulates mortality by cutting the weakest, overtopped trees which would die first. The focus is on the trees that have the greatest potential for growth. A heavy low thinning simplifies the stand structure of even-aged forests by removing the smallest trees. Low thinning has application in areas prone to drought in that it protects some of the larger trees which might otherwise succumb to drought-induced mortality due to competition.

Selection Thinning

Selection thinning, or thinning of dominants, is a treatment designed to carefully and thoughtfully remove selected dominant trees in order to

stimulate the growth of desirable trees in the lower crown classes. Selection thinning differs from and has no relationship to the selection method of regeneration applied to uneven-aged stands and the silviculturist must be familiar with the different objectives of both to avoid semantic confusion. Selection thinning, if not used with great care, can very easily lead to the destructive practice of high-grading by releasing trees with less than optimum vigor or poor-quality stems by removing the best. Many current texts on silviculture address this method of thinning and of the problems and concerns one should astutely be aware if choosing to implement this method.

Selection thinnings are best implemented as early as possible in the life of the stand and replaced by other thinning methods as soon as the crop trees approach the dominant position. In the most common use, low-value species or poorly formed dominants (wolf trees), are removed to favor quality crop trees chosen from the highest possible level in the stand. This type of thinning will have the most application in hardwood forests where species grown for furniture-grade clear wood is desired and where the co-dominants and the intermediates have grown tall yet have fewer branches than the dominants. Co-dominants with a higher first fork would be favored in the thinning.

In stands of shade-tolerant species with strong epinastic control such as spruce and true firs, dominants are removed to favor co-dominants with enough live-crown (at least 30–40 percent) to respond. Epinastic control is the control exhibited by a trees terminal bud over the length and orientation of lateral branches. When the terminal bud of many conifers (including Douglas-fir) is lost, the uppermost lateral branches grow upward and reassert epinastic control. Stands of intolerant species cannot withstand more than one or two selection thinnings before most of the trees capable of useful response are gone. In shade-tolerant plantations, selection thinning followed by artificial regeneration may occasionally be part of a long-term approach to minimize any unintentional dysgenic effects.

Caution is again emphasized if selection thinning is being considered. This kind of cutting can lead to a stand of poor trees that cannot be harvested economically.

Geometric (Proportional) Thinning

This type of thinning removes trees in rows, strips, or with fixed-spacing intervals with no regard for their species, position in the canopy, vigor, or form. This is the least desirable type of thinning because form,

phenotypic quality, and species composition are at best neutral after treatment. It may be justified in uniform, healthy plantations or in previously unthinned, extremely dense stands where other thinning methods are cost-prohibitive; there is little or no product recovery; and the work can be accomplished by using machinery at a reasonable cost.

Fixed-spacing thinning is generally applied only to overcrowded, young stands that have developed from dense natural regeneration or artificial broadcast seeding. Ordinarily geometric thinning is done only in the first thinning of the stand and sets the stage for subsequent selective thinnings, especially where machines can maneuver in less dense stands.

Free Thinning

This method releases selected crop trees by using a combination of the above thinning methods. The free thin, also known as the free selection method, is a form of uneven-aged management that recognizes the forest and each stand as a mosaic of conditions and tree groupings, and applies the desired forest treatment objectives appropriately to each encountered condition and grouping. For example, over-mature groups of trees may be removed as a group or thinned to a seed-tree configuration in order to promote shade-intolerant regeneration. Adjacent to one or more of these groups there may be maturing groups of trees in need of commercial thinning in order to redistribute growth to the residual trees. Adjacent to the maturing groups there may be juvenile components of trees that are in need of both overstory release and precommercial thinning. The free thin method takes full advantage of the variability of the forest, but requires a very well trained forester to apply the treatment on the ground.

This method is applicable in all situations where uneven-aged management is intended and where a variety of stand conditions exist (e.g., stands that are irregular in age, density or species composition) so that using only one method is not appropriate. Even though ”free thinning” may be the method, the silviculturist should use technical terminology to convey as much of the thinning description as possible. ”Modified crown thinning”, ”crown and selection thinning”, or ”crop tree release” would be more informative terms.

Text 5. Some Intermediate Treatments

Источник: https://www.bia.gov/cs/groups/xnifc/documents/text/idc-0225 36.pdf

Intermediate Treatments are treatments other than cuttings that may take place between the establishment of regeneration and the regeneration cutting.

Pruning

Artificial forest pruning is a silvicultural operation, distinct from ornamental pruning, fruit tree pruning, and Christmas tree pruning, performed to improve wood quality or to remove dead or diseased limbs. It is labor intensive, costly, and requires a certain degree of judgment and skill. Pruning may be used to remove mistletoe infections from young trees. Pruning is sometimes applied to increase the wood quality and value by promoting the growth of clear-wood on the lower boles of crop trees, particularly in short rotation crops.

There are a lot of additional benefits that are related to the changes in stand structure that result from forest pruning. Pruning, in conjunction with thinning, can be prescribed to perpetuate the growth of understory vegetation and thereby enhance wildlife habitat. The growth of some food and medicinal plants may be improved as a result of increased light reaching the understory following pruning. Pruning may be prescribed to control white pine blister rust infections and alter microclimate in five-needle pine stands. Pruning can be done to remove dwarf mistletoe infections from young trees. In addition, hazardous fuel reduction prescriptions often include pruning to remove ladder fuels.

Artificial pruning is expensive enough that is must be limited to a small number of trees per acre and there must be a substantial premium for knot-free wood. This usually exists with species that have wood suitable for cabinet work, interior finish, furniture, or high-grade surface veneer. Ordinarily, the premium has been regarded as insufficient in the case of species that are used primarily for framing timbers and building construction.

Commercial pruning has been demonstrated to be economically viable on conifers such as white pine, red pine, loblolly pine and Douglas-fir. Other species such as ponderosa pine may also be likely candidates. Interest in pruning has been cyclical over the years and successful pruning requires a number of items to be in place, such as:

– The ability to make substantial initial investments.

– The ability to track stands through time based upon good record keeping.

– Good sites – accrual of clear wood must be substantial enough to offset the capital carrying costs of pruning. (i.e., costs may have to be carried 30 to 50 years).

– Uniform stands or plantations of conifers with ample selection of ”crop” trees to prune.

– Commitment to perpetual intensive management to support the pruning investment.

– Labor pool – hand labor has been shown to be more effective than mechanical means substantial clear wood premium for future markets.

The literature includes ample information on the technical aspects of pruning. Pruning in conjunction with fuels treatments to reduce fire hazard is becoming a more common treatment on trust lands.

Fertilization

The application of fertilizer in forests is usually done to maintain or improve soil properties such as organic matter and the ability to supply nutrients, and to improve tree growth and yield. Remember that it is more effective to preserve soil productivity by careful implementation of silvicultural practices than to try to restore soils damaged by intensive site preparation or severe fires, for example.

Of all nutrient elements, nitrogen (N) is by far the primary growth-limiting nutrient in North America. Fertilization is not a common practice on Indian lands, especially large-scale commercial applications. Fertilization is expensive and because of this, the net gain from treatment must be recovered and capitalized relatively quickly. It is typically applied within 5–7 years of a final harvest. Other considerations are:

– Stands should be even-aged.

– Stands should be uniform, without large holes.

– Stands should be moderate to high in vigor.

– Sites should be moderate to high in yield.

– Local experts should be consulted to determine what types of geomorphology and soil types will best respond to specific nutrient mixes. While nitrogen is usually the limiting factor, this is not always the case. If water or phosphorous is the limiting factor, adding N may not cause trees to grow. Additionally, adding N may actually increase mortality due to Armillaria.

– Good silvicultural practices should first be in place before fertilization is contemplated.

– Stands selected for fertilization should be committed to future intensive practices.

In general, forest fertilization will not be practical on most trust lands. Regional experts should be consulted for detailed recommendations when

the silviculturist sees an opportunity. Fertilization will more often be used as a spot treatment to repair, protect, and enhance vegetative cover, such as on exposed soil, burned or degraded sites, or heavily used areas.

While fertilization may not often be attempted on a commercial scale, tree and forest nutrition should be on the mind of every practitioner. The type of silvicultural system or intermediate treatment used and how it is implemented will affect both short and long-term site productivity. Slash treatment or disposal method after a regeneration harvest or intermediate cut will affect short-term nutrient capital, as the fine material captures the greater part of those nutrients.

The relative nutritional effect of any treatment on future stand growth will be due to a great number of factors including such things as soil depth, soil type, fertility, severity of treatment (clear-cut vs. low thinning), treatment type (burning, slash trampling removal, etc.) rainfall, site severity, etc.

Prescribed Burning

Prescribed burning is a silvicultural technique or tool used to accomplish some aspect of a regeneration or intermediate treatment, and as such, is an integral part of the silvicultural prescription. The agency needs to work hard at coordinating burning projects rather than separating forest management from fire management planning and execution.

To maintain the control and ensure positive effects, foresters must plan why and how to burn. The detailed prescription, based upon analysis of the site and its needs, should have clearly stated objectives when fire is prescribed in forest stands. These might include: fuels reduction; site preparation; or the reduction of an undesirable tree species or an over-abundant species.

If site preparation for seedling survival or seed germination is the objective, thought should be given to the grass, forb and shrub species present, as well as the tree species to be managed. Seasonal timing and the intensity of the burn will affect both, with possible unintended consequences. The site: www.fs.fed.us/database/feis/plants, provides valuable insight into plant response to fire.

Application of Pesticides

Broad scale application of pesticides occasionally occurs, generally in conjunction with spraying for defoliators such as spruce budworm or tussock moth. These projects typically cover large areas, are costly and affect numerous other forest resources. Because the need is created by

catastrophic outbreaks, there will not be an environmental document to tier from, and thus will require their own stand alone analysis. Input of a number of specialists including entomologists, foresters, hydrologists, public, etc. will be required. In some cases, inter-agency efforts should be considered.

Smaller scale operations may include brood tree or trap tree treatments, or the use of pheromones to manipulate insect populations. These intense measures are only cost effective if considered ”holding actions’ and are associated with near-term silvicultural treatments to remedy the situation that caused the problem in the first place. For example, pheromone trapping may be used in some instances as a stand-alone treatment designed to get plantations to an age of resistance without excessive damage from pine shoot borer. If the root cause(s) of the stand condition is not being addressed, then these types of treatments should not be attempted.

Other Chemical Applications

Use of herbicides for site preparation and conifer release may be the most cost-effective solutions for some sites; however, public perception of their safety has generally limited that use on public and Indian forest lands.

Text 6. Forest Regeneration Practices

Источник: Английский язык в профессиональном общении: учебное пособие для магистрантов направления подготовки 35.04.01 ”Введение в лесопарковое хозяйство, уход за деревьями в урбанизированной среде” / Л. Р. Валитова. – Оренбург: ИЦ ОГАУ, 2015. – 81 с.

Forest ecosystems have come to be seen as one of the most important components of the biosphere, and forestry has emerged as a vital field of science, applied art, and technology.

Sustainable forest management means following ecologically sound practices that maintain the forest ecosystems’ integrity, productivity, resilience and biodiversity. That involves sustaining a wide range of ecological processes through which plants, animals, microorganisms, soil, water and air interact.

As a result of these processes, forests provide many functions essential to life on this planet. They maintain the chemical balance of soil, air and water, stabilize the climate, recycle nutrients, break down pollutants, clean the air and water, and are vital to watershed protection, soil formation, carbon storage and the habitat for wildlife. The products of

forest growth may be harvested on a sustainable basis, and even enhanced through silvicultural practices, as long as the forests' inherent biological limits are respected.

Forest regeneration is the act of renewing tree cover by establishing young trees naturally or artificially, generally promptly after the previous stand or forest has been removed. The method, species, and density are chosen to meet the goal of the landowner. Forest regeneration includes practices such as changes in tree plant density through human-assisted natural regeneration, enrichment planting, changes in tree genetics or tree species. Human-assisted natural regeneration means establishment of a forest age class from natural seeding or sprouting after harvesting through selection cutting, shelter (or seed-tree) harvest, soil preparation, or restricting the size of a clear-cut stand to secure natural regeneration from surrounding trees. Enrichment planting means increasing the planting density (i.e., the numbers of plants per hectare) in an already growing forest stand.

Silvicultural regeneration methods combine both the harvest of the timber on the stand and re-establishment of the forest. The proper practice of sustainable forestry should mitigate the potential negative impacts, but all harvest methods will have some impacts on the land and residual stand. The practice of sustainable forestry limits the impacts such that the values of the forest are maintained in perpetuity.

Reforestation is the restocking of existing forests and woodlands which have been depleted, with native tree stock. The term reforestation can also refer to afforestation, the process of restoring and recreating areas of woodlands or forest that once existed but were deforested or otherwise removed or destroyed at some point in the past. The resulting forest can provide both ecosystem and resource benefits and has the potential to become a major carbon sink.

Natural reforestation can occur naturally if the area is left largely undisturbed. Native forests are often resilient and may re-establish themselves quickly. Conceptually, it involves taking no active role in reforesting a deforested area, but rather just letting nature take its course.

Managed Reforestation

One debatable issue in managed reforestation is whether or not the succeeding forest will have the same biodiversity as the original forest. If the forest is replaced with only one species of tree and all other vegetation is prevented from growing back, a monoculture forest similar to agricultural crops would be the result. However, most reforestation involves

the planting of different seedlots of seedlings taken from the area. More frequently multiple species are planted as well. Another important factor is the natural regeneration of a wide variety of plant and animal species that can occur on a clear-cut. In some areas the suppression of forest fires for hundreds of years has resulted in large single aged and single specied forest stands. The logging of small clear-cuts and or prescribed burning, actually increases the biodiversity in these areas by creating a greater variety of treestand ages and species.

Reforestation need not be only used for recovery of accidentally destroyed forests. In some countries, such as Finland, the forests are managed by the wood products and pulp and paper industry. In such an arrangement, like other crops, trees are replanted wherever they are cut. In such circumstances, the cutting of trees can be carefully done to allow easier reforestation. In Canada, the wood product and pulp and paper industry systematically replaces many of the trees it cuts, employing large numbers of summer workers for treeplanting work.

Plantation

Reforestation is controversial when plantations are established in place of natural forest. In tropical American nations such as Costa Rica and Panama, many thousands of acres of ex-cattle pasture are being planted with economically valuable tropical timber species, often with the help of generous local government incentives. Unlike in the US and Canada, where plantations are established for wood pulp and paper, in Costa Rica and Panama and other nations in Central America, plantations are being established to grow timber.

For example, in just 20 years, a teak plantation in Costa Rica can produce up to about 400 m^3 of wood per hectare. As the natural teak forests of Asia become more scarce or difficult to obtain, the prices commanded by plantation-grown teak grow higher every year. Other species such as mahogany grow slower than teak in Tropical America but are also extremely valuable. Faster growers include pine and eucalyptus.

Text 7. Forestry in Russia

Источник: Английский язык в профессиональном общении: учебное пособие для магистрантов направления подготовки 35.04.01 ”Введение в лесопарковое хозяйство, уход за деревьями в урбанизированной среде” / Л. Р. Валитова. – Оренбург: ИЦ ОГАУ, 2015. – 81 с.

Russia occupies one eighth of the global land area and most of non-tropical Eurasia. Its territory presents landscapes of 8 natural zones, from arctic deserts and tundra all the way through the taiga zones to broadleaved forests and steppe areas. Over 11,000 species of vascular plants, 320 mammals, about 730 birds, 75 reptiles, about 30 amphibians and 270 fresh water fish species may be found in Russia.

In spite of a long his economic development lands of Northern Eurasia are relatively little disturbed especially in Siberia and the Far East. Industrial and agricultural expansion into these regions has been difficult due to permafrost, the cold climate and the land which is difficult to cultivate. Almost 90 % of tundra, up to 70–75 % of taiga forests and 20–30 % of Asian steppes have remained close to their natural state.

Somewhat more than half of the forests are young forests greatly altered by man, whereas less than 15 % can still be classified as frontier forests (virgin forests). The other forests consist of fragments of old-growth and other mature forests and areas dominated by marsh-bog complexes.

Compared with similar vegetation zones in Scandinavia, for instance, Russian zones still have a relatively high proportion of close to their natural state. Natural restoration of forest is much quicker in the south than in the north. It is also evident that the species diversity is much higher here.

The Russian zones, although not totally untouched, are of the highest quality that exists, and there is no doubt about the value of these sites.

Many species in the Red Data Books for Sweden and Finland still exist in viable populations in the Northwest of Russia. The main reason is that the forests although intensively used or disturbed in many places, have not been subject to the systematic and intensive forestry methods applied in the neighboring Finland and Sweden.

The annual growth of the Russian forests is nearly 1000 million m^3. It has been estimated that the economically exploitable forests comprise 55 % of the forested areas under state forest management. Mortality amounts 49 % of the gross growth. This is an extremely high figure compared with other countries. This is due to the fact, that there are still huge areas in Russia with unexploited old-growth forests, as well as a significant amount of fires, insect outbreaks, etc.

At present, Russia has 99 state reserved areas, i.e. strict scientific nature reserves with the total area of 33.2 million ha and 34 national parks with the total area of 6.8 million ha. There are plans to establish some 40 additional reserved areas and parks. Practically all the national parks are

located in forest areas and are managed by the state forestry authorities. The total protected area is about 5% of the forest resource area in Russia, but only about 2% is strictly protected.

Russian forests have been divided into three categories with respect and ecological characteristics. The first category comprises forests with protective function, e.g. forests along watersheds. However, these forests, comprising some 20% of the forested land, are certainly not strictly protected. According to Greenpeace in Russia, intermediate and sanitary tree fellings are practised in 95% of these forests, and even clear-cutting (maximum size 10 hectares) is allowed in 50% of the area. The second category includes forests in populated areas and forests with low production, comprising 5.5% of the total area. The vast majority of 74.5%, is included in category three, industrially exploitable forests, clear-cutting (maximum size 50 ha) is the main forestry practice.

Text 8. Forest Resource Assessment

Источник: Английский язык в профессиональном общении: учебное пособие для магистрантов направления подготовки 35.04.01 "Введение в лесопарковое хозяйство, уход за деревьями в урбанизированной среде" / Л. Р. Валитова. – Оренбург: ИЦ ОГАУ, 2015. – 81 с.

The 2005 Forest Resource Assessment is the most comprehensive assessment of forests to date. It tells us that forests cover 30% of the land area of planet Earth and range from undisturbed primary forests to forests managed and used for a variety of purposes.

A forest is an area with a high density of trees. These plant communities cover approximately 9.4% of the Earth's surface (or 30% of total land area) and function as habitats for organisms, hydrologic flow modulators, and soil conservers, constituting one of the most important aspects of the Earth's biosphere.

Forests can be found in all regions capable of sustaining tree growth, at altitudes up to the tree line, except where natural fire frequency is too high, or where the environment has been impaired by natural processes or by human activities. As a general rule, forests dominated by angiosperms (broadleaf forests) are more species-rich than those dominated by gymno-sperms (conifer, or needle-leaf forests).

Forests sometimes contain many tree species within a small area (as in tropical rain and temperate deciduous forests), or relatively few species over large areas (e.g. taiga). Forests are often home to many ani-

mal and plant species, and biomass per unit area is high compared to other vegetation communities.

Much of this biomass occurs below ground in the root systems and as partially decomposed plant detritus. The woody component of a forest contains lignin, which is relatively slow to decompose compared with other organic materials such as cellulose or carbohydrate.

Forests are differentiated from woodlands by the extent of canopy coverage: in a forest the branches and foliage of separate trees often meet or interlock, although there can be gaps of varying sizes within an area referred to as forest. A woodland has a more continuously open canopy, with trees spaced further apart, which allows more sunlight to penetrate to the ground between them.

Among the major forested biomes are: rain forest (tropical and temperate), taiga, temperate hardwood forest, tropical dry forest.

Forests can be classified in different ways and to different degrees of specificity. One such way is in terms of the ”biome” in which they exist, combined with leaf longevity of the dominant species (whether they are evergreen or deciduous). Another distinction is whether the forests composed predominantly of broadleaf trees, coniferous (needle-leaved) trees, or mixed.

Boreal forests occupy the subarctic zone and are generally evergreen and coniferous.

Temperate zones support both broadleaf deciduous forests (e. g. temperate 36 deciduous forest) and evergreen coniferous forests (e. g. temperate coniferous forests and temperate rainforests). Warm temperate zones support broadleaf evergreen forests, including laurel forests.

Physiognomy classifies forests based on their overall physical structure or developmental stage (e. g. old growth vs. second growth).

Forests can also be classified more specifically based on the climate and the dominant tree species present, resulting in numerous different forest types (e. g. ponderosa pine / Douglas-fir forest).

Temperate needleleaf forests mostly occupy the higher latitude regions of the northern hemisphere, as well as high altitude zones and some warm temperate areas, especially on nutrient-poor or otherwise unfavourable soils. These forests are composed entirely, or nearly so, of coniferous species (Coniferophyta). In the Northern Hemisphere pines, spruces, larches, silver firs, Douglas firs and hemlocks make up the canopy, but other taxa are also important.

Globally two broad types of forests can be identified: natural and anthropogenic.

Natural forests contain mainly natural patterns of biodiversity in established seral patterns, and they contain mainly species native to the region and habitat.

The natural formations and processes have not been affected by humans with a frequency or intensity to change the natural structure and components of the habitat.

Anthropogenic forests have been created by humans or sufficiently affected by humans to change or remove natural seral patterns. They often contain significant elements of species which were originally from other regions or habitats.

Text 9. Impact on Old-growth Forests and Biodiversity

Источник: http://www.borealforest.org/world/rus_mgmt.htm

Wood harvesting has changed the age structure of the forests in the European part of Russia dramatically during past decades. The area covered by mature and over-mature forests has decreased from 51 % in 1966 to 38 % in 1993. The proportion of mature and over-mature stands in the European part of Russia is only 19 % of the figure for the whole country, while this region produces 57 % of the annual harvest.

However, the old-growth forests of the European part of Russia are still a world-class natural heritage and the evaluation of their importance should be done in this light. The conservation of old-growth forests is not included in Russian forest legislation in any way, even in the areas where the remaining old-growth comprises only a small fraction of the total.

Thus the major part of the remaining old-growth areas in the Northwest of Russia are still under acute threat and the remaining area is getting smaller every year. The possible introduction of "softer" logging technologies will not solve the problem, as the only way to maintain the functional characteristics of old-growth areas is by protection of sufficiently large non-fragmented areas.

European and other international environmental funding should urgently be directed to the protection of these forests. Biodiversity conservation efforts in protected areas are fundamentally important, but a full program of forest biodiversity conservation must also deal with forests subjected to timber harvesting and other human intervention.

Forestry practices should be developed in more ecological direction – e. g. by leaving patches of mature and dead trees when harvesting,

regenerating with mixed species and refraining from clear-cutting, especially in all-aged stands of shade-tolerant species.

In future, consumer demand for sustainable forestry and the application of more ecological technology in forest production will require the adoption of a new approach in nature conservation, timber harvesting, forest industries and in marketing. The moratorium on logging of old-growth forests (to which a major part of Finnish companies have committed themselves) may be seen as the first step in this direction.

However, in most cases, the Russians' own timber harvesting enterprises are poorly prepared to meet the ecological demands.

Russia's Old-growth Forests and Conservation Efforts

Old-growth forest protection has always been one of the priorities of the Russian conservation movement. However, it is difficult to protect them without knowing where they are located. In many cases the lack of information about old-growth location resulted in leaving the most valuable forests unprotected, while protection status was applied to less valuable forest areas or even only to those ones which timber companies have voluntarily agreed to leave for conservation. The last option has not led to adequate biodiversity conservation. Information about old-growth location is also important for timber companies, which would like to avoid environmental conflicts and introduce environmentally responsible forestry.

Here are some successful attempts (made in 1990s) to apply analyses to identify relatively undisturbed Russian forest ecosystems:

– Russian Far East: A mapping project by Biodiversity Conservation Centre and Socio-Ecological Union.

– Novosibirsk oblast: A project for mapping valuable forests in a few districts of Novosibirsk oblast, Western Siberia. The project was implemented by the Ecological Club at Novosibirsk State University.

– European Russian North: The mapping of only the largest (more than 100 thousand hectares) areas of little-disturbed forest in European Russia. It was made by the Forest Club organizations (Biodiversity Conservation Centre, Greenpeace Russia, Socio-Ecological Union) in 1999. The following regions were covered: Murmansk oblast, Arkhangelsk oblast, Vologda oblast, Perm oblast, Karelia Republic, Komi Republic and Komi-Permjatsky okrug.

– The Frontier Forests Report was issued by World Resources Institute in 1997. The report also covered the whole of Russia.

– Karelia Republic: The kvartals (forest blocks) level based map of potential old-growth forests areas in the Republic. It was prepared in

1996 jointly by Biodiversity Conservation Centre and Greenpeace Russia. It was updated in spring 1999. This map is the base for still on-going logging moratorium announced by a few largest forest companies.

Text 10. Specially Protected Nature Territories

Источник: http://www.metla.fi/julkaisut/workingpapers/2009/mwp110.pdf

A network of specially protected nature territories plays an important role in preserving typical and unique natural landscapes, plant diversity, wildlife, and sites of natural and cultural heritage. According to the Federal law of the Russian Federation ”On the Specially Protected Natural Territories”, the specially protected natural territories include land plots and water bodies, with the air space above them, within the boundaries of the sites of special value in terms of science, aesthetics, recreation and health care. These are the sites that are officially excluded from management regime and that are under specific nature protection management. The following categories of specially protected sites that are officially in use:

– State nature reserves (strict nature zapovedniks), including biosphere reserves.
– National parks.
– Nature parks.
– Wildlife preserves (zakaznik).
– Nature monuments.
– Dendrological parks (arboreta) and botanical gardens.
– Resorts and health-care sites.

Apart from the specially protected territories, the following sites are of due importance and environmental value: forest reserves, forest stands of special value, forest stands of due scientific and historical importance, genetic reserves as well as relict habitat sites populated with rare, endemic, and threatened flora and fauna species.

These all play a crucial role in the formation of an ecological framework of a certain region. A state nature reserve (zapovednik) is the most traditional form of site protection and is clearly prioritized for biological diversity conservation. One hundred zapovedniks, with a total area of 33.5 million ha, were established in the Russian federation by the year 2002. They stretch over the territory of 64 subjects of the Russian Federation. According to the legislation, zapovedniks are establishments for nature conservation, scientific research and environmental education.

The system of Russian state nature reserves (zapovedniks) is recognized with respect all over the world. Twenty-one zapovedniks have the international status of biosphere reserves, seven are under the jurisdiction of the World Cultural and Natural Heritage convention, ten are under the jurisdiction of the Wetlands convention of international importance, especially as being considered to be waterfowl habitat, and four zapovedniks have been awarded with European Union Diplomas. Territories, that include natural complexes and sites, that have special economic, historical and aesthetic value, that are intended for nature conservation, environmental, educational, scientific, and cultural purposes, and that are designed for regulated tourism, are declared as national parks. By the year 2002 there were 35 national parks in Russia with a total area of 6924.5 thousand ha.

Nature parks of regional importance fit into a rather new category of specially protected areas. They represent establishments for nature conservation and recreation that come under the jurisdiction of the subjects of the Russian Federation. At present, the national parks network is in the developmental stage, and only 30 nature parks are officially registered.

Wildlife preserves (zakaznik) are the territories of special importance for the preservation or restoration of natural complexes (or components), as well as for the maintaining of ecological balance. State zakazniks carry out nature protection functions under the regime of restricted economic activities and restricted utilization of natural resources. The Ministry of Agriculture of the Russian Federation manages the majority of wildlife preserves. In addition to this, there are about 4 thousand zakazniks of regional importance.

Nature monuments are unique and irreplaceable sites of high ecological, scientific, cultural and aesthetic value, which are of natural and artificial origin. Depending on the value of the site, it can be of federal or regional importance. There are 28 nature monuments of federal importance under the jurisdiction of the Ministry of Natural Resources. Their total number at the regional level makes up more than 7.5 thousand.

There are 153 resorts with a balneological, climatic and mud-care profile in Russia. Most of them (52 resorts) are located in the Northern Caucasus.

Recreation is an important aspect of forest use. Forest lands, accessible for walks and visits, such as nature parks, zakazniks, urban and municipal forests, are considered sites for recreational use. In no uncertain

terms, all the Forest Fund lands (both covered and non-covered with forests) are considered as recreational sites and include rivers, lakes, glades, rocks, alpine meadows, roads, etc. Recreational use is defined as the utilization of the forest benefits for the recreation of people. According to the Forest Code of the Russian Federation, the forest users, when on the Forest Fund sites that are designated for cultural, health improving, tourism and sporting purposes, must undertake site improvement measures. Natural landscapes and forests have to be preserved and, therefore, fire safety rules and sanitary requirements have to be followed.

Text 11. Nomenclature of Plants

Источник: Английский язык в профессиональном общении: учебное пособие для магистрантов направления подготовки 35.04.01 ”Введение в лесопарковое хозяйство, уход за деревьями в урбанизированной среде” / Л. Р. Валитова. – Оренбург: ИЦ ОГАУ, 2015. – 81 с.

The taxonomy of plants deals with the kinds of plants (identification), their nomenclature, and their classification.

Dendrology

The term dendrology is derived from the Ancient Greek: dendron (= tree) and -logia (= study of or science of); the term xylology is used occasionally to denote the science and study of woody plants. Dendrology, called forest botany in some countries, usually is limited to taxonomy of trees but may also include shrubs and woody vines. This basic subject in the training of foresters teaches how trees are named (nomenclature), described (morphology), and grouped (classification); how to find the name of an unknown tree and recognize important forest species (identification); and where trees occur both by geographic ranges of species and by forest types (distribution). Woody plants may be trees, shrubs, and lianas.

There is no sharp boundary between plant taxonomy and dendrology. However, woody plants do not only belong to many different plant families, but these families may be made up of both woody and non-woody members. Some families include only a few woody species. This severely limits the usefulness of a strictly dendrological approach. Dendrology tends to focus on economically useful woody plants, their identification and horticultural or silvicultural properties.

Nomenclature – Common Names

The chief characteristics of trees usually influence the selection of their common names, although the names of many botanists or their

friends have also been commemorated in this way. A few examples may prove of interest.

– Habitat: swamp white oak, sandbar willow, alpine fir, river birch, mountain hemlock.

– Some distinctive feature: weeping willow, bigleaf maple, white-bark pine, bitternut hickory, cut-leaf birch, trembling aspen, tulip tree.

– Locality or region: Pacific yew, Idaho white pine, southern red oak, Ohio buckeye, Virginia pine.

– Use: canoe birch, sugar maple, tanbark oak, paper mulberry.

– In commemoration: Nuttall oak, Engelmann spruce, Sargent cypress, Douglas fir.

– Adaptation of names from other languages (i.e. Indian, Latin, Spanish): chinquapin, arborvitae.

Unfortunately for the beginner, the application of common names is not regulated by any constituted authority.

Scientific Names

Because of the great confusion on common names, it became necessary to find some universal system, which could be used not only within the boundaries of a single country, but throughout the world.

Such a system has been developed through the use of Latin names, many of which were first applied when this language was employed by scientists of all countries. This practice has been continued, and even now not only are technical names written in Latin but also the initial descriptions of new species.

Scientific names have been in common use since the middle of the eighteenth century when Linnaeus, the great Swedish botanist, developed the binomial system of nomenclature, which is now used. The scientific name of a tree or other plant consists of three parts – a generic name, a specific name, and the full or the original published plant description. Thus, in the scientific name ”Quercus imbricaria Michaux”, Quericus is the generic or group name, imbricaria is the specific or species name, and Michaux is the person who named and described the tree.

Generic names always appear first and are invariably capitalized, while specific names begin with small letters. In all but scientific writings, the author’s names may be disregarded. But it should be indicated that the factors, which influence the original choice of common names apply as well to scientific names.

Classification

The classification of plants dates back to ancient Greek civilization when Theophrastus (372–287 B.C.), a student of Aristotle's, and by many considered to be the father of botanical science, described and classified over 400 species. He differentiated between woody and herbaceous forms but failed to indicate any botanical relationships. Probably the first extensive classification of plants was that of Caesalpino (1519–1603), an Italian physician, who arranged and classified a large number according to the nature and structure of their fruits and seeds. While he did not recognize any natural relationships, his work is generally conceded to be superior to anything else developed previously.

Linnaeus' chief contributions to taxonomy were in the field of nomenclature, although he, too, developed an artificial classification of plants based on the parts of the flower, particularly the stamens. However, like the others, he also failed to recognize the possibility of a common lineage among plants or groups of plants.

It is of the greatest importance to remember that all of these early writers thought of different kinds of plants as separate and distinct from each other, and their arrangement in groups was only for convenience. The idea of evolution had not yet been generally accepted.

The publication of Darwin's "Origin of Species' in 1859, produced a revolution in scientific thinking, and in the field of taxonomy the artificial systems were swept away. Although the features of plants (flowers, fruits, leaves, etc.) had not changed, the method of approach became entirely different and similarities in anatomy acquired a new meaning, namely, that of relationship or common origin.

It was soon found that the structure of the flower was a suitable basis upon which to classify all seed-bearing plants. In fact, our present classifications are based upon flowers, and it has been demonstrated that plants exhibiting similar floral structure usually show other botanical similarities indicative of a common lineage. Furthermore, plants with flowers of simple structure are usually regarded as primitive or of great antiquity while those with structurally complex flowers are ordinarily conceded to be of much more recent origin. If this were invariably true, the taxonomist should experience little difficulty in arranging trees and other seed-bearing plants in the order of their apparent descent, listing those of greatest age first and those of most recent origin last. However, the phylogenetic positions of several plant families have never been accurately determined

because of conflicting evidence. It is often extremely difficult to ascertain if a certain plant (or group of plants) is inherently simple structurally, or if it is simple through extensive evolutionary modification.

It should not be surprising, however, that no one classification is universally accepted. At present, there are two principal systems in common use. England and her possessions employ the Bentham and Hooker system, while the United States and other nations prefer that developed by the German taxonomists, Engler and Prantl. In recent years a system initiated by the late E. C. Bessey, an American botanist, has found much favor with taxonomists.

Text 12. Identification of Trees

Источник: Английский язык в профессиональном общении: учебное пособие для магистрантов направления подготовки 35.04.01 ”Введение в лесопарковое хозяйство, уход за деревьями в урбанизированной среде” / Л. Р. Валитова. – Оренбург: ИЦ ОГАУ, 2015. – 81 с.

Tree Stems and Bark

Bark is one of the most important features in the identification of large trees, particularly when leaves and twigs are inaccessible, or during the winter months when the former may be lacking. The average timber cruiser relies almost wholly upon bark in tallying species.

In a few species such as beech, red alder, and balsam fir, the roughness of outer bark is seldom seen because the trees usually do not become of sufficient age or size. Deep cork formation commonly shows first at the base of a tree, so that while the surface there may be quite rough, that along the bole is still relatively smooth. Another place where early roughening may be expected is below the branch insertions in such groups of species as the poplars and birches.

The color, together with the shape and prominence of lenticels, is the most important feature of the bark on young stems. On old trunks the configuration, texture, thickness, and color are features to be observed.

Twigs, Buds and Leaf Scars, Leaves

Twigs offer an excellent means of identifying trees and shrubs throughout the year, except for a short time during the spring when the buds formed the previous season are opening and those for the current season have not yet appeared.

The most conspicuous features of twigs are their buds, leaf scars, stipule scars, and pith, although their color, taste, odor, and the presence

or absence of cork, spur shoots, spines thorns, glaucous bloom, or pubescence are also valuable characters for purposes of identification.

Buds are young, undeveloped shoots. If they are leaf-buds only they finally grow out to produce either single leaves or branch stems bearing other leaves. On the other hand, if they are flower-buds, they finally produce the flower or flowers and then their growth ceases. Axillary buds produce branch shoots, or single leaves or flowers.

When a leaf falls from a twig, there remains at the point of attachment a leaf scar. Leaf scars vary in size and shape with different species and hence are usually diagnostic. On the surface of each leaf scar are found one or more minute dots or patches, which show where the now ruptured strands of vascular tissue passed from the twig into the leaf. The size, number, and arrangement of these so-called vascular bundle scars are often helpful in identification.

Leaves are diverse in size and form. Thus we have the comparatively small and simple leaf of the privet, and, in contradistinction to this, the leaf of the banana plant, which, though roughly similar in shape, is from one to three yards long.

A typical leaf is composed of a leaf-stalk or petiole which usually widens at its base where it joins the stem at the node. The main flattened expansion of the leaf is called the leaf-blade or lamina. In some cases, the leaf-blade is borne directly on to the stem, that is, there is no leaf-stalk, in which case the leaf is said to be sessile. Where there is a leaf-stalk, it may be thick or thin, long or short.

On the leaf-blade thicker lines are visible. These are the veins, and are the channels for conducting water with its dissolved substances into the leaf and for transporting manufactured food substances away from the leaf. The main veins give off branch veins, thus presenting a complete network of veins. The whole arrangement of veins in a leaf is called venation. In some leaves there is one main vein, which branches. The branches give off secondary branches, and so on, thus producing a reticulate or net venation. This is seen in such leaves as elm, oak and all broad-leaved trees.

In many leaves, despite diversity of shape, the whole-leaf-blade is a single structure, as is the case in the elm, oak, maple and pine. Such leaves are simple.

In other cases, each leaf is composed of several leaflets arranged in a definite order, for example, horse-chestnut, ash and acacia. Such leaves are compound.

Roots

By virtue of their genetic origin, root systems of trees tend to exhibit three morphological types: taproot, heartroot, and plate or flatroot. A taproot consists of a nearly vertical main root and many laterals terminated in feeding roots; the feeding roots carry either root hairs or fungus-modified short roots, called mycorrhizae. A taproot system is particularly common to pine and oak species. Its full development is reached in permeable, adequately moist, but well-aerated soils. A heart-root lacks the main root but consists of several primary and secondary laterals, extending into a network of fibrous feeding roots. This root system pattern is produced by maple, beech, and fir. It attains its full development also in permeable, well-aerated soils. A plate or flatroot is composed of anchoring horizontals and numerous fringe roots. It is exhibited by spruce, hemlock, and other trees of saprophytic tendencies, especially when they grow in poorly drained soils.

Text 13. Description of Tree Species and Trees

Источник: Английский язык в профессиональном общении: учебное пособие для магистрантов направления подготовки 35.04.01 ”Введение в лесопарковое хозяйство, уход за деревьями в урбанизированной среде” / Л. Р. Валитова. – Оренбург: ИЦ ОГАУ, 2015. – 81 с.

In scientific texts we may come across descriptions of trees. These descriptions often vary, but there are principles universally recognized for the presentation of common and rare tree species.

A tree is a plant form that occurs in many different orders and families of plants. As we know, trees show a wide variety of growth forms, leaf type and shape, bark characteristics, and differences in reproductive organs. Most species of trees today are flowering plants (Angiosperms) and conifers (Gymnosperms).

All these differences, as well as the distribution, are taken into account when describing tree plants.

Sizes of Mature Trees

These are very variable and are often influenced by local conditions of site, or by geographical distribution, especially with boreal species, which may become shrubby or prostrate at the northern limits of their range. Maximum sizes are often from oldgrowth trees, which are no longer standing, and in some instances it is not certain whether actual measurements were made, or whether the size was merely esti-

mated. Maximum heights and diameters as given are usually not from the same tree.

Form

Trees when grown in the open tend to develop characteristic shapes, which may be typical of individual species, or groups of species (genera), this is well illustrated in such trees as American elm, white oak, or white pine. In general, open-grown specimens have large crowns, which may reach nearly to the ground and the clear trunk is short, with considerable taper. Under forest competition, the form is very different, the bole is long, more cylindrical, often clear of branches for one half or more of its length, and the crown small. Certain species, especially those which are extremely tolerant, resist crown restriction, but it may be said that most trees develop typical shapes only in the open, such individuals are, of course, usually unfit for lumber because of the short clear length and many side branches which would appear as knots in the finished boards.

Site

Although many trees are cosmopolitan in this respect, others are invariably associated with certain combinations of soil and moisture, and it is, for instance, as futile to look for a black ash on a high, excessively dry hillside, as to expect ponderosa pine to inhabit a permanent swamp. Site relationships are frequently very complicated, and the absence of a certain species may not be due to its inability to grow in a given situation, but merely because other forms can compete more advantageously there.

The effect of latitude on site is also pronounced, since trees of the north when found at the southern limit of their range often grow only in bogs, even though farther north they are found on dry ground.

Associates

When left unhampered, trees as well as other plants tend to group themselves on the basis of soil and climatic factors, and their ability to compete with their neighbors. In this way fairly definite plant associations come into being, which may be semi-permanent or only temporary in nature. Since a large portion of the forest of this country have been devastated, and the new growth springing up is often so different from that which preceded it, lists of associated tree species lose much of their value unless one knows the recent history of the particular forest in question: for example, trembling aspen originally occurred as a scattered tree in the spruce forests of the northeast, but following logging and fire has now spread in nearly pure stands over wide areas.

Tolerance

It has been known for a considerable time that certain species will grow under varying densities of forest cover, while others exist only in the open. For many years this was interpreted as a reaction to light, and hence an intolerant tree was one, which could bear little or no shade. At present it seems best to consider tolerance as the ability of a plant to complete its life history from seedling to adult, under the cover of a dense forest regardless of the specific factors involved. Or, put more simply, a tolerant tree is one, which can exist, if not prosper, under forest competition, when this is removed or lessened, the rate of growth usually shows a marked increase.

Tolerance is influenced by site (soil, exposure, climate, etc.) so that the best comparisons are made only between trees growing together under the same set of external conditions. Little is gained in attempting to compare two species of widely separated ranges, growing on different soils and with dissimilar associates.

Seed Production and Germination

These are very variable, the former depending on many factors including temperature extremes, condition of the tree, the presence or absence of competition, and the time elapsed since the last heavy crop was borne. The germination percentages vary exceedingly, being influenced by a large number of factors, such as storage (temperature, moisture, and stratifying media, if any) and conditions, surrounding actual germination.

Growth

It is difficult to make general statements of any value, unless they are accompanied by such facts as the age of the tree, density of the stand, and the quality of the site.

Text 14. Taiga's Growth Conditions

Источник: Английский язык в профессиональном общении: учебное пособие для магистрантов направления подготовки 35.04.01 "Введение в лесопарковое хозяйство, уход за деревьями в урбанизированной среде" / Л. Р. Валитова. – Оренбург: ИЦ ОГАУ, 2015. – 81 с.

The taiga is found throughout the high northern latitudes, between the tundra, and the steppes.

Taiga is a biome characterized by coniferous forests. Covering most of inland Alaska, Canada, Sweden, Finland, inland Norway and Russia (especially Siberia), as well as parts of the extreme northern continental

United States, northern Kazakhstan and Japan (Hokkaido), the taiga is the world's largest terrestrial biome. In Canada, boreal forest is the term used to refer to the southern part of this biome, while "taiga" is used to describe the more barren northern areas of the Arctic tree line.

Since North America, Europe and Asia were connected by the Bering land bridge, a number of animal and plant species (more animals than plants) were able to colonize both continents and are distributed throughout the taiga biome. Others differ regionally, typically with each genus having several distinct species, each occupying different regions of the taiga. Taigas also have some small-leaved deciduous trees like birch, alder, willow, and aspen; mostly in areas escaping the most extreme winter cold. However, the deciduous larch is coping with the coldest winters on the northern hemisphere in eastern Siberia. The southernmost part of the taiga also has trees like oak, maple, and elm scattered among the conifers.

Up to 70–75 % of taiga forests in Russia have remained close to their natural state. Despite the relative richness of the natural forests in European Russia, the taiga as a whole is relatively disturbed by various human activities, including forestry. Few substantial areas of intact natural forest remain. The remaining areas include the Pechora region and its headwaters in the Republic of Komi, the forests along the Karelia-Arkhangelsk and Arkhangelsk-Komi borders, the subtundra forests in the Arkhangelsk, Komi and Yamal-Nenets autonomous regions and the eastern part of the Kola peninsula.

Taiga soil tends to be young and nutrient-poor; it lacks the deep, organically enriched profile present in temperate deciduous forests. The thinness of the soil is due largely to the cold which hinders the development of soil, as well as the ease with which plants can use its nutrients. Fallen leaves and moss can remain on the forest floor for a long time in the cool, moist climate, which limits their organic contribution to the soil; acids from evergreen needles further leach the soil. Since the soil is acidic due to the falling pine needles, the forest floor has only lichens and some mosses growing on it. It is not good for farming because it is nutrient poor.

Taiga, the world's largest biome, has a harsh continental climate with a very large temperature range between summer and winter. Aside from the tundra and permanent ice caps, it is the coldest biome on Earth. High latitudes mean that for much of the year the sun does not rise far above the horizon. Winters last at least 5–6 months, with average temperatures

below freezing. Temperatures vary from minus 50 °C to 30 °C throughout the whole year, with eight or more months of temperatures averaging below 10 °C. The summers, while short, are generally warm and humid. In general, taiga grows south to the 10 °C July isotherm, occasionally to the 9 °C July isotherm. The southern limit is more variable. In these warmer areas, the taiga has higher species diversity with more warmth-loving species such as Korean Pine, Jezo Spruce and Manchurian Fir, and merges gradually into mixed temperate forest. The taiga experiences relatively low precipitation throughout the year (200–750 mm annually), primarily as rain during the summer months, but also as fog and snow; as evaporation is also low for most of the year, precipitation exceeds evaporation and is sufficient for the dense vegetation growth. Snow may remain on the ground for as long as nine months in the northernmost extensions of the taiga ecozone.

Text 15. Pine

Источник: Английский язык в профессиональном общении: учебное пособие для магистрантов направления подготовки 35.04.01 ”Введение в лесопарковое хозяйство, уход за деревьями в урбанизированной среде” / Л. Р. Валитова. – Оренбург: ИЦ ОГАУ, 2015. – 81 с.

A pine is a coniferous tree in the genus Pinus, in the family Pinaceae. They make up the monotypic subfamily Pinoideae.

Distribution

There are about 115 species of pine. Pines are native to most of the Northern Hemisphere. In Eurasia, they range from the Canary Islands and Scotland east to the Russian Far East, and the Philippines, north to just over 70°N in Norway (Scots Pine) and eastern Siberia (Siberian Dwarf Pine), and south to northernmost Africa, the Himalaya and Southeast Asia.

Morphology

Pines are evergreen and resinous trees (rarely shrubs) growing to 3–80 m tall, with the majority of species reaching between 15–45 m tall. The smallest are Siberian Dwarf Pine and Potosi Pinyon, and the tallest, Sugar Pine.

Pines are long-lived, typically reaching ages of 100–1,000 years, some even more. The longest-lived is the Great Basin Bristlecone Pine Pinus longaeva, one individual of which at 4.839 years (2007) is the oldest living organism in the world.

The bark of most pines is thick and scaly, but some species have thin, flaking bark. The branches are produced in regular ”pseudowhorls”, actually a very tight spiral but appearing like a ring of branches arising from the same point. Many pines are uninodal, producing just one such whorl of branches each year, from buds at the tip of the year’s new shoot, but others are multinodal, producing two or more whorls of branches per year. The new spring shoots are sometimes called ”candles’; they are covered in brown or whitish bud scales and point upward at first, then later turn green and spread outward. These ”candles’ offer foresters a means to evaluate fertility of the soil and vigour of the trees.

Pines have four types of leaves. Seed leaves (cotyledons) on seedlings, borne in a whorl of 4–24. Juvenile leaves, which follow immediately on seedlings and young plants, 2–6 cm long, single, green or often blue-green, and arranged spirally on the shoot. These are produced for six months to five years. Scale leaves, similar to bud scales, small, brown and nonphotosynthetic, and arranged spirally like the juvenile leaves. Needles, the adult leaves, which are green (photosynthetic), bundled in clusters of 2–5 needles together, each fascicle produced from a small bud on a dwarf shoot in the axil of a scale leaf. The needles persist for 1.5–40 years, depending on species.

Cones

Pines are mostly monoecious, having the male and female cones on the same tree. The male cones are small, typically 1–5 cm long, and only present for a short period (usually in spring), falling as soon as they have shed their pollen. The female cones take 1.5–3 years (depending on species) to mature after pollination, with actual fertilization delayed one year. At maturity the cones are 3–60 cm long. Each cone has numerous spirally arranged scales, with two seeds on each fertile scale; the scales at the base and tip of the cone are small and sterile, without seeds. The seeds are mostly small and winged, and are anemophilous (wind-dispersed), but some are larger and have only a vestigial wing, and are bird-dispersed. At maturity, the cones usually open to release the seeds, but in some of the bird-dispersed species (e.g. Whitebark Pine), the seeds are only released by the bird breaking the cones open.

Ecology

Pines grow well in acid soils, some also on calcareous soils; most require good soil drainage, preferring sandy soils, but a few, e.g. Lodgepole Pine, will tolerate poorly drained wet soils. A few are able to sprout after

forest fires, e.g. Canary Island Pine. Some species of pines, e.g. Bishop Pine, need fire to regenerate and their populations slowly decline under fire suppression regimes.

Several species are adapted to extreme conditions imposed by elevation and latitude; see e.g. Siberian Dwarf Pine, Mountain Pine, Whitebark Pine and the bristlecone pines. The pinyon pines and a number of others, notably Turkish Pine, are particularly well adapted to growth in hot, dry semi-desert climates.

The seeds are commonly eaten by birds and squirrels. Some birds, notably the Spotted Nutcracker, Clark's Nutcracker and Pinyon Jay, are of importance in distributing pine seeds to new areas where they can grow. Pine needles are sometimes eaten by some Lepidoptera species and also the Symphytans species pine sawfly.

Uses

Pines are among the most commercially important of tree species, valued for their timber and wood pulp throughout the world. Pine wood is widely used in high-value carpentry items such as furniture, window frames, paneling and floors.

Many pine species make attractive ornamental plantings for parks and larger gardens, with a variety of dwarf cultivars being suitable for smaller spaces.

35.03.10 – ЛАНДШАФТНАЯ АРХИТЕКТУРА

ПРОФИЛЬ: Декоративное растениеводство

Text 1. What is Landscape Architecture?

Источник: http://www.wisegeek.com/what-is-landscape-architecture.htm

Landscape architecture is a branch of architecture that deals with the planning and design of land and its relation to the buildings around it. While many believe that it is simply related to landscaping and plant selection, landscape architecture is actually much more involved then that. This practice blends site planning, landscaping, art, and environmental restoration to help connect an area to the buildings around it, and make the landscape attractive in itself. The goal of landscape architecture is to create pleasing, functional, and beautiful spaces that serve the needs of their owners or the public.

As the green building movement grows, landscape architecture will likely become even more critical to the building process. Trained landscape architects help lay out a piece of land, determining where structures should be placed so that they have minimal impact on the environment. The landscape architect will take into account the profile of the land, plants and wildlife, nearby water bodies, and surrounding structures to help place the new building in the most effective spot. By properly placing the building, the occupants can enjoy more views and daylight, while the wildlife and soil are disturbed as little as possible.

With all of the responsibilities involved in landscape architecture, those wishing to pursue a job in this field will generally be required to complete an undergraduate degree or higher, depending on where they plan to work. The majority of US states and other western countries require that landscape architects are licensed. In the US, licensing is granted by The Council of Landscape Architectural Registration Boards (CLARB). To apply for a license, applicants must meet the requirements for their state, which may include a bachelor's or master's degree, or, a combination of education and experience.

After an architect has been licensed by CLARB, he or she is free to practice landscape architecture with a design firm, or on their own. Many landscape architects are hired by architecture firms to collaborate on projects with other designers and engineers. The landscape architect

may take care of the entire civil design, including site plans, underground work, and environmental protection, or may focus simply on the landscaping and topography. They may also find jobs in real estate, with municipalities, or with park or forest services. A fairly large percentage of landscape architects also start private practices, where they offer residential design services or consultation services in the commercial sector.

Text 2. What are the Basics of Modern Landscape Design?

Источник: http://www.wisegeek.com/what-are-the-basics-of-modern-land scape-design.htm

Modern landscape design often blends functional outdoor living pieces with adorning plants and accessories. This may require choosing a contemporary design theme that matches or complements the house, pairing hardscape materials with furnishings and planting vegetation for contemporary appeal. Modern landscaping echoes the basics of modern architecture, which utilizes clean, straight lines, minimalism and function over form. This aesthetic sharply contrasts the highly decorative and more ostentatious traditional landscape design used in English or French gardens.

Sketching the yard is a common first step to creating a modern landscape design. This provides a reference of space and helps to determine areas of the design. Seating may be in one spot, with another designated location for flowers and foliage. A second function of the sketch is to denote those places that are shaded, partly sunny and all sun. This will help in selecting the appropriate decorative plants.

Determining the theme and purpose of the yard is another crucial element of contemporary landscape design. Some people choose to utilize every inch of space with such elements as pools, fountains and patios. Others, however, want to create a quiet and restful area surrounded by nature. Knowing the purpose behind the landscape helps a designer select the elements it should contain.

The seating area of a modern landscape design often serves as the focal point. These areas historically featured an umbrella table and matching chairs. Modern landscaping, however, regularly extends indoor living arrangements to the outdoors. This may mean utilizing wicker sofas, elongated glass tables with rocking chairs or simple Adirondack seating. A key to modern landscape design is to pair outdoor furniture with hardscape materials.

Hardscape elements help to create lines and angles within contemporary landscaping. They may be used to bind architectural elements for a uniform look. Examples of hardscape materials include concrete, colored tiles, paving blocks, pebbles and mulch.

Contemporary landscaping often requires vegetation that is both functional and artistic. Many people incorporate gardening plants, such as herbs, vegetables and flowers, with modern landscaping. These can then be used in the house for cooking or decorating. Colorful and easy-to-care-for plants may also create contemporary outdoor living spaces. Suggestions for plant life that add visual texture include large-leafed palms, bamboo or evergreen trees, topiaries and container gardens for decks and patios.

Mass planting techniques may create full and lively appearances in yards. Vegetation can be layered according to size and texture and enhanced with contemporary accessories. Water features, candles, lights and sculptures are examples of outdoor living embellishments.

Modern landscape design may reflect a homeowner's taste or style, but it should also coordinate with the climate of a particular region. Plants often need to meet soil conditions to ensure their health, while furniture and accessories should be durable and weather-resistant. This will help to create a sustainable landscape that is low-maintenance throughout each season.

Text 3. How do I get a Landscaping Job?

Источник: http://www.wisegeek.com/how-do-i-get-a-landscaping-job.htm

An associate's degree or higher in landscaping is a good start at being employable in a landscaping job. After completing education and training for landscape design jobs and then gaining some experience, it's possible to get a landscaping job in one or more different career areas. The most effective way to get the best landscape jobs is to build up a resume of client references.

Landscape architect jobs take experience and a thorough understanding of outdoor architecture. Architect landscaping jobs are done mainly in an office setting as opposed to a maintenance and labor kind of landscaping job that is done outdoors on work sites. Strong computer design skills with some experience or knowledge of urban planning can help landscapers beat the sometimes intense competition for landscape architecture jobs.

Starting as an assistant landscaper can help build both knowledge and experience for future design landscape jobs. Landscaping assistants are often needed on an outdoor landscape crew. With some education or

landscaping training, aspiring landscapers may be able to find labor and maintenance landscaping jobs by contacting local landscape companies. Spring and summer are the busiest seasons in gardening landscaping jobs and local companies often need help to fill in for vacationing crew members. Since at least 49 states require landscapers to be licensed, getting experience by being supervised on a labor crew is a good start for a landscaping job while aspiring landscapers work on getting their licenses.

The United States Department of Labor's Bureau of Labor Statistics notes that the rate of landscape architects who have their own businesses is about double the rate of entrepreneurs in other occupations. Continuing to get landscaping jobs for one's landscaping business relies on marketing and building good client references. It's important for landscapers to gather client references and testimonials and use them in their advertising testimonials to attract new clients.

Many landscapers with their own landscape businesses work in residential landscaping. They must train and hire crew members who are motivated, talented and reliable. Time must be devoted to promoting the business and constantly looking for new landscaping job leads.

Government parks services are another possible job source for landscapers. Landscape designers working for the government may have to prepare reports on how their park designs fit in with sustaining the environment. Many landscape designers work for commercial real estate companies to do landscaping for shopping centers and business developments.

Text 4. What does a Landscape Architect do?

Источник: http://www.wisegeek.com/what-does-a-landscape-architect-do. htm

A landscape architect is responsible for the design and layout of gardens, parks and other outdoor spaces. Landscape architects often work with contractors, builders and architectural firms on collaborative projects. The design of the exterior space has a huge impact on the feel and utility of a building, adding or detracting from the design.

In order to become a landscape architect, you will need to complete post-secondary education in landscape architecture from an accredited university, community or career college. These programs are typically three to four years in length and provide training on design elements, water distribution and environmental impact of design. Many people learn landscape architecture to fulfill a dream and passion for nature.

A typical landscape architect's day can be divided into two main elements: design and implementation. Landscape architects work with a wide range of clients, ranging from private individuals to local governments. Many landscape architects are self-employed, with connections or relationships with several architect firms.

The design aspect is typically initiated by a request for a quotation or design. After meeting with the client to review the basic requirements, expectations and key dates, the landscape architect will visit the proposed site. Detailed measurements of the actual elevation, width and depth are taken. During this visit, the architect will make note of the existing soil condition, any landscaping already in place, drainage and any nearby water management systems. All these items have impact on the final design and site management.

On average, three different designs are created and presented to the client. These designs are usually conceptual drawings and are often made with specialized computer software. Many landscape architects include future time projections in their designs, allowing the client to visualize the space in five to 10 years. This is important with landscape design, as it may take several years for the plants to establish themselves.

Upon selection by the client of a design, the landscape architect typically hands the drawings over to an estimator. This person is responsible for costing the project, creating the project plan, and coordinating the bids from the landscape contractors who will complete the actual work.

In the implementation phase, the landscape architect is now functioning as a project manager. Although the contractor completes the physical work, the architect is responsible for inspecting the site, confirming the changes are made correctly, and dealing with any issues.

The architect remains responsible for the project until the client has inspected and approved of the finished product. It is important to note that many clients maintain a relationship with the landscape architect, and may request a follow-up consultation in three to five years time to ensure that the design is maturing as expected.

Text 5. What is an Alpine Garden?

Источник: http://www.wisegeek.com/what-is-an-alpine-garden.htm

An alpine garden is a garden composed primarily or entirely of plants that are native to mountainous climates. These plants are called "alpine plants", and are characterized by small, shrub-like leaves and tiny flow-

ers. A garden need not be in a mountainous climate to be considered an alpine garden, as the classification depends entirely on the types of plants growing, not on the garden's physical location. Alpine gardens at low elevations usually require special care to flourish. Alpine plants thrive in rocky, acidic soil, and require a consistently cool climate.

A plant is considered an alpine plant if it grows in an alpine climate – that is to say, if it is indigenous to rocky, mountainous conditions. On a typical mountain, the base is lush and green, but the trees grow sparser going up in elevation until finally they disappear. Smaller plants persist on the rocks going higher still, until finally there are no plants, just rocks and usually snow. The place where the trees stop is called the "tree line", and everything above the tree line is considered an alpine climate. Alpine plants usually grow below the tree line as well, but they stand out in the alpine climate because they are the only things growing there.

Gardeners who live in mountainous climates, such as the Rocky Mountains in the United States or the Alps in Europe, will often make use of indigenous alpine plants in their arrangements. The result is, often by default, an alpine garden. Plants common to lower-lying gardens do not usually survive in the colder, rockier climate of the mountainous north.

The simplest alpine garden is a living collection of indigenous alpine plants in a mountainous setting. More complex gardens involve artistic arrangement of alpine plants, often incorporating rock sculptures and arrangements and plant identification. Many alpine gardens are predominantly rock gardens, with several varieties of vine-like, low-lying flora interspersed. Local governments and private foundations in alpine conditions often sponsor the creation and upkeep of publicly accessible alpine botanic gardens to showcase native landscapes.

Alpine plants are prized for their aesthetic value outside of mountainous climates, as well. Many lower-altitude gardeners will seek to incorporate alpine plants into their gardens, both as a means of introducing variety and as a way to capitalize on potentially low-water or drought conditions. Many alpine plants are accustomed to growing with little water, and planting them in dry soil is not usually a problem.

Just because alpine plants will survive in lower altitudes does not mean that they will thrive there. Gardeners seeking to create an alpine garden setting in a lower altitude will need to pay special attention to the alpine plants' growing conditions. If the soil is too rich, the air too bright, or the wind too still, the plants may suffer.

Text 6. What is Softscape?

Источник: http://www.wisegeek.com/what-is-softscape.htm

A softscape is, simply put, the living parts of a landscape, in contrast with a hardscape, which composes the inanimate portions of landscaping and gardening. The term is often used in landscaping jargon, with most gardeners preferring to just say ”plants”. The composition of the softscape is a critical part of landscaping, and thanks to the development of advanced landscaping design programs, landscapers can play around with the softscape on a computer before they even start to break ground, getting an idea of how subtle changes will impact the landscape.

Numerous things can be incorporated into a softscape, including plants, trees, shrubs, vines, and groundcovers. Some items may be fixed, as in the case of evergreen trees and shrubs which remain consistent year round, while others are temporary, like annual plants installed along pathways to add color in the summer, or bulbs which only bloom for a few months of the year before dying back. Arranging all of these elements in an aesthetically pleasing way is the cornerstone of landscaping.

Most gardens and landscapes combine softscaped and hardscaped elements. A garden is not a garden without plants, but stone walkways, walls, fountains, and other hardscape features are equally important. A good landscaper takes the condition of the underlying land into account, looking at how the features of the land lie, and then works with inanimate and living objects to create a pleasing whole.

Climate is usually a major influence on the softscape, since climactic conditions limit what can be grown in the area. Some gardeners also like to look at the surrounding environment and use that as a gardening inspiration, blending the garden with the surrounding area so that it feels more natural. Other determining factors might include which colors the gardener wants to use, the design of surrounding structures, and the look that the gardener is going for. There are a number of different gardening styles, from very formalized gardens to rambling gardens filled with native plants and landscaped to look wild, and each requires a different approach.

Materials for softscaping can be acquired from nurseries and garden supply stores. Some gardeners also like to grow their own softscaping from seeds and cuttings, exchanging horticultural elements with other gardeners in the area. This method can be especially useful for gardeners who are new to an area, as it allows them to cultivate plants which are known to thrive in the region.

Text 7. What is Hardscape?

Источник: http://www.wisegeek.com/what-is-hardscape.htm

Hardscape is the non-living elements of a landscape. You could think of it as everything but the plants, encompassing walkways, walls, patios, gazebos, and a wide variety of other structures. Arranging the hardscape elements in a landscape is a critical part of achieving an aesthetically pleasing whole, whether one is gardening in a small patch of land in front of a city home or landscaping a sprawling country estate.

When a garden is designed, hardscape elements are often among the first things to be plugged into the landscape. The gardener usually starts by assessing the lay of the land, and looking for key elements of the natural landscape and surrounding environment which will become integral to the landscaping. For example, if a garden is in a region surrounded by mountains, the garden can be arranged to complement the view of the mountains, integrating the garden with the surrounding area.

One of the first hardscaped elements to be installed is often pathways, which may be made from brick, crushed gravel, woodchips, and a wide variety of other materials. Pathways map out the garden, determining how it will flow across the landscape and how people will interact with the environment. As softscape elements like flowerbeds, shrubs, and so forth start are installed, gardeners can identify areas in which other hardscape elements might be desired, like a low rock wall to separate different parts of the garden, or a gazebo for entertaining in a pleasant area of the property.

Usually, the elements of the hardscape are fixed and permanent. Sometimes, they are there before the garden is installed, as in the case of large boulders which may be impossible to move, or structures which existed before the landscaping was initiated. In other instances, the garden may be designed around a key hardscape feature like a fountain or outdoor sculpture. Gardeners may also include mobile elements, like rotating displays of art which can be changed with the seasons.

In a well-designed garden, the softscape and the hardscape complement each other without clashing or competing for attention. Gardens can be designed in a number of different styles, and the hardscaping can have a huge impact on the look and feel of the garden. For example, a formal garden might have crushed gravel paths and fountains in its hardscaping, in contrast with a storybook garden, which may include stepping stones and pools to make people feel like they have been transported into a book of fairy tales.

Text 8. What are the Best Tips for Low-Maintenance Landscaping?

Источник: http://www.wisegeek.com/what-are-the-best-tips-for-low-main tenance-landscaping.htm

Furnishing a yard does not have to be constant state of hard work and complicated upkeep. Multiple options exist for creating beautiful, presentable lawns that do not require meticulous attention. Although the specifics of low-maintenance landscaping depend on climate conditions, there are a few general guidelines to keep in mind concerning the makeup of the lawn, flowers or additional plants, and yard decorations.

Regions that receive adequate rainfall generally produce lawns made of grass. As anyone who has ever cared for a lawn knows, weekly mowing does not always feel like low-maintenance landscaping. Certain types of grass grow more slowly than others, and may be a good choice for those who tire of frequent mowing. Bahia grass, for example, is great for low-maintenance landscaping because it does not grow to great heights, and is also thick enough to slow weed development. The down side of slow-growing grasses is that they tend to turn brown if not given adequate water, which can be inconvenient in warmer, drier climates.

Landscaping in warm, dry climates often feature alternatives to grass lawns. Homes in drought-prone areas sometimes completely forgo grass, and instead have yards filled with sand or small, clean, attractive pebbles. These landscapers know that if the climate is not appropriate for certain plants, trying to maintain attractive yard work will be fighting a losing battle. Opting for sand or pebbles eliminates the need for mowing and extra irrigation in times of low rainfall.

Low-maintenance landscaping can still incorporate plant life, as long as the foliage is selected carefully. If the climate permits flowering plants, perennials, or plants that grow back year after year, are the best option. Perennials are often hardy plants that do not require much attention, and the fact that they keep coming back drastically decreases planting time. Another low-maintenance option is to plant various types of low lying shrubs. Shrubs will also return season after season, and, with the exception of some light and occasional trimming, do not require much upkeep.

Regardless of what types of plants are used, there are measures that can be taken to keep gardens looking well-kept without a large amount of work. Consider laying a weed-deterring material during planting to discourage unwanted plant life from creeping into the garden. Mulch, or

wood chips, are another great way to keep weeds at bay, and also provides a finished, well-maintained look.

Certain lawn ornaments are more difficult to care for than others. Simple decorations like stone edging around a garden or driveway, decorative rocks or statues, or low-lying garden lights are excellent choices for low-maintenance landscaping. These accessories add polish to a yard but do not require much care. Elaborate decorations such as ponds or fountains that will need to be cleaned and repaired are not ideal for low-maintenance landscaping.

Text 9. What is Landscaping Brick?

Источник: http://www.wisegeek.com/what-is-landscaping-brick.htm

Landscaping brick is block-like material used in residential or commercial outdoor landscape design. There are many different shapes and sizes of brick as well as a vast array of landscaping projects. Landscaping brick can be used in creating walkways, driveways, patios, steps, walls, swimming pool decks, and garden borders.

A brick contractor usually offers clients many different options for landscape design. The placement of the bricks alone can give different looks to the same driveway or patio. For example, a fish-bone landscaping brick pattern features bricks angled on edge from a center line, while fan masonry patterns have semi-circular shapes that overlap each other.

Landscaping brick contractors typically plan different brick layouts from which homeowners may choose. For example, if a homeowner wants a masonry contractor to make a brick deck for an outdoor swimming pool, contractors will often present several options in the sizes, colors, and shapes of the bricks to be used. Once the homeowner makes his or her decision, contractors commonly lay the outside frame first and then fill in the brick pattern. Sand mixture is used to fill in the spaces between the bricks to keep the finished brick landscaping piece sturdy.

The look and texture of landscaping brick varies widely. In addition to the classic porous, reddish-toned bricks, there are flatter, light-colored cobblestone brick types, plus many other styles. Flagstone is wide, flat irregular-shaped landscaping material that is especially popular for walkways because of its eye-catching dark color that contrasts well with grassy lawns.

Using brick landscaping can be an ideal way to give style and definition to yards that are basically large expanses of grass. For instance,

flowers can be planted in containers built from brick in one area of the yard. A brick pathway can divide the planters from the rest of the yard. A brick driveway and brick steps can further add to the cohesiveness of the brick landscape accents.

Masonry driveways or walls with posts can add great curb appeal to a house. Curb appeal means that the front exterior of a house looks attractive to most people, including potential homebuyers. Even a small brick walkway and a few masonry planters can make a house look more attractive. Like plant landscapes, landscaping brick can create interesting accents for the eye to look at; just as the difference between two flower planters near the front door can make a difference, so can brick rather than plain cement steps. Brick is also a durable material that stands up well to many different weather conditions.

Text 10. What Are the Different Types of Front Garden Designs?

Источник: http://www.wisegeek.com/what-are-the-different-types-of-front-garden-designs.htm

Front garden designs can be elaborate, colorful, or classic depending on the taste of the homeowner. Some gardeners prefer a manicured look with plush lawns, sculpted shrubs, and brick edged walkways. Others enjoy more of a country type setting, with a white picket fence and multi-colored wildflowers that cover the yard and spill over the front gate. Yet another type of front garden landscape may have more unusual designs, such as exotic rock gardens, ponds, and miniature waterfalls.

Some homeowners want an attractive but understated entrance to their home, with a healthy, green lawn, flanked by small bushes and a stone pathway. Such front garden designs may include white gravel under potted plants that line the walkway. In this type of garden a few rhododendron bushes and a birdbath may ornament the way to the main entrance of the home. Small trees planted in front of the windows may offer both privacy and curb appeal in a classic front yard.

For gardeners who enjoy a more elaborate display, front garden designs might include statues that double as planters, polished pebbles, and waterfalls. This kind of garden may feature a walkway lined with colorful pebbles alongside a Koi fish pond that can be lit after dark. Some homeowners design their own rock gardens, using textured rocks to form pictures or words that can be changed whenever desired. A variety of plant-

ings, such as pussy willows, Japanese maple trees, and Rose of Sharon may add color and texture. A pond might have a waterfall under a willow tree, along with a wooden, swinging bench.

If the front yard has a fence, combinations of wildflowers and perennials may grow on both sides, in an variety of natural front garden designs. For a fence that is white or natural wood, colorful combinations of sunflowers, daffodils, or tulips can create a pleasing contrast. Plants like clematis and wisteria can be trained to climb the fence posts. A gazebo may fit well within such a design. Hanging plants and wind chimes might be placed inside to create a peaceful sitting area. In a large yard, a multi-storied bird house can round out this combination of natural and manmade features.

Text 11. What are the Different Uses for Landscape Pebbles?

Источник: http://www.wisegeek.com/what-are-the-different-uses-for-land scape-pebbles.htm

Landscape pebbles can be used in gardens, aquariums, and as an accent for potted plants. These pebbles are also occasionally embedded into tile or paving materials for outdoor walkways. Swimming pools and patios often have tile and paving made up of landscape pebbles for decoration. Pebbles used in landscaping usually come in many different colors and shapes, and for this reason they tend to have an attractive appearance that might be helpful in covering up dull, ordinary-looking surfaces. In addition to being useful outside the home, landscape pebbles are also sometimes used for decorative purposes inside the home.

Most people use landscape pebbles in their gardens. These pebbles typically make decent edging or border material, and they might be useful for separating a garden from a yard or walkway. Swimming pools also often have walkways and paving materials surrounding them that are made up of landscape pebbles. In addition to being useful for paving materials and garden edging, landscaping pebbles are occasionally used in ground cover for gardens. Some people also use the pebbles for mulch, because unlike many other types of mulch, landscape pebbles do not decompose over time, and no pests are attracted to them.

In addition to gardens, landscaping pebbles are also popular for use in aquariums. Many people decorate the bottoms of their aquariums with these pebbles. The pebbles used for aquariums are often much more elaborate in appearance than what a person might see used in landscaping. Aquarium pebbles are typically fairly small in size and may be very brightly colored.

Even though brightly colored pebbles are often used, it is possible to find more natural-colored landscape pebbles for use in aquariums.

There are many people who enjoy using landscaping pebbles for indoor decor. The pebbles may be used indoors to cover the soil in potted plants much in the same way as they are used for ground cover outdoors. Some people fill up clear vases with brightly colored landscape pebbles to display in their homes. In addition to looking decorative, pebbles in the bottom of a flower vase could also help to keep the vase steady by weighting down the bottom. Landscaping stones might also add to the appearance of a decorative indoor waterfall or fountain.

Landscaping pebbles can normally be found for sale at most lawn and garden centers. Other places to buy them include stores that sell arts and crafts or aquarium supplies. Some people don't buy landscaping pebbles and instead choose to find them on their own. One of the best places to find landscaping pebbles is inside sand deposits in the bottom of riverbeds.

Text 12. What are the Best Tips for Shrub Gardening?

Источник: http://www.wisegeek.com/what-are-the-best-tips-for-shrub-gar dening.htm

Planting and cultivating shrubs involves a little more than digging a hole and inserting the shrub roots. In order to create the right landscaping for your yard, factors like the shrub species, the general climate, and the quality of the soil must be considered. If you are thinking of engaging in a little shrub gardening, try using these tips to get off to a good start.

First, get some idea of what type of shrubbery grows properly in your area. Some shrubs thrive in climates where there is a fair amount of humidity and heat for most of the year. Others do very well in areas where the weather is somewhat dry and the temperature moderate from the spring to the autumn. Local gardening and horticulture clubs can help you identify the best shrub plants for your general location. If there is not one of these clubs nearby, a local plant nursery can supply you with practical suggestions for your shrub gardening.

While evaluating the types of landscape shrubs that are right for your area, you will also need to decide whether you want to go with flowering or green shrubs. Many people prefer a mixture throughout their landscaping. For example, you may want to plant flowering shrubs near windows and doors, allowing everyone to enjoy the fragrance of the blooms when arriving at the house or while sitting near an open window. Green shrubbery can be used along privacy fences or sidewalks to give the lawn a finished look.

An important component of shrub gardening is selecting the right shrubbery for the soil in your yard. Submitting a soil sample to a county extension office or the local university will help you get an idea of what shrubs will thrive in your soil, with minimal care. Compare that list to the listing of recommended shrubs you received from the nursery or local gardening club. Finally, select from the shrub names that appear on each of the lists.

Placement is also important if your shrub gardening efforts are to create a landscape that is both attractive and practical. Take the time to sketch a layout of your front and back yards, then decide where each type of shrub should be placed. Keep in mind that taller shrubs will work well along fence lines, adding privacy to your yard. The shrubs used to soften the lines of the house should generally be shorter; this will prevent the mature shrubs from covering windows or blocking walkways leading to the front and back doors.

Don't be afraid to mix things up a bit with your shrub gardening. For flowering shrubs, use a mixture of annuals and perennials; this will allow you to enjoy fresh and fragrant blooms all year long. In like manner, use a mixture of evergreens with shrubs that feature different colors of leaves throughout the year. The variety will add visual interest to your landscaping, while also allowing your yard to take on a new and fresh look as the seasons change.

Text 13. What are the Different Types of Garden Ponds?

Источник: http://www.wisegeek.com/what-are-the-different-types-of-gar den-ponds.htm

Garden ponds may be stocked with exotic fish, plants, frogs, snails and other critters to create a miniature ecosystem. This kind of pond may feature fountains, natural rock settings and cascading waterfalls that add soothing sounds in a backyard setting. Some ponds have goldfish, koi fish and colored lighting with either a preformed pond liner or a flexible one that can conform to whatever shape is needed. For homeowners who want minimal effort, there are even above ground garden ponds. Of course, for those who enjoy digging and designing, a do-it-yourself pond may be the way to go.

Koi ponds tend to be a popular choice when it comes to landscaping with ponds. This kind of pond may fit in perfectly as a garden centerpiece, with its unusual fish and plants. A koi pond does require a bit of maintenance though, including proper filtration of the water in order to keep the large fish healthy and strong. A fish pond with its multicolored fish is often a conversation piece for young and old alike.

Some homeowners create ponds that are aesthetically pleasing with cascading waterfalls and shapes that mimic natural streams. A fountain built into a pond tends to be a bit of a showcase, with a large or small display of gushing water. A pond that is lit at dusk may really stand out as well, with either flood lights or floating lights to provide special effects.

Homeowners who have children may prefer garden ponds that are above ground. This type of pond may be very similar to a dug pond, but usually is much easier to install. When children are around, an aboveground pond may be a better choice, so youngsters won't stumble and fall into the water. An aboveground pond may have the same detailing as a dug pond, but cost a fraction to install. If a dug pond is preferred, a preformed pond may simplify installation to some extent because the shape is already there and all that needs to be done is to add detailing.

Sometimes people just decide to build their own garden ponds, using whatever they have available on their property. They may use rocks to provide barriers, and shop for plants such as red and purple water lilies, water lettuce, and papyrus. When designing a garden pond, some research is required in order to maintain a healthy balance in the pond. Building a pond from scratch in an outdoor space may take a little extra effort, but it may prove to be worthwhile, not to mention easier on the pocketbook.

Text 14. How do I Choose the Best Ornamental Landscaping Grasses?

Источник: http://www.wisegeek.com/how-do-i-choose-the-best-ornamen tal-landscaping-grasses.htm

From Asian-inspired gardens accented with towering bamboo to naturalized gardens with native plants, ornamental landscaping grasses can add interest and texture to any yard. In order to make the best choice, you may want to take a little time to learn about ornamental grasses in general. Some things to consider are the differences between warm and cool varieties of grass and the extremes of temperature in your area. Think about the location in which you want to plant the grass and whether you want the grass to be a ground cover, an accent to other plants, or to act as a screen. Other details to consider include the color, blade type, and the form the grass takes as it grows.

Landscaping grasses are classified as warm season or cool season. Warm season grass is dormant during the winter and waits until the ground is warm before actively growing again. This means that warm season grass may not green up until mid-to-late spring. Warm varieties require less watering and upkeep overall; some species are drought tol-

erant and suitable for xeriscaping. Keep in mind that warm grasses will not add much to the visual appeal of the garden for several months of the year. Some examples of warm season landscape grasses are fountain grass, pampas grass, and prairie cord grass.

Cool season grasses prefer lower temperatures. They generally begin their active growing seasons earlier in the spring. In areas with mild winters, this type of ornamental grass may be evergreen. During warm weather, they do need quite a bit of watering to stay green; some plants can even grow in water-logged areas. These varieties are prone to wilting in the center during warm weather, but dividing the plant helps avoid this problem. Tufted hair grass, blue oat grass, and fescues are cool season landscaping grasses. Now that you have an overall understanding of warm and cool season plants, find out what U. S. Department of Agriculture Hardiness Zone you live in. Not every grass will survive extreme weather conditions. Most ornamental landscaping grasses prefer zones 4 through 9, although there are some that will tolerate the coldest temperatures of zones 2 and 3, as well as the hottest temperatures of zones 10–11.

The next consideration is whether you want the grass to be a ground cover, an accent, or to work as a screen. Running or creeping ornamental landscaping grasses, such as ribbon grass and Japanese blood grass, may be a good choice for ground cover. Running grass can be very invasive if not kept in check. Clumping grass types, such as golden sedge or switch grass, may be a better choice if you want a non-aggressive, slow-growing accent plant. Blue Indian grass or Great Basin wild rye are good options for a screen. Ornamental landscaping grasses may be green, variegated, silver, blue, red, or copper. They can have narrow, willowy blades like the Japanese rush or plumes as the variegated feather reed grass does. Some types grow in an arched shape just as the little bluestem species or can be dense and fan-shaped as in the case of bronze veil tufted hair grass. Landscaping grasses have so many different growing preferences, appearances, and other individual characteristics that you are almost sure to find a species that suits your needs.

Text 15. Lawn and Preparation of Lawn

Источник: http://www.agriinfo.in/default.aspx?page=topic&superid=2&to picid=1284

Lawn

A lawn which is a green carpet is an essential feature of a garden whether a small home garden, public park, office or factory gardens. The view of

the lawn should be uninterrupted from entrance, and should be visible from home windows or verandas, office, factory building and windows. A beautifully maintained lawn adds and accounts for 75% beauty of the garden.

Preparation of Lawn

The site selected should have simple sunshine. There should not be big trees near the lawn site as they cast shadows, and during leaf fall, the leaves falling on the lawn make difficult the task of keeping the lawn clean. The soil depth should be about 25–30 cm.

The soil for establishing a lawn should have a ph 5.5 to 6.0 should be fertile and containg organic matter and having a good drainage.

Generally, the material, i.e. grasses used for lawn arte shallow rooted, and hence, care has to he taken that there is no stagnation of water in rooting zone. On a big town, proper drainage can be achieved by using drainage pipes.

The soil should be dug to a depth of 45 cm. and kept aside. The soil at the bottom may be pressed do that, after filling, there is no sagging of the soil. The clods in the dug up soil should be broken. Presence of clods would present difficulty in achieving proper level. The soil may be refilled in the dug up portion and well rotten. The seeds should be used at the rate of 500 kg per 100 sq. m. should be spread evenly and then this should be worked up in soil to a depth of 15–30 cm. The digging work should be taken up. Weed seeds would be killed due to heat. The refilled soil needs to be consolidated.

The entire area should be flooded with water. This would also help the wood seeds to germinate. The woods should be removed. On all sides, 10–12 cm high bunds may be prepared to check run-off. This will also help in leveling the land, as at some places, water pools would be formed which could b filled with soil. From the centre, the land should have gentle slope on all sides. The flooding should be repeated 2 to 3 times.

The most commonly used grass for preparing lawn is doob grass (Cynodon dactylon). It is also called as ”HARIALI”. This thrives under hot sunny site. This grass is suitable for large areas and poly ground on account of its tolerance to wear and tear and has good recuperation habit. Another grass is Korean grass (Zoysia japonica). This is recently introduced in India and has become popular due to its velvety growth and cold tolerance. It makes cushion like turf suitable for smaller areas and home lawns. The water requirement of this grass is more. This grass should be clipped at a height of 1.5 to 2.5 cm. This is a slow growing grass.

20.03.02 – ПРИРОДООБУСТРОЙСТВО И ВОДОПОЛЬЗОВАНИЕ

ПРОФИЛЬ: Мелиорация, рекультивация и охрана земель

Text 1. What Is Soil Conservation?

Источник: http://www.wisegeek.com/what-is-soil-conservation.htm

Soil conservation aims to prevent the rapid erosion and overuse of soil. Most trees and other plants require soil to thrive because soil provides nutrients. Conservation of soil involves improving and maintaining general soil health through various practices including planting trees, rotating crops, and tilling.

Soil erodes rather quickly and takes quite a long time to naturally develop. The detrimental effects of weathering and erosion can be managed through soil conservation though. Nutrient-poor soil does not promote as vigorous vegetative growth as nutrient-rich soil. Good soil conservation contributes to better crop yields, enriched lands, and a balanced environment. Conservation of soil is especially important in countries with agriculture-based economies where entire populations depend on the success of crops.

Planting trees is one of the most common methods of soil conservation. As the trees mature, they grow deep roots, which stabilize soil and help prevent soil erosion. Trees, plants, and other vegetation also act as windbreakers, making it difficult for wind to shift away the soil beneath them.

Rotating crops is also an effective means of soil conservation. Cultivating the same crop for several consecutive seasons can cause pathogens to rapidly build up in the soil. Rotating crops involves growing different crops in a particular area across growing seasons. This practice improves overall soil fertility and structure. It also curbs pathogen build-up and helps prevent rapid nutrient depletion.

Terraces on hilly terrain help prevent soil from washing downhill when it rains. The practice of contour plowing involves plowing across slope contour lines to slow water runoff and prevent soil from washing away. Too much water can be disastrous to soil but too little water promotes erosion. Watering dry soil is an easy way to prevent soil erosion by the wind.

Tilling involves plowing and preparing soil for farming. Over time, this repeated process can make soil too compact to support any organisms including earthworms, which help aerate and enhance soil. No-till farm-

ing is a relatively effective means of soil conservation and can still lead to generous crop yields.

Maintaining the soil itself is perhaps the most effective means of soil conservation. Acid rains and basic or acidic pollutants can dramatically affect the pH level of soil. Nutrient availability in soil is greatly affected by pH levels. Salinity management ensures that soil does not accumulate an excessive amount of salts. Soil with high salt concentrations discourages vegetative growth, contributing to soil erosion.

Text 2. What is Conservation Agriculture?

Источник: http://www.wisegeek.com/what-is-conservation-agriculture.htm

Conservation agriculture, also known as CA, is a form of farming meant to ensure soil health, promote sustainable farming, and prevent the damaging overuse of land. Gaining popularity in the 21st century, conservation agriculture aims to help farmers keep land healthy and productive by maintaining sustainable growing methods. There are several strategies to ensuring the health and continued fertility of land through conservation agriculture, many of which are outlined in guidelines from the Food and Agricultural Organization of the United Nations.

One of the most important principles that forms the backbone of CA is reducing soil damage by discouraging tilling. In the tilling process, the soil is turned over by hand or by machine in an attempt to bring nutrients to the surface as seeds are planted. While in the short term this may benefit the current crops, many scientists suggest that it leads to long-term degradation of the soil, eventually leaving it unusable. By refraining from tilling, organic soil matter may actual benefit as crop fragments form a protective mulch over the soil.

A second major factor in conservation agriculture is the planting of cover crops. When feasible, these crops prevent soil erosion by protecting the top soil from wind, sun, and rain. Cover crops also provide nutrients to the organisms in the soil, which in turn feed the crops. Although the UN guidelines regarding CA acknowledge that some application of pesticides may be necessary for commercial crops, it is also recommended that farmers minimize herbicide use to protect the natural biodiversity of the soil and local environment. By protecting the soil and ensuring a healthy, thriving bio-system, many experts believe that crops are more likely to flourish.

The third principle touted by the UN guidelines for conservation agriculture regards the rotation of crops. Repeatedly planting the same land with the same crop can lead to nutrient depletion in the soil. By cycling crops that need different nutrients through the same field, the soil has time to rest and replenish its nutrient stores.

Some CA organizations also promote reserving a portion of land to encourage the growth of a natural ecosystem. By keeping some land free from agricultural pursuits, the surrounding farmland will have a proper balance of wildlife, insects, and native plants. Although saving land may not be a viable option in many cases, some experts suggest that proper conservation efforts such as natural land reserves will help convert farming operations from environmentally destructive to environmentally aware.

Text 3. Cover Crops: Growing Solutions Right Under Our Feet

Источник: https://modernag.org/soil-health/cover-crops-growing-solutions/

Sometimes the solutions to recurring problems are right there in front of us. For centuries, farmers have used cover crops to help manage pests, reduce weeds, improve rainfall capture, and enrich soils to produce vegetables and grain.

Cover crops like grasses and legumes are planted over what would otherwise be a barren garden bed or field in between growing seasons for a primary crop. For farmers, after they harvest a primary crop like corn or soybeans, a cover crop can be planted to cover and protect the soil until next year.

Some farmers use cover crops that produce nitrogen, a nutrient that helps make the following year's crop more bountiful. Cover crops can help make farmers more effective with their use of fertilizer and crop protection products during the growing season, saving time and money and helping to protect the environment.

There's so much potential to this growing solution. By enabling greater efficiency in the use of fertilizer and other inputs needed to grow our food, cover crops help prevent nutrient loss to waterways and lower greenhouse gas emissions.

Cover crops keep soil healthy. For instance, by creating soil structures that retain water better, cover crops may also reduce the effects of

drought. The drought in the United States in 2012 was one of the worst in decades. That year, a farmer survey by the Conservation Technology Information Center showed a near 10 percent improvement in harvests when cover crops had been used prior to the drought.

To sum up, new tools and solutions give farmers more options to have a better harvest and maintain farmland. Some solutions, like cover crops, are time-tested and just as useful as they've ever been. Others, like digital tools, have evolved as farmers combat issues like climate change and a growing population. Farmers have many choices when it comes to growing crops, and all of these methods have a role to play.

Text 4. Biodiversity on the Farm

Источник: https://modernag.org/biodiversity/biodiversity-on-the-farm/

Farmers realize the importance of biodiversity, which refers to the variety of plants, animals and microorganisms above and below the soil within an ecosystem.

Farms are ecosystems in and of themselves. Each part, from the soil to the animals that live there to the crops themselves, has an important role to play. A change in this delicate system can have wide-reaching effects – so farmers understand that the decisions they make on their land must be considered carefully.

"Farmers are stewards of the land and the environment," said Dustin Spears, a farmer in northern Illinois. "We want to protect the land and the wildlife around us. We live out here, and we enjoy nature as much as the suburban and urban person looking for their weekend getaway."

There are many agricultural practices that promote biodiversity. Many of the practices listed below have been around for at least 40 years, but they have seen an uptick in interest from farmers in recent years; those involved in agriculture have learned more about the importance of biodiversity on the farm. With more research under way into the benefits of the practices and technologies, we can expect to see more interest down the road. And that's good for biodiversity.

Firstly, farmers are practicing more conservation tillage. Tilling the soil is the practice of using a tool, like a plow, to turn up the soil. This practice helps to turn over the residue from the previous crop, provide loose soil to make it easier for seeds to take root, and disturb weed growth. However, this practice can increase the potential for soil erosion.

Conservation tillage minimizes the soil disturbance by using tools that turn over the soil lightly or hardly at all in some cases. The practice can leave some crop residue on the surface to lessen the opportunity for the soil to erode. Conservation tillage is increasing on farms: In 1983, only 17 percentof all U.S. farmland was in conservation tillage. In 2013, that rose to 63 percent. The main benefit of this method is that it aids in building organic matter for the soil.

Secondly, farmers are planting more cover crops. Cover crops are those planted by farmers in between the harvest of one cash crop and the planting of another. These crops, such as rye or radishes, can assist with soil conservation, keeping soil from eroding and returning nutrients and benefits to the soil for future crops. Cover crops also provide habitat for birds and insects.

In a survey by the Sustainable Agriculture Research and Education Program to more than 1,900 farmers, participants increased cover crops acreage on their farms by 30% each year because of the benefits they provide.

Thirdly, farmers are conserving land. In the United States, some farmers receive payments from the government to enroll a portion of their land in the Conservation Reserve Program, which encourages farmers to ”remove environmentally sensitive land from agricultural production and plant species that will improve environmental health and quality”. This land also serves as habitat for wildlife and can improve water quality.

Land conservation is truly a global effort. In Brazil, farmers are working with Conservation International and local stakeholders to implement better techniques to restore biodiversity in one of the most unique ecosystems in the world: the Cerrado. In Indonesia, another key biodiversity hotspot, farmers are participating in the Sustainable Agriculture Landscape project, which helps farmers meet the objectives of producing food and conserving habitat.

In the fourth place, farmers are planting buffer strips. Buffer strips are wide strips of land, usually grass, between fields of crops that help ease soil erosion and water runoff. These strips of land also can provide habitat for birds and animals. They are particularly beneficial in areas with hilly terrain.

In the fifth place, farmers work with conservation districts and environmental groups. Many farmer and environmental groups connect to learn from each other on best practices to improve soil health, water quality, and air quality. For example, one such group is the Iowa Soybean Association,

which works to ”employ principles of cooperative conservation, planning, applied evaluation and adaptive implementation (to engage) partners in action-oriented, on-the-ground programs, projects and initiatives”.

”We have improved how we farm over time, and while we have some work to do to continue to improve, I’m confident we will continue to balance the needs of producing food sustainably with the needs of the environment,” said Spears. ”For example, we want to use the least amount of inputs, such as pesticides, insecticides and herbicides as possible. We don’t want to overuse inputs, as that may impact the environment, and it hurts our bottom line. We are much more precise with our applications. We’ll continue to get better. It’s as important to farmers as much as it is for consumers who eat the food we produce.”

Text 5. Agricultural Land Improvement

Источник: http://www.eolss.net/Sample-Chapters/C10/E5–09.pdf

Agricultural efficiency depends significantly on the quality of soils, the main source of agricultural productivity. Land improvement (amelioration) became the most important component of peasant labor at the dawn of agricultural development (in ancient Egypt, Greece, Rome, China, etc.). Amelioration differs from the common annual agricultural practices (plowing, harrowing, etc.) in that the effects on the soil can be radical and long lasting. It can be defined as a system of measures for radical improvement of unfavorable hydrologic, soil, and agroclimatic conditions, with a view to the most efficient use of land resources.

Along with the effect on land productivity, amelioration allows us to bring poor and unused land (swamps, wastelands, anthropogenically degraded lands, etc.) into agricultural production, to improve the sanitary state of soils and the environment, and, hence, to raise the living standards and quality of life for people.

The main amelioration practices are engineering reclamation (irrigation, drainage, filling up, flood walls, etc.), chemical, anti-erosion, and agronomic amelioration.

Specific methods of land reclamation include the agricultural use of sea and lake bottoms (polders), the development of desert soils, and the improvement of the heat regime of soils (thermal amelioration).

Soil amelioration was indispensable over vast areas, with agriculturally unfavorable conditions found in almost all countries. Over thousands of years of the history of land amelioration, experience has been accu-

mulated, the theory of amelioration has been developed, and its methods have been improved.

Today, all developed countries have special laws regulating land reclamation policy. The efficiency of amelioration depends on the level of field management.

Text 6. Land Improvement – The History of Farmlands Irrigation

Источник: http://www.eolss.net/Sample-Chapters/C10/E5–09.pdf

Efficient and sustainable agriculture is impossible without special measures aimed at improving land quality. Historically, the most significant and wide-scale measures for creation of sustainable agricultural systems were related to irrigation and drainage practices.

Irrigation of farmlands was first practiced by ancient humans after the transition from nomadic to sedentary lifestyles. Ancient Egypt provides an excellent example of well-developed irrigation systems. The lives of ancient Egyptians were closely related to regularly occurring flooding of the Nile river. Even seven to eight thousand years ago, ancient Egyptians used special engineering works to protect their settlements from floods (by creation of thick beds in the foundations of palaces and temples, and embankment of settlements) and to deliver the Nile water to agricultural fields through a network of canals. The construction of large dams and water storage basins on the Nile River dates back to 3000 B. C. The cult of the Nile appeared at the dawn of ancient Egyptian civilization. According to Herodotus and Plutarch, irrigation was considered by ancient Egyptians to be a sacred wedding of the Nile and soil: Osiridis cum Nephti coitum. Soil fertility was a matter of worship for them.

Labor-intensive projects for irrigation and drainage favored the consolidation of separate tribes into better organized local societies (nomes) ruled by regional nomarchs; later, the power of nomarchs was diminished by central leaders, and Egypt became the first unified state governed by pharaohs.

The development of irrigation systems in Mesopotamia (between the Euphrates and Tigris rivers), as well as in India and China, also dates back to the third millennium B. C. The first measures of salinization control were applied in Mesopotamia as early as 2400 B.C.

Gradually, irrigation and drainage systems that are the most important means of drought, flood, and swamp control became indispensable measures of efficient agriculture in many areas of the world.

Antique and medieval irrigation constructions, such as canals, dams, aqueducts, and sluices, are still preserved in many countries. The history of these constructions has yet to be studied. The most important events were recorded in annals, for example by inscription on papyrus or engraving on memorial stones.

The art of hydraulic engineering and meliorative construction has been perfected by the labor of many generations of scientists and engineers, specialists in different fields of knowledge (from hydraulic engineers, physicists, mathematicians, and civil engineers to modern ecologists and specialists in information science). We should pay tribute to Archimedes, Raphael, Leonardo da Vinci, D. Bernoulli, L. Euler, and many other contributors to the prosperity of modern civilization. It is interesting to trace the progress of irrigation and drainage technologies: from earth to stone and then to high ferroconcrete dams; from a water bucket to windmills and electric pump stations; from spades to powerful machines and sprinklers; from open ditches to closed tile and plastic pipe drainage systems (see ”History of land improvement”, EOLSS on-line, 2002).

Text 7. Irrigation in Agriculture

Источник: http://www.eolss.net/Sample-Chapters/C10/E5–09.pdf

The role of irrigation and drainage systems in modern agriculture cannot be overestimated. From antiquity to the 1950s, the total area of such improved land had been expanded to 600,000,000 ha. In recent decades, it has been increased to 784 million ha. This is a great accomplishment of modern civilization; the total fund of potential arable land is estimated at 1,392 million ha. In Europe, Asia, and Central America, there are virtually no free land reserves suitable for farming, but vast areas of undeveloped potential arable land exist in Africa (621 million ha) and South America (695 million ha). However, only a small proportion of this land can be used for agriculture without special ameliorative measures. Most of it lies either in extremely dry (e.g. the Sahara) or waterlogged (e.g. the Amazon basin in Brazil) areas.

Irrigated and drained land with artificial regulation of soil water regime represents the most valuable resource of agriculture. This land provides the best opportunities for the most efficient use of water and soil resources. Irrigation of arable land helps to raise crop yields by a factor of four to twenty, depending on local conditions.

Irrigation has converted many initially infertile stony and sandy deserts in Algeria, Tunisia, China, Sudan, Mexico, India, Uzbekistan, and many other countries into flourishing oases.

As at 1995, the Earth's total area of irrigated lands stood at 267 million ha. Of this amount, the largest area (71 million ha, or 27 percent) is in India. The area of irrigated land in China constitutes 48 million ha (18 percent) and in the United States, 25 million ha (9 percent). The total area of drained lands (including land specially protected from floods) reaches 210 million ha. About 28 percent of this area (60,000,000 ha) lies in the United States.

In general, all ameliorated land constitutes about 61 percent of the total area of croplands. Taking into account ameliorated (specially watered) pastures and the farmlands protected from erosion, we can conclude that progress in food production over the last fifty years has been mainly achieved through land amelioration measures. The former UN Secretary-General Boutros Boutros Ghali has stressed that the earth's food problem would be solved if the area of irrigated land could be expanded by 0.5 percent every year.

The further development of irrigation is more limited by the lack of freshwater reserves (except for Brazil, Canada, and Russia) rather than by the lack of potentially suitable land. Indeed, many regions suffer a marked deficit of freshwater.

In this connection, large-scale irrigation projects require comprehensive development of land management strategies with due account for all water users, including cities and settlements, industrial enterprises, agriculture, transport, and recreation facilities.

In 1992, the Earth Summit in Rio de Janeiro adopted the Agenda 21 program on sustainable development for the next century. It is stressed in this document that the exploitation of water resources should be based on the principle of participation of all interested parties, from local water users to engineers and decision-makers. Water is a valuable economic resource and the cost and benefit of irrigation projects should be thoroughly evaluated before the construction of irrigation systems. Large-scale irrigation systems can provide water to many users, so responsibility for regulation of water distribution and consumption should rest with the society.

In recent years, projects intended to transfer water between different drainage basins have been implemented in many countries. The most impressive projects have been designed in the United States (the

Central Valley of California), Pakistan, Iraq, Sudan, Germany, Turkmenistan (from the Amudar'ya River to the Caspian Sea), India, Mexico, and Australia, (see "Water resources for agricultural production", EOLSS on-line, 2002). In China, a huge project is underway to transfer part of the water from the Yangtze to the Huang He River. The volume of water to be transferred is estimated at 30 km³ and the length of canals will reach 4,000 km.

In order to combat water deficiency, it is necessary to raise the efficiency of irrigation, to pursue a policy of water economy, to ensure the secondary utilization of drainage and sewage water, and to control the development of secondary salinization of soils in irrigated areas.

Text 8. Introduction to Irrigation Systems

Источник: http://www.eolss.net/sample-chapters/c10/E5–09–02–03.pdf

Irrigation is the supply of water to fields that lack moisture: it provides an optimal water regime within a root zone for the development of agricultural crops, and is one of the main methods of reclamation. It consists of a complex of engineering, agronomic, and organizational-economic activities based on hydraulic engineering techniques of rationed water supply to soil to provide soil moisture. Irrigation is required when there is a lack of natural moisture for crops, either for the whole vegetation period or at different stages of development. Without it the highly productive use of agricultural land is impossible. Because of irrigation, favorable moisture and other related soil regimes are established. These are necessary for enhancing fertility, obtaining a high and steady harvest, and the essential improvement of farming production quality. Irrigation makes it possible drastically to improve the soil conditions of dry zones and make them suitable for agricultural use, and to make more productive use of those regions that are adequately wetted. In the latter case irrigation is an indispensable prerequisite of the development of cotton and rice growing, grain production (with the creation of guaranteed grain harvesting zones), fodder crop and vegetable growing, horticulture and livestock breeding (the secondary sowing of fodder crops on irrigated land, and the creation of pastures and hay land).

An irrigation system consists of the hydraulic structures (water intake and pumping stations, canals and pipelines, and so on) and operational structures (roads, highways, bridges, and so on) within an area of land that provide irrigation to the area. There are systems for regular

irrigation, basin irrigation, and irrigation impounding (impounding irrigation). The regular irrigation system consists of:

– a water source;

– a head water intake (that withdraws water from the water source and protects the irrigation system from silting, debris, and garbage);

– the irrigation network;

– a disposal network;

– a collector-drainage network (for drawdown of the groundwater table and disposal beyond the irrigated area);

– hydraulic structures;

– pumping stations;

– irrigation equipment;

– operational structures (roads, bridges, and so on); and

– instruments for monitoring reclamation and the state of the irrigated lands, communication lines, forest belts, and so on.

Irrigation systems can obtain their water supply from canals by gravity or mechanical lift (where water is supplied by a pumping station).

The irrigation system efficiency is expressed as the ratio of water discharge supplied to the field (Q net), to the volume withdrawn from the water source (Q gross).

The rational use of water resources requires an irrigation system efficiency of 0.8 to 0.9 for the inter-farm distributing canals; 0.85 to 0.95 for farm ditches; 0.9 to 0.95 for annual ditches (that is, ditches redug each year); and 0.95 to 0.98 for buried networks.

With the aim of improving the irrigation system's efficiency and reducing seepage loss, use is made of lining materials and revetment (concreting and asphalt paving of bottom slopes, screens of polyethylene film, polymer-concrete and clay), sealing, solonetzification, and gleyzation of the canal bed. The irrigation system efficiency is much higher when buried pipelines are used.

There are three types of irrigation system design:

– open (commonly practiced) with earth ditches (lined or unlined) or flumes erected on supports of different height,

– buried irrigation systems (most advanced), where ditches are replaced with pipelines, and

– combined irrigation systems: these are combinations of open ditches and pipelines.

The large combined irrigation systems have open canals as main supply canals, whereas distributing and water application networks use bur-

ied pipelines; small irrigation systems have buried pipelines for the distribution network, while the water application network has annual ditches or connecting furrows. Water is supplied to pipelines by mechanical lift, pumping, or by gravity (owing to the natural slope).

The choice of the irrigation system design is made on the basis of comparison of the engineering and economic alternatives for the particular irrigation area.

Text 9. Five Effective Water Conservation Tools for Farmers

Источник: http://www.seametrics.com/blog/farming-water-conservation-tools/

Simply put, farmers are the true stewards of the nation's water supply.

Agribusiness places some of the greatest demands on fresh water in the U.S. and around the world. According to the latest statistics provided by the United States Geological Survey, farmers use 138.92 billion gallons of water a day for irrigation, livestock care and aquaculture.

The importance of farmers' role in using the world's most vital natural resource as responsibly as possible cannot be overstated. As the population grows and more food is required, better water management will become as critical as the water itself.

Below, we take a look at five helpful water conservation resources for farmers.

1. More Efficient Irrigation Equipment

Irrigation equipment upgrades can be costly, but there is no question that it will be worth it in the long run. The reality of an ever-shrinking water supply in the face of growing needs will become more evident, and eventually the true cost of water will emerge.

The most efficient irrigation system will depend on the type of crop, the type of soil, area climate and other factors. Gravity-flow systems and irrigation systems are just two examples of possible solutions for more efficient water use. Using water flow meters can help measure and control the amount of water being used in irrigation.

2. Weather Apps

Some farmers may be inclined to set an automated irrigation schedule and let it run regardless of the weather. Adjusting irrigation systems to work in better harmony with natural precipitation takes more work, but it is an inarguable way to save significant amounts of water.

There are numerous weather apps available that provide up-to-the-second precipitation reports. Using these along with irrigation systems

can help save water, which will save farmers money and reduce wear and tear on systems.

3. Soil Management

Proper soil management is a key to conserving water. It is the soil that absorbs, transmits and holds the water for crops to use and there is much a farmer can do to manipulate the nature of soil, and is especially helpful if the soil quality is compromised.

Various techniques farmers may consider include conservation tillage, using compost and utilizing cover for crops. Again, what works the best to conserve water will depend on what kind of soil is being managed.

4. Water Recycling

Avoiding or mitigating runoff can save millions of gallons of water over the course of a growing season. Runoff can occur due to overwatering, poor soil and other factors, and in any case is a natural result of irrigation to some degree.

Recycling runoff not only helps save water, it helps save entire ecosystems. Agricultural runoff typically contains large amounts of chemicals that can seep into groundwater and pollute rivers, streams and other bodies of water. The costs are significant, but so are the benefits.

5. Organic Farming Methods

Water recycling is far less expensive when a farmer doesn't have to treat the water before reusing it. Organic farming methods that reduce or eliminate the use of chemicals are yet another way for farmers to conserve water by taking out a costly step in the recycling process.

Using organic farming methods can arguably also lower the water-use footprint by preserving the quality of water that would otherwise be negatively affected by polluted runoff. That said, not all organic farming methods reduce the amount of water used, so conservation-minded farmers should carefully consider the options.

Text 10. Next Generation Water Tools

Источник: https://modernag.org/water-conservation/next-generation-water-tools/

Farmers have long been focused on using the least amount of resources possible. As a result, they are very dedicated to water conservation. In today's changing climate, farmers continue to come up with innovative approaches to conserving water. As they do so, modern agriculture is working to provide them with the tools necessary to do the job.

Around the world, agriculture is responsible for an estimated 70 percent of freshwater consumption. Drought is becoming more common in some regions, population growth continues to increase demand for water, and many other industries also need to use water. This has led to more pressure on water resources. As a result, modern agriculture is driven to find innovations that help farmers make better use of rainwater, as well as ones that help them irrigate in the most precise manner possible.

Where next-generation innovations in seed and sensor technology are available, they have already been used by early adopters on farms around the world. Based on investment patterns and the number of start-ups in the agricultural technology sector, this trend is expected to continue. As with other segments of the industry, these tools have the potential to provide economic and environmental benefits, helping farmers save money while reducing their water use.

Seeds as Solutions

Fortunately, farmers concerned with water conservation have sophisticated tools available. The first is the seeds themselves. In recent years, seed producers have introduced seeds with improved drought tolerance and resilience in response to shifting rainfall patterns.

In an era when drought is more frequent and rainfall is less predictable, breakthrough seed technology can help farmers optimize water use.

An additional innovative approach involves using these drought-tolerant hybrids, which can better withstand periods without rain and still produce a healthy crop, in combination with techniques like no-till farming, which has demonstrated an improved ability to help soil retain moisture.

Advanced Sensors and Satellite Technology

Another option for farmers facing drought and changing weather patterns is a new wave of agricultural technology, including sophisticated sensors and software platforms. Farmers can take advantage of forecasting tools that will combine robust data collection with advanced analytics software. This can enable farmers to make informed and precise decisions about irrigation frequency, translating to financial savings and natural resource savings.

A small but growing group of early-adopter farmers are currently using a new crop of digital tools, including soil sensors and thermographic sensors. These tools and other imaging devices have the potential to provide growers with vital information about soil moisture and plant moisture levels. These sensors are capable of providing a glimpse inside the

soil and the growing crops which means farmers know more precisely when plants need attention.

In climates and regions where access to water is limited, this information can help make difficult choices about irrigation a little bit easier.

Bringing Peace of Mind to the Farmer

Since the dawn of agriculture, farmers have dealt with the unpredictable nature of the weather. A new generation of seeds, sensors, and digital tools can help reduce that variability. As we move into a new age of climate challenges, water conservation is likely to remain one of the highest priorities.

In response, modern agriculture is committed to providing farmers what they need to lead the way.

Text 11. Introduction to Land Drainage

Источник: http://www.eolss.net/sample-chapters/C10/E5–09–03–01.pdf

Land drainage – the removal of excess water via open ditches, subsurface tile drains, vertical drains, or through the creation of dikes and pumping the water out from embanked areas – is widely used not only in agriculture but also in the forestry industry, municipal and industrial construction, the mining industry, the construction of sport facilities, and the organization of recreation zones.

Land drainage allows humans to bring low-productive areas (marshes, the sea bottom, inundated and waterlogged territories around water storage basins, etc.) into agricultural use and to raise the efficiency of farming. Land drainage has a long history: the first drainage systems were created in Ancient Egypt, China, and India as early as in the third millennium BC. Since that time drainage technology has improved considerably, in parallel with the general scientific and technical progress of our civilization.

Simulation methods are widely used for the scientific substantiation of modern drainage projects. A feasibility analysis of a drainage project should take into account not only economic but also environmental aspects of the problem. Modern drainage technologies apply the findings of many sciences, including physics, chemistry, mathematics, biology, ecology, soil science, and earth sciences.

Environmental protection should be studied thoroughly during the development of drainage projects. It is necessary to predict negative im-

pacts of the future drainage system on the environment, including wildlife, and to suggest adequate mitigation measures. These measures should ensure the highest ecological security of drainage systems.

Land drainage is performed through the construction of open channels and subsurface plastic, ceramic, or tile drains. Land drainage projects are based on the results of topographic, soil, hydrologic, hydrogeologic, and other kinds of survey. The sizes of drainage channels and drainage parameters are calculated by special equations describing the hydraulic and filtration properties of soils.

The main criteria used in these calculations are the desired drainage depth (the projected depth of the groundwater table), the drainage discharge rate, and the water-conductive capacity of drains. Water budget equations are used to determine optimum drainage parameters.

Envelope filter materials (sand, copra) are used to protect drains from silting; simultaneously, these filters increase the water intake capacity of drains and provide the hydraulic connection of drains with the plow layer in heavy-textured soils with low natural infiltration capacity. The deposition of iron oxides on drain walls (drain ochering) is another danger that decreases the efficiency of drainage. A system of preventive measures is required to minimize drain ochering.

Open channels are constructed with the use of heavy excavators. The construction of subsurface drainage is performed in trenches or without them, using flexible drain pipes and drain loaders. A crucial point in the construction of drainage systems is the driving of channels and drain pipes in strict accordance with the necessary slope angle. This is achieved with the help of laser-based equipment.

Special tillage operations – subsoiling, slitting, landforming, and land planning – are used to increase the efficiency of drainage. The removal of shrubs and stones from the surface, soil liming, and fertilization are also performed during the construction of drainage systems.

Text 12. Land Drainage Systems

Источник: http://www.eolss.net/Sample-Chapters/C10/E5–09.pdf

Land drainage systems form the basic element of the economy and wealth of many countries, such as the Netherlands, Belgium, Denmark, Finland, Germany, and Belarus. Early drainage systems are still efficiently used in these countries, they are maintained in a good state of repair, and are subjected to necessary regular renovation and reconstruction.

By the second century B.C., people living on the coastal plains periodically flooded by the waters of North Sea, within the territories of modern Netherlands and Germany, had created artificial mounds (terps) on which they could save themselves and their livestock during high floods and surges. Similar mounds can be found in the flood plains of large rivers in the United States and Bangladesh.

In the seventh century A.D., the first sea dikes were constructed, to protect low-lying areas from seawater incursion.

More than one-third of the Netherlands lies below sea level. The land is protected by a system of dikes, dams, canals, and locks supplied with powerful pumps. Earlier, the pumping of water was provided by thousands of windmills.

A classical example of an efficient drainage system is found in south-eastern England, where the first dikes (e.g. the Roman dike) and drainage-ways were built by the Roman invaders. The first law on amelioration of land was adopted in England as early as the twelfth century. Drained lands were considered national property. Experience in drainage of swamps was gained by trial and error.

In the seventeenth century, the sagging of the peat surface led to the waterlogging and inundation of peatlands instead of their drainage. It was suggested that the excess water should be pumped into rivers and the sea with the help of windmills. The drainage system in south-eastern England served as a key site for scientific studies of the most efficient drainage techniques. Thus, optimal parameters of drainage-ways (depth, width, length, etc.) were found.

A special machine for the production of drain tubes from clay was invented. These tubes were applied in many countries for more than a century. Indeed, we can say that modern drainage technology is based on the experience gained in south-eastern England.

It should be mentioned that land amelioration can radically change natural landscapes. Agricultural oases favorable for the life of people are created in deserts and swamps; water storage basins and canals not only ensure the water supply of people and serve as the basis for industrial and agricultural development of vast areas, but they can also become important habitats for wildlife. Grand hydraulic engineering constructions built of stone and concrete, numerous water lifts and pumps (including windmills) can make the scenery more diverse and interesting, enhancing the aesthetic value of the landscape.

Text 13. Amelioration Techniques Applied for Saline Soils

Источник: http://www.krishisewa.com/articles/soil-fertility/586-ameliora tion-techniques.html

There are several reasons for development of salinity in the soils. They are:

– Excessive and uncontrolled irrigation.

– Accumulation of salts in the top layer due to evapo-transpiration in arid conditions.

– Water logging conditions in perennial river basins/irrigation sources due to seepage.

– Excessive use of chemical fertilizers containing chlorides, sulfates etc.

– Poor drainage conditions.

Effect of salinity on crop growth and development

Increasedosmotic pressure of soil solution due to excessive salts retards moisture and nutrient absorption by crops. High concentration of soluble salts produces toxic effect directly to the crops. Microbial activity also be checked and the soil becomes barren. But these soils are potentially productive soils and their potential can be improved by proper ameliorating techniques.

Ameliorating techniques for saline soils

The main objective of amelioration is reducing the quantity of soluble salts from saline soil. The following technologies can be followed to reclaim the saline soil.

1. Scraping

It is removal of the salts that have accumulated on the soil surface mechanically. It has limited success and may temporarily improve crop growth.

2. Leaching

This is the most effective management technique for removing salts from the root zone of soils. Stagnation of fresh water can dissolve the salts in the field. Now this water with dissolved salts can be drained out from the field. This way salts can be leached from the salt affected field. Leaching should preferably be done when the soil moisture content is low and the groundwater table is deep. Leaching during the summer months is less effective because large quantities of water are lost by evaporation. If adequate fresh water is not available, less saline water (EC 0.25 dS/m) also can be used.

3. Drainage

Poor drainage condition leads to accumulation of rain water in low lying areas during rainy season. If it is not drained out properly the

groundwater table is raised to less than 2 m within 5–10 years and result accumulation of salts due to evaporation from the surface. In general, the critical depth of water table ranges between 1.5 to 3.0 m to check the salinization. So drainage is necessary to prevent salinization.

4. Irrigation frequency

More frequent irrigations prevent the salt accumulation by keeping the soil at higher soil moisture content. So crops grow in saline soils must be irrigated more frequently.

5. Irrigation method

Sprinkler or drip irrigation is ideal method for irrigating frequently and with small quantity of water at a time. Leaching of soluble salts is also accomplished more efficiently when the water application rates are lower than the infiltration capacity of the soil and such a condition cannot be achieved by flood irrigation methods.

6. Proper use of irrigation water

Salt free or less saline (if salt free water is not available) water only to be used. Moisture should be kept at optimum field capacity to check the salt accumulation.

7. Management of soil fertility through proper fertilizer application

Generally saline soils are low in fertility status. Response of nitrogen is better when it is applied with green manures and green leaf manures. However, excessive fertilization on a highly saline soil is of no value. Uses of acid forming fertilizer such as ammonical and amide form help to drop the pH level of soil.

8. Mulching

Soil salinization is particularly high when the water table is shallow and the salinity of groundwater is high. Mulching can reduce evaporation from the soil surface and encourage downward flow of soil water there by check the accumulation of salts on soil surface.

9. Placement of seed or seedling

Salts tend to accumulate at the raised portion of soil. So planting or seeding at sides or shoulder of ridges help them to emerge in saline soil.

10. Growing salt tolerant crops

Tolerance and sensitiveness vary with crops.

Conclusion

Saline soils are barren but potentially productive soils. All the problematic soil are need to be rectified and made to be productive to ensure the food security of ever growing population. Soluble salts concentration

of saline soil can be minimized by the above technique and made into productive. Tolerance of crops to be improved through salt resistant root stocks, genetic and molecular approach those further helps to get higher yield in saline soils.

Text 14. New Methods of Land Amelioration

Источник: http://www.eolss.net/Sample-Chapters/C10/E5–09.pdf

In recent decades, new methods of land amelioration have been developed. Their emergence is related to the need to minimize the negative consequences of anthropogenic impacts on land and water resources, as well as on nature in general.

These are the measures of erosion and deflation control, waterlogging and inundation control, soil pollution control, and so on. Together with the traditional methods of amelioration, they form the basis of sustainable development of modern society. Integrated amelioration methods can be called multiple amelioration.

Multiple ameliorative procedures are a vital element of modern farming systems as they raise the fertility of soils and ensure high and stable yields. At present, sustainable agriculture assumes the creation of purposefully managed agro-landscapes. The sustainability of farmland is ensured by the purposeful control of soil, hydrological, biochemical, and other processes taking place in these landscapes. The main goal of control measures is to regulate energy and matter fluxes in agro-landscapes and to minimize their unproductive losses.

The land reclamation worker and the land manager are the architects of agro-landscapes. The design of agro-landscapes should be adjusted to local environmental conditions. On the basis of long-term experience, scientists have developed optimal methods and technical means of land amelioration for different natural zones. Each amelioration project should take into account zonal peculiarities of amelioration procedures and the specific features of the local environment.

There have been very serious controversies concerning optimal land use in certain areas. Often, it is difficult or impossible to satisfy the interests of all parties, for example, those concerned with agriculture, wildlife, landscape planning, recreation, and so on.

Irrigation, drainage, and other ameliorative systems include not only land areas but also rivers, lakes, and other water bodies that serve as water sources for irrigation or water collectors for drainage networks. Often, it

is necessary to create artificial water storage basins and pump stations on these water reservoirs.

Dikes and artificial levees are built along water courses to protect neighboring lands from floods. Sometimes, river beds are deepened and straightened. To provide the infrastructure and necessary means of transportation, irrigation and drainage systems are also supplied with a network of roads, power supply lines, communication lines, technical buildings, and houses. This infrastructure is an obligatory component of modern large-scale ameliorative systems.

While solving economic and social problems, amelioration can have very serious impacts on the environment, especially on land and water resources, vegetation, and fauna. To a lesser extent, it affects subsurface conditions and the atmosphere.

Text 15. Methodology for Afforestation of Saline Soils

Источник: http://biodivers-southcaucasus.org/wp-content/uploads/2015/02/ Assessment-Report-new.pdf

Afforestation of salt-affected soils requires a specialized approach to site development, choice of species and level of management. Though many tree species are tolerant to adverse conditions, specific measures are required to successful development of tree plantations on saline areas. The stress faced by the trees depends upon the nature and extent of salinity, especially toxic salts, depth and salinity contents of ground water (GW), among other factors.

Planting methods

Site preparation for afforestation of sodium-affected soils requires proper planning for successful establishment and development of the trees. It includes soil salinity assessment in pit profiles, modifications in the root environment by leaching of salts, soil amendment for optimum root growth, and planting of saplings with simultaneous filling of the pits with appropriate composition of filling mixture. Provision of maximum retention of soil moisture, proper maintenance of soil fertility and in some areas breaking the hard pan by perforation to permit vertical growth of tree roots may be required.

The composition of the filling mixture has a profound effect on the survival and growth of the tree species. The compound typically consists of chemical amendments (e.g., gypsum) and manure. In cases of clayey soil texture, the addition of sand into the backfill composition may be ad-

vantageous. Planting selected tree species in pits refilled with the original sodium-saline soil mixed with gypsum and manure may be easier and more advantageous from economic viewpoint. Raised earthen bund 42 containing soil with gypsum and fertilizers around backfill will prevent the entry of salt-rich runoff water into the pit.

Choice of species, spacing and pruning

In order to obtain maximum production from saline land, it is vital to choose the correct tree species. The choice of species will depend on a range of factors, including degree of soil salinity, tree tolerance and growth rates. Moreover, the chosen trees should be able to fix atmospheric nitrogen through symbiosis, use GW after establishment hence releasing freshwater for other purposes, and generally improve soil conditions through intense biological activities of their roots and litter.

Considering the hostile soil conditions and thus, mortality of saplings in the initial stages may be considerable. Some species may grow slower than the others and require long time for economic exploitation. Therefore, instead of monoculture, planting should be done with mixed species.

Increase in number of plants per unit area results in higher total biomass production, although the biomass of the single trees decreases. Therefore, for fuel-wood production the distance between the trees can be closer than is usually practiced, but depends on the chosen tree species. Also, in harsh environment of the sodium soils, closer planting partially covers the risk of high mortality of the trees.

The distance between tree species should be adjusted such that big plants come in bigger pits and at wider spacing. Likewise, smaller trees may be planted at closer spacing. When mixing species their growing habits (aggressive index) should be kept in mind. After the establishment of tree plantations, some trees can be harvested for fuel-wood, while others can continue to grow for timber/fruit production.

Pruning to remove unwanted branches enables accelerating the tree growth, improving the quality of wood and also promoting the growth of under-story vegetation. Pruning is usually done before the onset of spring, in January or February. A study conducted in Armenia revealed a number of tree species which can be suitable candidates for afforestation. Among them are Populus nigra var.italica, Populus gracilis and Eleagnus anguistifolia. Casuarina equitisefolia can grow in water-logged areas and withstand salinity; it is a fast-growing tree and is suitable for fuel-wood

purposes. It may also be advantageous to import certain salt-tolerant tree species proven to grow in sodium-affected soils, for testing purposes.

Tests of survival, growth, adaptation to water, salinity and nutrient stress, and quality of useful products in Uzbekistan showed that Russian olive (Elaeagnus angustifolia L.) was among the most promising species for afforestation.

Time of planting and irrigation

Field conditions at the time of planting, and during the first few months after planting, are of critical importance. The best time for any planting is when the soil is moist and warm, but not waterlogged. Depending on the types and chemistry of the soil salinity targeted leaching of the pits with amendments (gypsum) can be used to flush out salts and to allow the soil in the pit to settle down. This will provide salt-free and amended environment for the better establishment and healthy growth of young saplings. Newly planted trees need regular irrigation of the tree pits within 1–2 years until their roots will grow long enough to use GW. Irrigation during the initial period of establishment also enables protecting trees from dry weather as well as decreasing concentrations of harmful salts. Application of gypsum and fertilizers during irrigation will be advantageous.

5. ОСНОВНЫЕ ПОЛОЖЕНИЯ ТЕОРИИ ПЕРЕВОДА

5.1. СПОСОБЫ ПЕРЕВОДА

Перевод – это преобразование сообщения на исходном языке в сообщение на языке перевода. Точный перевод по определению невозможен уже в силу того, что разные языки отличаются как по грамматическому строю, так и по простому количеству слов, не говоря уже о различии культур, что тоже может иметь влияние на способ и результаты перевода.

Выполняя перевод, переводчик прежде всего определяет способ перевода, то есть меру информационной упорядоченности для переводного текста. Первая ступень в выборе способа перевода заключается в определении того, в каком виде должен быть представлен исходный текст в переводящей культуре: полностью или частично. В зависимости от коммуникативного задания на этом этапе выбирается либо полный, либо сокращенный перевод (в некоторых источниках именуемый также реферативным, хотя эти термины не вполне адекватны).

Полный перевод

Полный перевод направлен на тщательное воспроизведение всех компонентов информационной упорядоченности исходного текста в единицах переводящего языка. Полный перевод может осуществляться различными способами, но наиболее распространенными можно считать следующие: буквальный, или пословный перевод, семантический перевод и коммуникативный перевод.

Буквальный перевод заключается в пословном воспроизведении исходного текста в единицах переводящего языка по возможности с сохранением даже порядка следования элементов. По существу, буквальный перевод сравнительно редко применяется для коммуникативных целей и обычно имеет исключительно научную область распространения. Так, в целях лингвистического анализа буквальный перевод является предпочтительнее других способов.

Семантический перевод заключается в возможно более полной передаче контекстуального значения элементов исходного текста в единицах переводящего языка. Процесс семантического перевода представляет собой естественное взаимодействие двух стратегий:

1) стратегии, ориентированной на способ выражения, принятый в переводящем языке; 2) стратегии, ориентированной на сохранение особенностей исходной формы выражения.

Первая стратегия применяется к общеупотребительным лексико-грамматическим элементам исходного текста, таким как стандартные синтаксические структуры, пунктуация, длина предложений, типичные метафоры, союзы, синтаксические обороты, морфологические структуры, широко распространенные общекультурные и научно-популярные термины и выражения и т. п. Вторая стратегия оказывается уместной при переводе нестандартных, авторских оборотов, оригинальных стилистических приемов, необычной лексики и т. п. – в таких случаях семантический перевод чаще всего ориентируется на специфику исходного знака и сохраняет в переводе как можно больше его особенностей, вплоть до буквального перевода.

Коммуникативный перевод заключается в выборе такого пути передачи исходной информации, который приводит к переводному тексту с адекватным исходному воздействием на получателя. Главным объектом при таком способе перевода оказывается не столько языковой состав исходного текста, сколько его содержательное и эмоционально-эстетическое значение. Причем в отличие от функционального перевода, коммуникативный перевод не допускает ни сокращений, ни упрощений исходного материала. В сущности, то, что в обиходе часто называется литературным и, в частности, художественным переводом, на самом деле представляет собой именно коммуникативный перевод, учитывающий – или программирующий – прагматику получателя. Этот способ является оптимальным для большей части художественной литературы, публицистики, части научно-теоретических и научно-популярных текстов и т. п.

Сокращенный перевод

Сокращенному переводу могут подлежать практически все типы текстов: от простого делового письма до романа. Результатом применения сокращенного перевода являются такие тексты, как тезисы, конспекты, рефераты, аннотации, переложения, дайджесты и т. п.

В сущности, сокращенный перевод выполняется одним из двух фундаментальных способов перевода: выборочный перевод или функциональный перевод.

Выборочный перевод как способ сокращенного перевода состоит в выборе ключевых, с точки зрения переводчика, единиц ис-

ходного текста и их полном переводе. Все остальные компоненты исходного текста при таком способе отбрасываются как второстепенные с точки зрения достижения результата и не подлежат переводу вообще. Такой способ довольно часто применяется для пересказа в тезисно-реферативном виде деловых писем, газетных материалов, научных статей и сообщений, докладов и т. п. Достоверность такого перевода основывается на точности выбора ключевых единиц, чтобы в переводе не пропала какая-либо важная часть информации.

Функциональный перевод как способ сокращенной передачи исходного текста на другом языке заключается в компоновании переводного текста из функционально преобразованных единиц исходного текста. Функциональное преобразование может основываться на лексико-семантических, грамматических и стилистических трансформациях исходного текста, примененных в целях его общего сокращения или упрощения. Типичным примером такого способа перевода является так называемый литературный пересказ, когда целое крупное произведение пересказывается в упрощенном варианте, например, Алиса в Стране Чудес в переводе-пересказе Б. Заходера. Помимо трансформации-упрощения исходного текста функциональный перевод допускает также общие купюры наиболее сложных частей исходного текста, но это не обязательно, так как они могут быть также упрощены.

Top Tips

Рекомендуемые правила для выбора способа перевода

Частичный перевод применяется для передачи на переводящем языке исходных текстов в целях общего ознакомления с их содержанием, когда подробности не являются коммуникативно существенными.

Выборочный частичный перевод используется при переводе содержания докладов, деловых писем, стандартных сообщений, газетных материалов и других аналогичных текстов или высказываний, когда нужно получить представление о ключевых содержательных моментах исходного текста, но подробное ознакомление со всем контентом не является первоочередной задачей.

Функциональный частичный перевод применяется для сокращения или упрощения исходных текстов, когда они предназначены либо для массового читателя, либо для получателей менее высокого уровня готовности к восприятию такого типа исходных текстов. К таковым относятся различного рода пересказы, адаптации, версии и т. п.

Полный перевод применяется для передачи исходных текстов, содержание которых имеет настолько высокую значимость, что должно быть представлено получателю переводного текста в подробном виде.

Буквальный полный перевод применяется в сравнительно редких случаях, например в учебных или научных целях, для академических изданий уникальных текстов, в частности эпоса, и т. п.

Семантический полный перевод выполняется для передачи исходных текстов, имеющих высокую научную или социально-культурную значимость, подробное содержание которых предназначено для широкого круга специалистов.

Коммуникативно-прагматический полный перевод используется для передачи исходных текстов, имеющих высокую социально-культурную значимость, подробное содержание которых предназначено для массового получателя.

5.2. ЕДИНИЦЫ ПЕРЕВОДА

Одно из основных умений переводчика заключается в свободном владении различными способами членения исходного текста.

Наиболее распространенной ошибкой начинающих переводчиков является стремление переводить пословно, то есть однообразно членить исходный текст или высказывание на отдельные слова, находить им соответствие на языке перевода и таким образом составлять переводной текст. Суть ошибки состоит в подмене представлений о характере переводимых знаков: вместо речевых единиц, которые собственно и подлежат переводу, переводчик механически подставляет языковые единицы, в то время как в разных языках языковой состав той или иной речевой единицы может не совпадать. Точное определение единиц перевода – одно из важнейших условий точности перевода вообще.

Основой единицы перевода может служить не только слово, но любая языковая единица: от фонемы до сверхфразового единства. Главным условием правильности определения исходной единицы, подлежащей переводу, является выявление текстовой функции той или иной исходной единицы.

Top Tips

Рекомендуемые правила сегментации текста для перевода

Устанавливая статус и параметры единицы перевода, мы членим текст на более или менее крупные отрезки, от отдельного слова до целого эпизода, а порой и до сегмента, равного самому тексту.

Если слово зависит главным образом от ближайшего контекста, то основанием для построения единицы перевода является словосочетание или простое предложение, в которое входит данное слово.

Если слово зависит от нескольких текстовых компонентов, в том числе и выходящих за пределы предложения, то построение единицы перевода основывается на сложном предложении или эпизоде.

Если слово зависит от множества текстовых компонентов, то в основе единицы перевода должен лежать весь исходный текст.

Если слово зависит от условий, выходящих за пределы текста, то переводчик должен предусмотреть возможность культурологического комментария или создания новой языковой единицы путем транслитерации или калькирования (в некоторых случаях возможно сочетание всех названных способов).

5.3. РОЛЬ СЛОВАРЯ ПРИ ПЕРЕВОДЕ

Словарь, несомненно, является неоценимым пособием и помощником при овладении иностранным языком. Переводчик, как бы он хорошо ни владел языком, вынужден постоянно обращаться к словарю, так как в процессе перевода перед ним раскрывается все богатство иностранного языка: его краски, явные и скрытые возможности слов, нетрадиционные словосочетания, фразеология, в значительной мере отражающая национальный характер, и многое другое. Зачастую словарь не дает готового перевода слова, лишь подсказывая его значение, а порой и просто указывает, в каком направлении нужно искать обусловленное контекстом значение. Поэтому глубоко заблуждается тот переводчик, который считает, что словарь отвечает на все вопросы, разрешает все недоумения и загадки. Умение правильно пользоваться словарем, извлекать максимум информации из лаконичной словарной статьи и правильно, творчески применять данные словаря в конкретных условиях контекста – непременные качества переводчика.

Для начинающего переводчика наилучшим англо-русским словарем является словарь профессора В. К. Мюллера, бумажная или электронная версия **(www.twirpx.com/file/1214745/).**

Данный словарь достаточно удобен для переводческой работы. В нем тщательно продуман состав словарных единиц, он богат типичными моделями, словосочетаниями и конструкциями современного английского языка.

Содержание словарной статьи

Какую информацию получает переводчик в словарной статье? Словарная статья включает следующее:

– заглавное слово;

– транскрипцию;

– указание на принадлежность слова к определенной части речи;

– стилистические пометы;

– перечисление основных значений, присущих данному слову;

– переводы примеров-иллюстраций;

– толкования и пояснения заглавного слова и его значений (если в русском языке нет прямого соответствия, т.е. словарного эквивалента);

– сочетаемость слова;

– фразеологические единицы.

Существует определенная традиция в расположении информации внутри словарной статьи.

Многозначные слова представлены во всем многообразии их значений. Значения распределяются в зависимости от их употребительности. В конце словарной статьи даются термины, общеспециальные и узкоспециальные, характерные для отдельно взятой области.

Стилистические пометы

Начинающий переводчик, который только вырабатывает навыки общения с англо-русским словарем, не вправе игнорировать такой важнейший элемент словарной статьи, каким является стилистическая помета-сокращение. Стилистическая помета, стоящая перед определенным значением слова, дает не только стилистическую характеристику слова, но и указывает на ограниченные возможности словоупотребления, кроме того, она более глубоко раскрывает смысловую структуру слова.

Стилистическая помета соотносит слово либо с литературно-книжной лексикой (термины науки и техники, архаизмы, поэтизмы, историзмы, библеизмы, редко употребляемые слова и т.д.), либо с разговорной лексикой (вульгаризмы, жаргонизмы, сленг, просторечие).

Типы словарных соответствий

Для того чтобы переводчик смог трезво оценить возможности англо-русского словаря и умело им пользоваться в своей практической работе, он должен представлять себе, какого рода смысловые соотношения существуют между единицами словарного состава английского и русского языков.

Русское слово, более или менее близкое по значению определенному английскому слову, является его лексическим или словарным соответствием.

Сравнивая единицы словарного состава английского и русского языков, можно выявить два основных типа словарных соответствий – эквиваленты и вариантные соответствия.

Когда значению английского слова соответствует значение одного русского слова, мы имеем дело с эквивалентом.

Слов-эквивалентов сравнительно немного. Эквиваленты есть в основном у терминов, географических названий и имен собственных. Эти слова наиболее устойчивы и в наименьшей мере зависимы от контекста.

Второй тип соответствий, наиболее распространенный, – вариантное соответствие.

Когда одно английское слово имеет в русском языке несколько словарных соответствий, можно говорить о вариативном соответствии.

Переводчик имеет возможность выбирать из нескольких вариантов именно то соответствие, которое наилучшим образом вписывается в имеющийся контекст. При этом решающую роль играет контекст. Следует помнить, что термин ”вариантное соответствие” предполагает несколько словарных соответствий английскому слову внутри одного значения, но отнюдь не многозначность. Например:

intention – намерение, стремление, цель, замысел

nice – хороший, приятный, милый, славный

retired – удалившийся от дел; отставной, в отставке; ушедший на пенсию

Контекстуальное значение

Далеко не всегда словарь может предложить переводчику то единственное нужное слово, которое требуется по контексту. Как правило, семантическая структура слова, то есть объем всех его значений, не исчерпывает всех смысловых возможностей, заложенных в слове. Иногда некоторые значения и оттенки значений реализуются только в определенном контексте. Контекстуальное значение не входит в смысловую структуру слова и в словарях не фиксируется. Так, среди словарных значений прилагательного brave – 1) храбрый, смелый; 2) превосходный, прекрасный; 3) уст., книжн. нарядный – нет ни одного, которым можно было бы воспользоваться при пере-

воде сочетания *a coat of brave lipstick*. По всей вероятности, здесь речь идет об интенсивном цвете губной помады – слой ярко-красной губной помады.

Таким образом, особенности контекста могут заставить переводчика отказаться от словарных соответствий, искать и находить контекстуальные значения слов, что является наиболее творческим приёмом в процессе перевода.

Контекст и виды контекста

Под контекстом принято понимать языковое окружение, в котором употребляется та или иная языковая единица.

Значение слова, особенно многозначного, реализуется в словосочетании, в грамматической конструкции, в совокупности слов. Попробуйте произнести вне контекста такие русские слова, как класс, передача, сторона, и вы поймете, что употребленные в изолированном виде они вряд ли несут какую-либо информацию и не могут вызвать у слушателя определенные ассоциации. Для того чтобы они обрели значение, им нужен ”указательный минимум”.

Принято различать несколько видов контекста – узкий, широкий и экстралингвистический (внелингвистический).

Под узким контекстом подразумевается контекст словосочетания или предложения.

В отличие от узкого контекста широкий контекст выходит за рамки предложения. Это может быть абзац, глава и все произведение в целом. Следующий пример взят из романа Энн Тайлер.

Первая глава романа повествует о том, как одну супружескую пару, прожившую вместе 20 лет, постигло горе – хулиганы убили их единственного, горячо любимого двенадцатилетнего сына. Главный герой, глядя на свою убитую горем жену, вспоминает, какой она была 20 лет назад, когда жизнь только начиналась и обещала одни радости:

Sarah, a bubbly girl with a tumble of copper-brown curls.

Сара, жизнерадостная девушка с копной медно-рыжих курчавых волос.

В словаре В.К. Мюллера прилагательное *bubbly* представлено двумя значениями: 1) пенящийся (о вине); 2) пузырчатый (о стекле).

Поскольку словарные эквиваленты русско-английского словаря неприемлемы для перевода *bubbly*, нам приходится искать единственно правильное определение (жизнерадостная) в контексте всей главы.

5.4. ЛЕКСИКО-СЕМАНТИЧЕСКИЕ МОДИФИКАЦИИ

Лексико-семантические модификации или переводческие трансформации – это ряд переводческих техник и приёмов, используемых при передаче содержания слов и устойчивых словосочетаний, имеющих вполне определённые словарные соответствия в переводящем языке. Однако наличие словарного соответствия не всегда решает проблему адекватности перевода. Обычно под лексико-семантическими модификациями понимают: расширение или генерализацию значения, сужение или конкретизацию значения, логическое развитие или смену вектора причинно-следственной связи, целостное преобразование, описание.

Сужение, или конкретизация, исходного значения используется в тех случаях, когда мера информационной упорядоченности исходной единицы ниже, чем мера упорядоченности соответствующей ей по смыслу единицы в переводящем языке, например: русское понятие ”исследовать” может относиться к различным ситуативным условиям и в значительной мере упорядочивается контекстом; в английском языке ему будут соответствовать различные более узкие по значению единицы, в зависимости от контекста:

to explore (ср. исследовать местность – to explore the environment)

to investigate (ср. исследовать рынок – to investigate the market)

to research into (ср. исследовать явление – to research into the classical literature) и т. д.

Английское значение слова *man* достаточно широко и может употребляться в таких контекстах, в которых на русском языке требует слова с более конкретным значением, например:

He is a man of taste.

Он человек со вкусом.

All the king's men.

Все королевские солдаты.

Then you will be a man, my son.

Вот тогда ты и станешь мужчиной, сын; и т. д.

Причиной конкретизации глаголов также могут служить не структурно-системные различия языков, а стилистические нормы повествования. Так, глаголы речи *to say* и *to tell* могут переводиться не только глаголами, сопровождающими высказывания типа ответил, спросил, заметил, сообщил, возразил, но и глаголами, выходящими за рамки собственно речевых: посочувствовал, велел, при-

грозил и т. п. Чаще всего это делается во избежание монотонности повествования для создания большей естественности и живости текста.

Расширение, или генерализация, исходного значения, имеет место в тех случаях, когда мера информационной упорядоченности исходной единицы выше меры упорядоченности соответствующей ей по смыслу единицы в переводящем языке. Например, русское слово ”лечение” соответствует английскому *treatment*, которое обладает гораздо более широким спектром значений и для информационного упорядочения требует специальных контекстов, не совпадающих с контекстами лечения.

Лечение оказалось успешным, и она полностью выздоровела.

The treatment turned to be successful and she recovered completely.

Их понимание ситуации.

Their treatment of the situation.

Он обращался с родителями очень почтительно.

His treatment of his parents was very deferential.

Каждый язык по-своему отражает окружающий нас мир, и это, в частности, проявляется в том, как он ”дробит” действительность с помощью словесных знаков. Эти знаки – слова и устойчивые словосочетания – в английском языке отличаются в целом большей широтой и абстрактностью значений, чем в русском. Широта, а иногда и аморфность их семантики, является основной причиной того, что при переводе на русский язык приходится чаще прибегать к сужению, или конкретизации значений, чем к обратному приему – расширению, или генерализации.

Логическое развитие – это такой вид переводческих трансформаций, при которых происходит замена одного понятия другим на основе их смежности или логической близости. При этом главная идея высказывания остается неизменной, так как понятия тесно связаны друг с другом. Такого рода замены возможны и в рамках одного языка. Сравните, к примеру, ряд следующих синонимичных фраз: это очень популярная книга, на эту книгу большой спрос, эта книга пользуется большим успехом, этой книгой зачитываются все и т. д. Конечно, при переходе от одного предложения к другому происходит незначительный семантический сдвиг, но общность смысла в них сохраняется. Аналогичный механизм преобразований лежит в основе межъязыкового логического развития. Таким

образом, сама природа языка определяет возможность и даже закономерность этого приема.

Логическое развитие – это установление связей, перебрасывание своеобразного ”смыслового мостика” между логически близкими понятиями.

Some cocaine dealers employ children as runners: they're less likely to be arrested.

Многие торговцы наркотиками используют детей в качестве посыльных – они меньше привлекают внимание (и не возбуждают подозрений).

Целостное преобразование. Название приема – целостное преобразование – говорит о том, что изменения, которые происходят при нем, носят более значительный и глубокий характер, чем во всех приемах, рассмотренных выше. Целостность заключается в том, что трансформации подвергается не отдельно взятое слово (как это может быть на нижней ступени конкретизации, генерализации, логического развития и даже антонимического перевода), а целый смысловой комплекс – словосочетание или все предложение. Причем ни один из элементов (то есть слов) этого преобразуемого комплекса, взятый в отдельности, не связан семантически с новой формой выражения – то есть преобразование проходит более глубоко и более кардинально.

В качестве классических примеров целостного преобразования обычно приводят те фразеологизмы или этикетные формулы, перевод которых на русский язык требует полного отрыва от словарных значений составляющих их компонентов: *a fly in the ointment* (букв. ”муха в бальзаме”) – ложка дегтя в бочке меда; *help yourself* (букв. ”помогите себе!”) – угощайтесь, пожалуйста! Такого рода примеры действительно очень наглядно иллюстрируют механизм целостного преобразования, однако подобные переводческие операции возможны и при передаче свободных словосочетаний. В таких случаях готовый, ”преобразованный” вариант перевода, естественно, нельзя найти в словаре, однако использование этого приема вовсе не является неоправданной вольностью.

Описание. Когда ни один из словесных приемов подбора соответствия не удовлетворяет ситуации, переводчики прибегают к описанию. Описательный перевод, как правило, употребляется параллельно с транскрипцией и применяется при переводе терминов, культуронимов, уникальных объектов и т. п.

Top Tips

Правила применения лексико-семантических трансформаций

1. Сужение значения применяется в тех случаях, когда исходная единица обладает высокой степенью информационной неопределенности и в значительной мере зависит от контекста. При этом практически переводится не столько само слово, сколько конкретный вариант его значения в определенном контексте.

2. Расширение исходного значения допускается в тех случаях, когда переводящее слово отличается большей степенью информационной неопределенности, которая в достаточной мере упорядочивается данным контекстом.

3. Прием логического развития носит творческий характер – для удачного пользования им от переводчика требуется глубокое проникновение в текст, способность логически мыслить, развивать исходную идею и одновременно не преступать той грани, за которой начинается уже новый, иной смысл.

4. Описание значения исходной единицы применяется в условиях отсутствия регулярного словарного соответствия или при несовпадении смысловых функций соответствующих единиц в исходном и переводящем языках. Описание должно быть предельно кратким и в идеале приближать по своим качествам к отдельному слову или фразеологической единице таким образом, чтобы оно могло употребляться в тексте без искусственной единицы, создаваемой в таких случаях либо с помощью транскрипции, либо калькирования, когда это по каким-либо соображениям неуместно в пределах данного текста.

5. Целостное преобразование приводит к комплексному лексико-грамматическому преобразованию исходного предложения, как следствие, основной задачей становится сохранение неизменным плана содержания.

5.5. СИНТАКСИЧЕСКИЕ ПРЕОБРАЗОВАНИЯ НА УРОВНЕ ПРЕДЛОЖЕНИЙ

Предложение – наиболее сложная по формальному и семантическому составу единица языка. Если отдельное слово, морфологическую форму или даже словосочетание можно рассматривать как устойчивую и сравнительно независимую информационную данность, соответствия которой в принципе исчислимы, то любое

предложение обязательно связано и обусловлено авторской установкой, а потому может, с точки зрения перевода, иметь неопределенное множество интерпретаций.

Все эти свойства предложения, доставляющие много хлопот переводчику, проявляются в гибкости практически всех компонентов предложения, которые при переводе могут частично или полностью менять свой грамматический и/или лексико-семантический облик.

Проблема перевода предложения с английского языка на русский решается, как правило, с помощью таких приемов, как нулевой перевод, функциональная замена, распространение, стяжение, перестановка, расщепление, объединение, антонимический перевод.

Нулевой перевод – обусловленная разницей грамматических структур невозможность передать какой-либо компонент предложения. Нулевой перевод используется, например, для английских предложений с формальным подлежащим, которое носит исключительно грамматический характер и не имеет лексико-семантического содержания:

It is a long way to the final solutions.

До окончательного решения еще далеко.

You must know your place.

Знай свое место.

Функциональная замена – замена одного члена предложения другим является наиболее частым приемом при переводе сказуемого. Наиболее распространенный вариант – это замена глагольного сказуемого именным – и наоборот.

Например, исходное глагольное сказуемое в русском предложении преображается в составное именное при переводе на английский язык.

He was very evasive.

Он вел себя очень уклончиво.

Вариантом функциональной замены является распространение (противоположный ему прием – стяжение), которое заключается в превращении единичного члена предложения в группу или в целое придаточное предложение:

Such was Tolstoy's fame that Yasnaya Polyana became a place of pilgrimage.

Слава Толстого была настолько велика, что Ясная Поляна превратилась в место паломничества.

Часто функциональная замена дополняется таким приемом, как перестановка компонентов предложения. Этот прием используется, когда последовательность элементов, при общности значения, определяется разными речевыми традициями и условиями, например в способе выражения отрицания:

They had no money but they had their wits.

У них не было денег, зато была голова на плечах.

Вообще различие в порядке слов и его функциональных особенностях в русском и английском языках заставляет переводчика достаточно часто обращаться к приему перестановки, что связано, прежде всего, с различиями в восприятии более или менее значимой информации предложения. Так, в русском предложении значимые компоненты, несущие новую информацию, тяготеют к концу фразы, вплоть до расщепления именного сказуемого (Вернулся он оттуда совершенно иным человеком). Английское предложение не требует обязательного помещения значимой информации в конце фразы (значимая информация может быть подчёркнута, например, с помощью неопределенного артикля или специфических оборотов).

При переводе сложных предложений вышеназванные приемы могут дополняться более кардинальным преобразованием структуры исходного предложения: расщеплением или объединением.

Расщепление заключается в том, что одно длинное или сложное по составу предложение разбивается на два или более (что встречается сравнительно редко). Этот прием может быть обусловлен как соображениями грамматическими (например, в случае различия в допустимости набора синтаксических оборотов), так и прагматическими (например, если предложение претерпевает целый ряд преобразований, приводящих к избыточному содержательному плану).

Противоположный расщеплению прием – стяжение – это объединение нескольких простых предложений в одно более сложное, применяется, как правило, в условиях различия синтаксических или стилистических традиций.

Заслуживает внимания также еще один прием, который используется в связи с предложениями: антонимический перевод, то есть замена отрицательной или вопросительной формы предложения на утвердительную, или наоборот. Условия применения такого преобразования, как правило, связаны с лексико-семантическим составом сказуемого. При переводе на русский язык с английского чаше всего отрицательная форма предложения меняется на утвердительную.

”No kidding, I’m sorry,” I kept telling her.

”Серьезно, я действительно сожалею об этом”, – твердил я ей.

В число приемов преобразования предложения можно включить и так называемое добавление – и его противоположность – опущение. Добавление чаще применяется при переводе с английского языка на русский, в силу большей лаконичности, присущей английскому синтаксису; соответственно, средний объём предложения или текстового отрывка на русском языке, как правило, больше, чем в английском.

Top Tips

Рекомендуемые правила преобразования предложений при переводе

Нулевой перевод применяется в условиях синтаксической или лексико-семантической неуместности воссоздания исходной формы в единицах переводящего языка.

Функциональная замена используется при частичном несовпадении структурно-семантических свойств той или иной синтаксической единицы в исходном и переводящем языках.

Перестановка компонентов предложения используется в случаях несовпадения традиций актуального членения предложения в исходном и переводящем языках.

Распространение применяется тогда, когда уровень сложности предложения в исходном языке ниже, чем требуется для данного контекста в переводящем языке.

Стяжение применяется в том случае, когда уровень сложности исходного предложения выше, чем позволяют возможности переводящего языка.

Антонимический перевод употребляется в случае несовпадения логических характеристик исходного сказуемого и условий манифестации смысла в переводящем языке.

Добавление применяется при наличии подтекста или имплицированных компонентов значения в исходном тексте, если переводящий язык или речевая традиция требуют их экспликации.

Опущение используется при наличии в исходном тексте избыточных элементов, которые должны быть имплицированы в соответствии с требованиями переводящего языка или речевой традиции.

5.6. ЛОЖНЫЕ ДРУЗЬЯ ПЕРЕВОДЧИКА

При сравнении английского и русского языков можно выявить значительное количество слов, имеющих сходное написание или звучание. В основном эти заимствования – либо из одного языка в другой, либо – что чаще – обоими языками из третьего, общего источника, как правило, латинского, греческого, французского (parliament, diplomat, method, theory, organization, etc.). Слова такого рода могут как помогать, так и мешать переводчику. Помощь они оказывают в тех случаях, когда за внешним сходством стоит совпадение значений.

Нельзя забывать о том, что у ряда слов в обоих языках сходство чисто формальное – у них нет ни одного общего, пересекающегося значения. При этом контекст зачастую не подает сигналов о том, что напрашивающееся по аналогии ”соответствие” – ложное. В основном это бывает следствием того, что разноязычные ”аналоги” принадлежат к одному кругу понятий. К примеру, английское слово *decade* и русское *декада* означают определенный отрезок времени, но первое – *десятилетие*, а второе – *десять дней*. Английское *biscuit* и русское *бисквит* относятся к гастрономической сфере, но первое – это *сухое печенье, галета,* а второе – *выпечка из сладкого сдобного теста.* Вот еще несколько примеров:

She has a very fine complexion.

У нее чудесный цвет лица (а не ”комплекция”).

The work is done accurately.

Эта работа выполнена точно (а не ”аккуратно”).

Well, he must be a lunatic.

Он, должно быть, сумасшедший (а не ”лунатик”).

Еще большую опасность несут в себе слова, которые при наличии общего значения с соотносимыми с ними русскими словами имеют и другие значения, не присущие последним. Например, *fiction* – это не только *фикция*, но и *художественная литература, беллетристика, false* – это не только *фальшивый*, но и *ошибочный, искусственный (о волосах, зубах), officer* – это не только *офицер*, но и *чиновник, полицейский, капитан на торговом судне* и т.д. Такая лексика составляет большую часть ”ложных друзей переводчика” и поэтому требует особого внимания. Страховкой от ошибок может быть лишь очень внимательный анализ контекста и проверка всех значений слова по словарю.

В этой же группе ”ложных друзей переводчика” есть немалое количество слов, у которых общее с русским сходным словом значение не является основным, ведущим, оно менее частотно и находится на периферии словарной статьи: *novel* – это в первую очередь *роман* и гораздо реже *новелла*; *partisan* – это *сторонник, приверженец* и значительно реже *партизан*; *sympathetic* – это *сочувственный, полный сочувствия* и исключительно редко *симпатичный* и т. д. Фактор частотности надо принимать во внимание, нередко он играет не последнюю роль в выборе нужного соответствия в переводе.

Из всего сказанного нетрудно заключить, что данная группа лексики требует повышенного внимания со стороны переводчика. Тщательный анализ контекста (как узкого, так и широкого), словари и энциклопедии могут обезопасить ”ложных друзей переводчика” и даже превратить их в настоящих друзей.

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AGRONOMY AND SOIL SCIENCES GLOSSARY

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Условные сокращения

Английские

n.	noun	имя существительное
v.	verb	глагол
adj.	adjective	имя прилагательное
adv.	adverb	наречие
prep.	preposition	предлог
Br.E.	British English	британский вариант
Am.E.	American English	американский вариант
pl.	plural	множественное число
syn.	synonym	синоним
ant.	antonym	антоним

Русские

агрохим. – агрохимия
агроэкол. – агроэкология
анат. – анатомия
биол. – биология
биотех. – биотехнология
биохим. – биохимия
бот. – ботаника
вод. – водопользование
ген. – генетика
геол. – геология
зоол. – зоология
ланд. – ландшафтный дизайн
лат. – латинский язык, латинский термин
лес. – лесоводство
мелиор. – мелиорация
микр. – микробиология
мол. биол. – молекулярная биология
мол. ген. – молекулярная генетика
овощ. – овощеводство
пож. – пожарное дело
почв. – почвоведение
раст. – растениеводство
рек. – рекультивация
с.х. – сельское хозяйство
техн. – техника
фтп. – фитопатология
хим. – химия
экол. – экология
экон. – экономика
энт. – энтомология

Aa

AA test (Accelerated aging test) ускоренное испытание на старение
abdominal *adj.* абдоминальный, брюшной
abiotic *adj.* абиотический; неживой; нежизненный
abloom *adj.* цветущий; расцветший; в цвету
abort *v.* остаться недоразвитым; прекратить развитие на начальной стадии; стать бесплодным
abortion *n.* остановка развития; *ген.* недоразвитие органа; *агрохим.* недозрелость
above-ground part надземная часть
abscission *n.* ампутация; *бот.* опадение, сбрасывание *(напр. листьев, плодов);* ~ layer *бот.* отделительный слой *(в черешке листа);* слой разъединения; ~ zone *бот.* место отделения органа; ~ period *лес.* период листопада
absorb *v.* впитывать; абсорбировать; поглощать
absorption *n.* абсорбция, впитывание, всасывание; ~ capacity of soil поглотительная способность почвы
abundant *adj.* широко распространенный, обильный
acacia *n. бот.* акация
accelerate *v.* ускорять(ся), убыстрять
acceptor *n. биол.* акцептор; *adj. ген.* акцепторный; ~ RNA транспортный РНК; ~ site акцепторный участок; ~ substrate акцепторный субстрат
accumulation *n.* накопление, аккумулирование; скопление; salt ~ *агрохим.* засоление; накопление солей
acid *n.* кислота; abscisic ~ абсцизовая кислота; acetic ~ уксусная кислота; amino ~s аминокислоты; citric ~ лимонная кислота; organic ~ органическая кислота; *adj. хим.* кислотный, кислый; ~ base balance кислотно-щелочной баланс
acidification *n.* окисление, скисание
acidifier *n.* кислотообразователь; подкисляющее средство, подкислитель
acidity *n.* кислотность; titratable ~ титруемая кислотность
acre *n.* акр *(мера площади = 0,4 га)*
acreage *n.* площадь (в акрах)
active *adj.* активный; ~ roots – активные (всасывающие) корни
adapt *v.* приспосабливать(ся)
adaptability *n.* адаптивность, приспособляемость
adapted to *adj.* адаптированный к
add *v.* прибавлять, добавлять
additional *adj.* дополнительный, добавочный, придаточный; ~ crossing дополнительное скрещивание; ~ nutrition добавочное питание, подкормка
additive *n.* добавка *(пищевая);* приправа
adhesion *n.* прилипание; слипание; сцепление; ~ of soil связность *(почвы)*
adjacent *adj.* прилегающий, смежный, соседний; сопредельный
adoption *n.* усвоение, принятие
adornment *n.* украшение; ~ plant *биол.* декоративное растение, *syn.* adorning plant
adult *adj.* взрослый, зрелый; развитой; *n.* взрослая особь

adventitious *adj.* адвентициальный, добавочный; ~ roots on the stem адвентивные корни на стебле
adviser *n.* советник, консультант, эксперт; farm ~ *с.х.* консультант по сельскому хозяйству; специалист, консультирующий фермеров
aerate *v.* аэрировать, насыщать воздухом почву, проветривать
aerial *adj.* надземный, воздушный; ~ parts *n.* надземные органы растения
aesthetic *adj.* эстетический; чувствующий красоту; имеющий развитой вкус; эстетичный
affect *v.* воздействовать *(на что-то),* поражать
afforestation *n.* облесение, лесонасаждение, лесовозобновление
aftercrop *n.* второй урожай
after-ripening *n.* дозревание; дозаривание
agent *n.* агент; возбудитель *(напр. болезни);* фактор; способ, средство; causal ~ *с.х.* возбудитель *(болезни),* причинный фактор *(заболевания)*
aggregate *n.* совокупность; *v.* собирать, соединять
aggregated *adj.* агрегированная, отструктурированная *(о почве)*
aging *n.* вызревание, созревание, выдержка
agriculture *n.* сельское хозяйство, земледелие, агрокультура
agricultural *adj.* сельскохозяйственный; аграрный, земледельческий; ~ chemistry агрохимия; ~ engineering агротехника; ~ Management Solutions системы управления сельским хозяйством, системы точного земледелия; ~ science агрономия; ~ soil science агропочвоведение
agroclimatic *adj.* агроклиматический; ~ conditions *экол.* агроклиматические условия
agroecology *n.* агроэкология
agroecosystem *n. экол.* сельскохозяйственная экосистема, агроэкосистема
agroforestry *n.* агролесоводство
agrolandscape *n.* сельский пейзаж *(в ландшафтном дизайне)*
agronomics *n.* агрономия, *syn.* agronomy
agronomist *n.* агроном
agrotechnical *adj.* агротехнический; ~ level of tilling агротехнический уровень обработки почв
airborne *adj.* воздушно-капельный, переносимый по воздуху
air *n.* воздух; ~ circulation циркуляция воздуха
airtight *adj.* герметичный, воздухонепроницаемый
alder *n.* ольха; red ~ ольха красная *(Alnus rubra)*
alfalfa *n.* люцерна; ~ yellow spot вирус мозаики люцерны
algae *n.* водоросли
alkali *n.* щелочь, зола
alkalify *v.* подщелачивать
alkaline *adj. хим.* щелочной; ~ reaction щелочная реакция
alkalinity *n.* щелочность
allele *n. ген.* аллель
allelochemicals *n. экол.* аллелопатически активные вещества

allelopathy *n. биол.* аллелопатия *(подавление одного вида растений другим)*
allium *n. с.х.* лук
allow *v.* позволять, разрешать
alpine *adj.* альпийский; ~ meadow альпийское пастбище; альпийский луг; ~ garden альпийский садик; альпинарий
alter *v.* изменять; менять; видоизменять, вносить изменения, переделывать
alternaria n. альтернария, черная гниль; ~ stem canker альтернариозный рак стеблей
alternate *adj.* поочередный, (по)переменный, чередующийся; ~ row промежуточный ряд *(растений)*
altitude *n.* высота; отметка уровня; высота над уровнем моря; высокая местность
aluminum *n.* алюминий
ambient *n.* внешняя среда; *adj.* окружающий *(о среде)*
amelioration *n.* мелиорация; улучшение почв, *syn.* melioration, land reclamation; agronomic ~ *экол.* агромелиорация; агрономическая мелиорация; thermal ~ тепловая мелиорация
amend *v.* исправлять, совершенствовать, улучшать, *syn.* improve
amide *n. хим.* амид
ammonia *n.* аммиак; ~ nitrogen *хим.* аммиачный азот
ammonical *adj.* аммиачный
ammonium *n. хим.* аммоний; ~ nitrate аммиачная селитра
amount *n.* величина, количество; ~ of growth прирост
ample *adj.* обильный; большой; достаточный
anaerobic *adj. биол.* анаэробный
anchor *v.* закреплять, фиксировать, укореняться
androecium, *Pl.* androecia *n.* андроцей; совокупность тычинок
anemophilous *adj.* анемофильный, ветроопыляемый
aneuploidy *n. ген.* анеуплоидия *(увеличение или уменьшение числа хромосом, не кратное гаплоидному)*
angiosperms *n.* покрытосемянные; лиственные (листопадные) деревья
angular *adj.* угловой; угловатый; коленчатый; ~ lesions угловатые поражения
animal *n.* животное; зверь; *adj.* животный, относящийся к животному миру; животноводческий; ~ husbandry животноводство
annual *n.* однолетнее растение
anoxia *n.* аноксия *(отсутствие кислорода в тканях)*
anther *n.* пыльник; ~ scarring нитеобразное рубцевание; ~ tube тычиночная нить с пыльником
anthocyanin *n.* антоциан, растительный пигмент
anthracnose *n.* антракноз
anthropogenic *adj.* антропогенный, вызванный деятельностью человека, созданный человеком, обусловленный влиянием человека
anthropogenically *adv.* антропогенно; ~ degraded land антропогенно деградированная земля

apiary *n.* пчельник, пасека
apiculture *n.* пчеловодство
aphid *n.* тля; тли *(Aphidinea);* настоящие тли *(Aphididae)*
apomict *n. ген.* апомикт; obligate ~ облигатный апомикт; facultative ~ факультативный апомикт
apomictic *adj. биол.* апомиктический; апомиктичный
apomixis *n. биол.* апомиксис *(размножение бесполым путем)*
app *n.* дополнения, приложения; weather ~ приложения, отображающие погодные условия
application *n.* применение, внесение; commercial ~ *лес.* применение в промышленном масштабе; промышленное применение; применение в коммерческих целях
apply *v.* вносить *(удобрения);* применять
apricot *n.* абрикос
aquaculture *n.* аквакультура
aqueduct *n.* акведук, водопровод
aqueous *adj.* водный, водянистый, водяной; ~ solution водный раствор
arable *n.* пашня, пахотная земля; ~ land cultivation обработка пахотных земель
arboretum *n.* дендрарий; питомник; экол. лесной питомник; лесопитомник; арборет; дендрологический парк
arborvitae *n.* туя *(Thuja)*
architecture *n.* архитектура; landscape ~ садово-парковая архитектура; садово-парковый дизайн *(включает строения и насаждения);* декоративное садоводство; ландшафтная садовопарковая архитектура
area *n.* площадь, зона, район, область; barren ~ пустошь, неплодородный, тощий *(о земле);* ~ of risk farming зона рискованного земледелия
arid *adj.* засушливый, сухой, безводный
aridisol *n.* аридисоль *(почва)*
aridity *n.* засушливость, аридность
arm *n.* ветвь, отросток, вырост *(растения)*
arthropod *n. зоол.* представитель семейства членистоногих
artichoke *n.* артишок *(Cynara scolymus)*
artificial *adj.* искусственный, синтетический; ~ classification искусственная классификация, систематизация; ~ fertilizer (manure) минеральное удобрение; ~ lighting искусственное освещение *(светокультура);* ~ regeneration искусственное восстановление *(растительности);* искусственное лесовозобновление; ~ selectioin искусственный отбор; ~ soil искусственная почва
asexual *adj.* бесполый; вегетативный
ash *n.* зола; ясень; white ~ ясень белый, ясень американский
asparagus *n.* спаржа
aspen *n.* осина; trembling ~ тополь осинообразный *(Populus tremuloides)*
assess *v.* оценивать, давать оценку
assessment *n.* оценка, оценивание; comprehensive ~ полная комплексная оценка

assimilate *v.* поглощать, усваивать; *n.* ассимилят, фотосинтат, продукт фотосинтеза
associate *adj.* ассоциативный, сопутствующий *(вид);* ~ species сопутствующие породы; ubiquitous ~ вид, постоянно встречающийся в разных ценозах
association *n.* сообщество; plant ~ *биол.* растительное сообщество; растительная ассоциация; фитоценоз
aster *n.* астра
auxin *n.* ауксин *(гормон роста растений)*
available *adj.* доступный; усвояемый *(о питательных веществах)*
avoid *v.* избегать
axil *n.* пазуха *(листа)*
azalea *n.* азалия *(Azalea, Rhododendron)*

Bb
backcross *n. ген.* возвратное скрещивание, обратное скрещивание
bacterial *adj.* бактериальный; ~ canker бактериальный рак; ~ diseases бактериальные болезни; ~ speck бактериальная пятнистость; бактериальная точечность плодов томатов
bactericide *n.* бактерицид, бактерицидное вещество
bacterium *n.* (*pl.* bacteria) бактерия
bamboo *n.* бамбук; бамбуковые *(Bambuseae)*
bark *n.* кора (дерева); *v.* образовывать кору *(о дереве),* наращивать кору *(о дереве);* покрываться корой; сдирать кору; ~ roughness шероховатость, неровность коры; outer ~ корка *(наружный слой коры), бот.* перидерма; scaly ~ чешуйчатая кора, *syn.* flaking ~
barley *n.* ячмень
barn *n.* амбар, сенной сарай, гумно, хлев; ~ machinery сельхозяйственные машины
barnyard *n.* скотный двор; ~ manure навоз со скотного двора
barren *n.* пустырь, пустошь; песчаная равнина, покрытая кустарником; *adj.* бесплодный; неплодородный, тощий *(о земле);* бессемянный; не приносящий плодов, бесплодный
barrier *n.* барьер, преграда, препятствие; planting ~ ограждение в виде насаждений; snow ~ щит для задержания снега
base *n.* основание, нижняя часть *(растения)*
basic *adj.* основной, главный; ~ fertilizer основное удобрение
basin *n.* бассейн, резервуар, водоем; пруд; вдавленность *(у ножки или верхушки плода);* water-storage ~ водохранилище
basswood *n.* американская липа
batch *n.* группа; партия; серия; доза; ~ of eggs кладка яиц; ~ of roots кучно расположенные корни
bean *n.* боб, фасоль; ~ pod стручок; ~ seeds зерна фасоли; black ~ долихос обыкновенный, лобия египетская; broad ~ кормовые бобы *(Vicia faba);* common ~ фасоль обыкновенная *(Phaseolus vulgaris);* hyacinth ~ бобы ги-

ацинтовые *(Dolichos lablab);* kidney ~ фасоль обыкновенная*);* lima ~ фасоль лима *(Phaseolus limensis);* mung ~ маш, фасоль золотистая *(Phaseolus aureus);* pinto ~ фасоль пинто, runner ~ фасоль огненно-красная *(Phaseolus coccineus);* string ~ волокнистая фасоль
bear (bore, borne) *v.* производить, плодоносить, приносить *(плоды);* выносить, выдерживать, терпеть
bearing *n.* плодоношение; плоды, урожай
beard *n.* ость *(колоса)*
bed *n.* грядка, место семени в стручке; *v.* сажать, высаживать; nursery ~ рассадочная грядка; root ~ площадь питания корней
bedding-out *n.* высаживание, высадка в грунт
beech *n.* бук
bee-garden *n.* пчельник, пасека
bee-hive *n.* улей
bee-keeper *n.* пчеловод
beet *n.* свекла
beetle *n.* жук, жучок; blister ~s нарывники *(Meloidae);* Epilachna ~s род божьих коровок из подсемейства Epilachninae; flea ~s земляные блошки *(Halticinae),* мелкие листоеды *(Altica, Systena и др.);* ground ~ жужелица *(Carabus);* plum snout ~ слоник сливовый *(Rhynchites cupreus);* potato ~ колорадский жук
belt *n.* зона, район, полоса; land-protective ~ полезащитная полоса; wind ~ ветрозащитное насаждение
bench *n.* лабораторный стол; ~ test лабораторное испытание
berry *n.* ягода; мясистый плод
betacarotene *n.* бетакаротин
biennial *adj.* двулетник; двулетний; двухлетнее растение
bind (bound, bound) *v.* связывать
binder *n.* сноповязалка
biocycle *n.* биоцикл; жизненный цикл
biodegrade *v.* становиться биологически безопасным
biodiversity *n. биол.* биоразнообразие, биологическое разнообразие
biodynamic *adj.* биодинамический; ~ agriculture *с.х.* биодинамическое сельское хозяйство; ~ farming биодинамическое фермерское хозяйство
biogeocenosis *n. экол.* биогеоценоз
biological *adj.* биологический; ~ control биологическая борьба *(с вредителями)*
biomass *n.* биомасса, энергетическое сырье; ~ material *биотех.* материал биомассы; ~ supply *агрохим.* запас биомассы; ~ yield *биол.* выход биомассы; community ~ *лес.* биомасса всех видов сообщества *(на единице площади);* herbal ~ *с.х.* травяная биомасса; leafy ~ лиственная биомасса; loose ~ рыхлая биомасса; species ~ биомасса вида, биомасса особей одного вида; wood-based ~ древесная биомасса
biome *n.* биом; forested ~ лесной биом *(совокупность видов растений и животных);* terrestrial ~ наземный биом, живущий на земле или в земле

bioreactor *n.* биореактор, ферментер
biotic *adj.* биотический; ~ soil test биотическое испытание почвы; crop resistance to ~ and abiotic stresses устойчивость культур к биотическим и абиотическим факторам; ~ reproductive potential *ген.* биотический репродуктивный потенциал
birch *n.* береза; canoe ~ береза бумажная *(Betula papyrifera);* river ~ береза черная *(Betula nigra)*
birdbath *n.* ванночка; купальня для птиц; пруд для птиц
black *adj.* черный; ~ currant черная смородина; ~ frost заморозки при сухой погоде; ~ henbane *бот.* белена черная *(Hyoscyamus niger);* ~ rot черная гниль; ~ veins почерневшие жилки *(листа)*
blackberry *n.* ежевика
blade *n.* пластинка *(листа);* willowy ~ тонкая и гибкая листовая пластинка
blanching *n.* бланширование; обесцвечивание, этиолирование
blend *n.* смесь семян разных сортов трав; *v.* смешивать
blight *n.* гниль, заболевание растений *(увядание, гниение или прекращение роста);* black ~ of potatoes кольцевая пятнистость картофеля; early ~ бурая пятнистость пасленовых; late ~ of potato фитофтороз картофеля; phytophora ~ фитофтороз
blindness *n.* безверхушечность, без точки роста
blister *n.* пузырчатое заболевание растений *(возбудители – грибы Taphrina);* ~ rust *лес.* серянка сосны веймутовой и кедра сибирского *(возбудитель – гриб Cronartium ribicola),* ржавчинный рак *(пихты, сосны, кедра)*
blistered *n.* пузырчатый *(о листьях салата)*
block *n.* кубик; soil ~ почвенно-перегнойный кубик; paving ~ *ланд.* брусок *(для мощения)*
blood *n.* кровь; род; происхождение; сок *(плода, растения);* powdered ~ meal *с.х.* порошкообразная кровяная мука
bloom *n.* цвет, цветение; цветок; восковой налет *(на листьях или плодах);* пушок *(на плодах); v.* цвести; glaucous ~ *бот.* сизый налет
blossom *n.* цвет; *v.* цвести, распускаться, расцветать; ~ end носик *(на вершине)* у плодов томата; ~ end rot вершинная гниль; ~ season время цветения; cease/finish ~ing отцвести; full ~ стадия полного цветения; initial ~ начало цветения;
blotchy *n.* пятнистость; ~ ripening неравномерное созревание, сопровождаемое пятнистостью
body *n. биол.* тело; туловище; тельце; организм; ствол; стебель; большое количество; масса; water ~ *экол.* водоем; водный объект
bog *n.* болотистая почва; верховое болото; торфяник
bogging *n.* заболачивание
bok choy *n.* бок-чой; китайская листовая капуста
bole *n. лес.* ствол; штамб; пень; ~ area площадь поперечного сечения ствола *(дерева);* ~ form форма ствола; ~ height высота ствола *(до кроны);* ~ surface area площадь боковой поверхности ствола *(дерева);* clear ~ ствол без сучьев; top of ~ верхний конец бревна

boltering *n.* цветушность
borer *n.* сверлильщик, точильщик *(насекомое или животное, протачивающее ходы);* бур; grain ~ усач цветочный злаковый, усач тонкий *(Cacodacnus filum);* pine shoot ~ *лес.* листовертка хвойная рыжая
boron *n.* бор
botrytis *n.* ботритис *(серая гниль)*
bottom *n.* нижняя часть растения; at the ~ of the leaf на нижней поверхности листа, прикорневая часть розетки листьев *(у салата);* sea ~ морское дно; lake ~ озерное дно
bountiful *adj.* достаточный; обильный; благодатный; плодотворный; просторный
branch *n.* ветвь, ветка; *v.* ветвиться; lateral ~ боковая ветвь; secondary ~ ветвь второго порядка
branchy *adj.* разветвленный, ветвистый; раскидистый
brand *n.* торговая марка, бренд; *v.* маркировать; ~ed product маркированное изделие *(с фабричной или торговой маркой)*
Brassica *n.* род капусты
break (broke, broken) *v.* вспахивать, разрыхлять *(почву);* ~ down лопаться *(о почках),* распускаться *(о бутонах)*
breed (bred, bred) *v.* разводить, выводить
breeder *n.* селекционер
breeding *n.* селекция, улучшение породы или сорта; ~ industry *с.х.* промышленное разведение; combination ~ комбинационное разведение; mutation ~ мутационная селекция; varietal plant ~ сортовыведение
brick *n. ланд.* кирпич; ~ pool deck кирпичная обходная дорожка бассейна; fish-bone landscaping ~ ландшафтный кирпич для укладки «елочкой«; cobblestone ~ кирпичи из булыжного камня; landscape ~ кирпич для ландшафтного дизайна; porous ~ пористый кирпич
bridge *n. ген.* мост; chromosome ~ хромосомный мост
brittle *adj.* ломкий, хрупкий; крошащийся
Brix *n.* градус Брикс *(шкала Брикс используется в пищевой промышленности для измерения среднего количества сахара во фруктах, овощах)*
broadcast *n.* посев вразброс; *v.* производить посев вразброс
broccoli *n.* брокколи
Brussels sprouts *n.* капуста брюссельская
buckeye *n.* конский каштан; Ohio ~ *биол.* конский каштан голый *(Aesculus glabra)*
buckwheat *n.* гречиха
bud *n.* почка; *v.* давать почки; окулировать, прививать глазком; terminal ~ верхушечная почка; tomato big ~ столбур томата; болезнь большого бутона
budding *n.* окулировка, прививка глазком
budworm *n.* гусеница листовертки-почкоеда *(Choristoneura, Hedya и др. родов);* spruce ~ гусеница листовертки-почкоеда елового *(Archips fumiferana)*

buffer *n.* буфер, буферный раствор; *ген.* буферный ген; *экол.* защитная зона; *v.* создавать защитную зону; ~ strip буферная полоса, противоэрозионная полоса; *лес.* фильтрующая полоса; streamside ~ zone прибрежная буферная зона *(охранная зона вокруг заповедника)*
bug *n.* клоп; мелкое насекомое; мелкое членистоногое; assassin ~s клопы-хищнецы *(Reduviidae)*
bulb *n.* луковица *(цветка)*
bulky *adj.* большой, объемистый
bunch *n.* пучковая продукция
bur *n.* репейник
burdock *n.* лопух *(Arctium);* дурнишник *(Xanthium)*
burn *n. фтп.* ожог
burning *n.* выжигание, сжигание, огневая очистка, пал; *фтп.* ожог; broadcast ~ *лес.* сплошной пал, *пож.* контролируемое выжигание в лесной зоне; strip ~ *лес.* пуск пала полосами
burst *v.* внезапно появляться; прорастать; раскрываться; лопаться; растрескиваться
bury *v.* закладывать в почву, закапывать
bush *n.* куст, кустарник; *v.* густо разрастаться; ~ fruits ягоды
bushing *n.* закустаривание
bushlike *n.* кустовидный
butter head *n.* масляная голова *(тип салата)*
butterfly *n.* дневная бабочка, мотылек
butternut *n.* орех серый; древесина серого ореха; желто-коричневый цвет
by-product *n.* побочный продукт

Cc
cabbage *n.* капуста; ~ white butterfly капустница, белянка капустная; Chinese ~ пекинская капуста
cadaver *n.* труп
caked *adj.* затвердевший, слежавшийся *(о почве)*
calcareous *adj.* кальцифицированный, обызвествленный; известковый; ~ soil карбонатная почва
calcium *n.* кальций; ~ carbonate карбонат кальция; ~ nitrate азотнокислый кальций; нитрат кальция
caloricity *n.* калорийность; теплотворная способность
calyx *n.* чашечка *(цветка)*
cane *n.* лоза; стебли кустарников; сахарный тростник; fruiting ~ плодоносящий побег
canker *n.* язва; рак растений; некроз плодовых деревьев; *v.* разъедать; заражать, губить; разлагать; пожирать
canning *n.* консервирование
canopy *n.* растительный покров, облиственность; древесный полог; ~ coverage укрытие из полога *(навеса);* overstory ~ *лес.* листовой полог

capability *n.* способность; ~ of root penetration проникающая способность корней
capacity *n.* емкость, мощность, производительность; infiltration ~ *лес.* водопроницаемость, *почв.* впитывающая способность, *экол.* инфильтрационная способность; water-absorbing ~ водопоглащающая способность *(почвы);* water-holding ~ водоудерживающая способность *(почвы)*
capture *n.* поимка; отлов; добыча; сбор; rainfall ~ сбор дождевой воды
carbohydrate *n.* углевод; ~ metabolism углеводный обмен
carbon *n.* углерод; ~ dioxide *(CO2)* двуокись углерода, углекислый газ; ~ sink приемник углерода, колодец, поглощающий углерод; ~ storage хранение, накопление углерода
carrot *n.* морковь
cash *n.* наличные деньги, наличный расчет; ~ crop товарная культура, товарная часть урожая; сельскохозяйственная продукция, предназначенная на продажу за наличные
cassava *n.* маниока
caterpillar *n.* гусеница
cation *n.* катион; ~ exchange катионный обмен, катионообмен; ~ exchange capacity катионообменная способность почвы
cattle *n.* крупный рогатый скот
cauliflower *n.* цветная капуста
casuarina *(лат. Casuarina equisetifolia) n. бот.* казуарина хвощевидная, *syn.* Australian pine tree
cause *n.* причина; *v.* причинять; вызывать; ~-and-effect причинно-следственный
cavity *n.* полость, впадина; ~ spot *агрохим.* вдавленная пятнистость *(болезнь кальциевой недостаточности моркови)*
CD test (Controlled deterioration test) *n.* тест контролируемого ухудшения
celery *n.* сельдерей
cell *n.* клетка; ~ wall оболочка клетки, клеточная оболочка; клеточная стенка; founder ~ стволовая клетка
cellulose *n.* клетчатка, целлюлоза
cereal *n.* зерновые культуры, злаки, хлебный злак
certification *n.* сертификация; organic ~ сертификация продукции в качестве органической
chaff *n.* измельченная солома
chaining *n.* сцепление; цепь; цепочка; tuber ~ *с.х.* прекращение роста клубней картофеля
chalking *n.* известкование
Chantenay type *n.* тип шантане *(у моркови)*
character *n.* признак; особенность; свойство; характер; качество; природа; genetic ~ *ген.* наследственный признак; генетический признак
check *n.* контроль, проверка; *v.* контролировать, проверять; *adj.* контрольный, проверочный; ~ yield урожай с контрольной делянки

chemical *n.* химикат; *adj.* химический; ~ treatment химическая обработка; growth-regulating ~ регулятор роста; pest control ~ химикат для борьбы с вредителями; petroleum-based ~ химикат на нефтяной основе; soil-aggregating ~ структурообразующий химикат
chemicalization *n.* химизация, внедрение химикатов
chemist *n.* химик; agricultural ~ агрохимик, агроном по удобрениям; cereal ~ специалист по химии зерна; soil ~ химик-почвовед
chernozem *n.* чернозем, черноземная почва; black ~ высокогумусный чернозем; common (ordinary) ~ обыкновенный (средний) чернозем; steppe ~ чернозем степи
cherry *n.* вишня; слива; черемуха обыкновенная; black ~ черемуха поздняя
chicken *n.* цыпленок; курица; курятина, куриное мясо; *adj.* птицеводческий, куриный *(относящийся к курам и их разведению);* ~ farm птицеводческая ферма; ~ manure куриный помет; ~ coop курятник
chime *n.* колокольный звон; wind ~ *ланд.* музыка ветра, «Китайские колокольчики«
chinquapin *n.* карликовое каштановое дерево, каштан низкорослый
chive *n.* лук-скорода, шнитт-лук *(Allium schoenoprasum);* лук сибирский *(Allium sibiricum)*
chlorine *n.* хлор
chlorophyll *n.* хлорофилл
chlorosis *n.* хлороз *(заболевание растений, проявляющееся в появлении желтоватой окраски листьев)*
chlorotic *adj.* хлоротический, хлоротичный, хлорозный; ~ lesions хлоротичные поражения;
~ foliage хлоротичность листьев
cholesterol n. холестерин
circular *adj.* круглый, округлый; ~ chromosome кольцевая хромосома
clay *n.* глина; ~ loam жирный, тяжелый, иловатый суглинок; ~ soil глинистая почва, глинистый грунт
clayey *adj.* глинистый; глиноносный; содержащий глину; ~ soil суглинок, глинистая почва
clear-cut *v.* производить сплошную вырубку
clearing *n.* расчистка
clematis *n. бот.* ломонос *(Clematis)*
climate *n.* климат; ~ control система кондиционирования воздуха, контроль температурного режима; damp/humid/moist/wet ~ влажный климат; frigid ~ холодный климат; harsh ~ суровый климат; moderate ~ умеренный климат
clip *n.* зажим
clippers *n.* ножницы; кусачки; секатор
clipping *n.* скашивание, косьба, подкос; обрезка *(напр. деревьев);* lawn ~s *почв.* скошенная на газоне трава
cloche *n.* колпак из стекла или пластика для защиты растений
cloddy *adj.* комковатый, глыбистый *(о почве)*

clogging *n.* закупорка, засорение *(капельниц в теплице)*
clone *n.* клон; *v.* клонировать; размножаться вегетативным или клеточным путем
clover *n.* клевер; crimson ~ клевер мясо-красный *(Trifolium incarnatum)*
clubroot *n.* кила крестоцветных *(возбудитель Plasmodiophora brassicae)*
cluster *n.* кисть *(томата)*
coarse *adj.* крупный *(о семенах);* крупнокомковатый *(о почве);* ~ sand грубозернистый песок, крупнозернистый песок
coat *v.* покрывать слоем *(чего-л.)*
cob *n.* стержень початка кукурузы; початок кукурузы; крупный орех; лещина; фундук
coco *n.* кокосовая пальма; кокос; *adj.* кокосовый; ~ peat кокосовый торф
code *n. ген.* код; genetic ~ генетический код
cold-resistant *adj.* холодостойкий
collar *n.* воротничок; шейка; root ~ корневая шейка
collard *n. бот*. браунколь; капуста кормовая; капуста листовая
colour *n.* цвет; оттенок; flesh ~ цвет мякоти; skin ~ окраска кожуры плода
combine *n.* комбайн; *v.* убирать комбайном
commercial *adj.* коммерческий; ~ variety коммерческий сорт
common *adj.* общепринятый, распространенный; ~ name общепринятое *(в отличие от научного)* название растения, животного; ~ lineage общее происхождение, родословная; ~ practice распространенная практика
commodity *n.* продукт; товар; предмет потребления
compact *adj.* плотный; компактный; *v.* уплотнять *(почву);* ~ soil связная почва
compete *v.* соревноваться, конкурировать
competition *n.* конкуренция, борьба за существование; forest ~ конкуренция в лесах смешанного типа; under ~ в условиях конкуренции
competitive *adj.* конкурентный; ~ ability конкурентоспособность
complementarity *n.* комплементарность *(в молекулярной биологии); Pl.* – ties, biological ~ биологическая взаимодополняемость
composition *n.* состав; структура
compost *n.* компост; компостировать; приготовлять компост; earth-peat ~ торфоземляной компост; propagation ~ компост для рассады
compound *n.* состав; смесь, соединение; *v.* смешивать; *adj.* сложный, составной; ~ mineral fertilizer сложное минеральное удобрение
complete *adj.* полный, законченный; *v.* заканчивать, завершать
concentrate *n.* концентрат, обогащенный продукт; *v.* концентрировать, выпаривать
concrete *n.* бетон
condensation *n.* конденсация
condition *n.* условие; состояние, кондиция; adverse ~s неблагоприятные условия; environmental ~s условия окружающей среды; extreme ~s экстремальные условия; favourable ~s благоприятные условия; habitat ~ s условия

местообитания, среды; hot ~s условия высоких температур; humid ~s условия повышенной влажности; light ~s освещенность; living ~s условия существования; normal ~s обычные условия; under ~ в условиях
conductivity *n.* проводимость; ~ factor коэффициент проводимости
cone *n.* шишка; колосок
confusant *n.* приводящий в беспорядок; сбивающий с толку; путающий
conifer *n.* хвойное дерево
coniferous *adj.* хвойный
connect *v.* соединять(ся), связывать(ся)
connective *n.* связник; *adj.* связующий, соединительный
conserve *v.* сохранять, сберегать; консервировать
conservation *n.* охрана природы, рациональное природопользование, рациональное использование природных ресурсов; soil ~ охрана и правильное использование почв
conservationist *n. экол.* специалист по охране и рациональному использованию природных ресурсов
consistency *n.* последовательность, связность; устойчивость; прочность; консистенция; степень плотности; густота
constant *adj.* неизменный, устойчивый, константный; *syn.* invariable, permanent, continual; ~ results неизменные, устойчивые результаты
constituent *n.* составная часть, компонент
constitution *n.* структура, строение; chemical ~ химический состав
constraint *n.* ограничение, ограничивающее условие; environmental ~s ограничения, накладываемые окружающими условиями
contain *v.* содержать
contaminant *n.* загрязнитель, загрязняющее вещество
contaminate *v.* загрязнять, заражать, портить
contaminated *adj.* зараженный, загрязненный; ~ ground/area участок, зона заражения
contamination *n.* примесь, загрязнение, порча, заражение; порча, разложение; microbial ~ бактериальное обсеменение
content *n.* содержание *(чего-л. в чем-л.);* объем, вместимость; содержимое, доля, процент, *syn.* proportion; fat ~ жирность; nitrogen ~ содержание азота; oil ~ масличность; sugar ~ сахаристость; water ~ влажность
continuous *adj.* непрерывный; постоянный; ~ growth непрерывный рост; ~ production непрерывное производство *(плодоношение)*
control *n.* борьба *(с насекомыми, болезнями); v.* бороться, контролировать; подавлять; soil pollution ~ *экол.* контроль загрязнения почвы
conventional *adj.* обычный; общепринятый; традиционный; обусловленный; стандартный; устоявшийся
cooling *n.* охлаждение
copper *n.* медь; *зоол.* червонец
copra *n.* копра, мякоть кокосового ореха *(источник кокосового масла), syn.* coconut meat

cork *n. бот.* вторичная кора, вторичный луб; пробка; кора пробкового дерева
corky *adj.* пробковый; ~ root опробковение корней
corn *n.* зерно; кукуруза, маис; ~ drill зерновая сеялка; ~ fodder зерновой фураж
cornstalk *n.* стебель кукурузы
corny *adj.* зерновой, хлебный; хлеборобный
corolla *n. бот.* венчик
correlation *n.* корреляция, связь, соотношение, зависимость
correlative *adj.* коррелятивный, соответствующий, сходный
corrupt *v.* портиться, гнить, разлагаться; *adj.* гнилой, порченный
corruptible *adj.* способный портиться, портящийся
corruption *n.* порча, гниение, разложение
cotton *n.* хлопок
cotyledon *n.* семядоля, *syn.* seed leaf
couch *n.* трава или сорняк с ползучими быстро размножающимися корневищами; white ~ пырей ползучий
couching *n.* выпалывание *(сорняков)*
country *n.* страна, сельская местность; *adj.* сельский; ~ of origin страна происхождения *(напр. сорта);* grain-exporting ~ страна-экспортѐр зерна; one-crop ~ страна монокультуры
countryside *n.* сельская местность
cover *n.* растительный покров; *v.* укрывать, запахивать, заделывать *(семена),* окучивать; ~ crop покровная культура, *агрохим.* подпокровная культура, *с.х.* запашная культура, *экол.* защитное насаждение; покровное насаждение; посевы трав; растительный покров; good foliage ~ хорошая облиственность, растение с превосходной листвой и покрытием плода
covert *n.* убежище, логовище
cow *n.* корова
cowpea *n.* вигна *(Vigna)*
cowshed *n.* коровник, хлев
crack *n.* трещина; growth ~s трещины, образующиеся в период роста; radial ~s радиальные трещины
cracking *n.* растрескивание, трещина; micro ~ микротрещины
cradle *n.* накопитель, оборудование для сбора урожая
crate *n.* деревянный ящик; тара для упаковки *(клеть, корзина)*
create *v.* создавать, творить, сформировать
cricket *n.* сверчок; прямокрылые насекомые с укороченными надкрыльями или бескрылые
crispy *adj.* хрустящий
critter *n. Am. E.* живое существо
crooked *adj.* кривой, изогнутый, искривленный; ~ fruits искривленные плоды
crop *n.* с.-х. культура; урожай, хлеб на корню; *v.* возделывать с.-х. культуру; собирать урожай; сажать, сеять, засеивать; bad ~ неурожай; cultivated ~ пропашная культура; возделываемая культура; cash ~ товарная культура; с.-х. зерновая культура, выращенная на продажу; *экон.* товарная часть урожая;

сельскохозяйственная продукция, предназначенная на продажу за наличные; companion ~ культура-уплотнитель; сопутствующая культура; crucifer ~ крестоцветная культура; industrial ~ техническая культура; pest-deterring ~ культура, отпугивающая вредителей и паразитов; preceding ~ предшествующая культура, предшественник; ~s under glass тепличные и парниковые культуры; ~ production растениеводство, выращивание с.-х. культур; ~ season вегетационный период; ~ping system система земледелия, система полеводства; ~ tree маячное дерево

crop-harvesting *n.* уборка урожая

crop-livestock integration *n.* организация комплексного полеводства-животноводства

crop-rotation *n.* севооборот; чередование культур; by-farm ~ прифермский кормовой севооборот; continuous ~ длительный севооборот; ~ experiment опыт в севообороте; field ~ полевой плодосмен; free ~ вольный севооборот; grazing ~ пастбищный севооборот; hay-pasture ~ луговой / лугопастбищный севооборот; multiple ~ многопольный севооборот; ~ farming плодосменное земледелие

cross *n. ген.* гибрид, помесь; *v.* скрещивание; скрещивать; *adj.* перекрестное; ~ fertilization перекрестное оплодотворение; ~ pollination перекрестное опыление; multiple ~ множественное скрещивание; natural ~ естественное скрещивание; reciprocal ~ возвратное скрещивание, реципрокное скрещивание

cross-bred *adj.* гибридный

cross-breed *n.* гибрид

cross-breeding *n.* скрещивание

cross-parent *n.* родитель при скрещивании

cross-pollinated *adj.* перекрестноопыляющийся

cross-pollinator *n. бот.* перекрестноопылитель

crown *n.* ботва, верхушка растений; ~ class *лес.* класс доминирующих деревьев *(образующих полог леса);* codominant ~ class *лес.* класс содоминирующих деревьев *(уступающих в развитии доминантам)*

cruciferous *adj. бот.* крестоцветный; ~ weeds крестоцветные сорные растения

crumbly *adj.* крошащийся, рассыпчатый, хрупкий, ломкий, рыхлый

crux *n.* главный вопрос, основная проблема

cucumber *n.* огурец; ~ mosaic virus вирус мозаики огурца; chayote ~ чайот съедобный или мексиканский огурец

cucurbit *n. бот.* тыква

cultivar *n.* культивар, сорт *(культурного растения)*

cultivate *v.* обрабатывать, возделывать, культивировать, выращивать

cultivated *adj.* культурный *(о растении);* возделываемый *(о земле);* ~ plant культурное растение

cultivation *n.* обработка; культивация; выращивание; возделывание *(земли);* рыхление *(почвы);* культивирование; разведение *(растений);* выращивание сортов *(с.-х. культур);* улучшение сортов *(с.-х. культур);* bring under ~

вводить в культуру; long-continued ~ многолетнее использование *(почвы);* pre-emergence ~ довсходовая культивация; primary ~ первичная обработка; regular ~ постоянная обработка *(в севообороте);* preplanting ~ предпосадочная / предпосевная обработка
culture *n.* с.-х. культура; культивирование, выращивание (растений); возделывание (почвы), *syn.* crop; *v.* возделывать с.-х. культуру
cultural *adj. с.х.* обрабатываемый, искусственно выращиваемый; ~ practice агротехнический прием, метод; ~ variety культурный сорт *(растения)*
curative *adj.* лечебный; целебный, целительный
curd *n.* головка *(соцветие)* цветной брокколи
curl *v.* закручиваться; ~ upwards закручиваться вверх; ~ downwards закручиваться вниз
currant *n.* смородина
cut *n.* надрез, срез; *v.* **(cut, cut)** резать, косить, жать, убирать урожай
cutting *n.* отросток, отводок, черенок; ~ machine резальная машина; clear ~ *лес.* вырубка; сплошная лесосечная рубка; сплошнолесосечная рубка; отборные пиломатериалы
cyanic *adj. хим.* циановый; ~ acid циановая кислота
cycle *n.* период, цикл, круговорот
cylindrical *adj.* цилиндрический
cypress *n.* кипарис
cysteine *n. биохим.* цистеин
cytokinin *n.* цитокинин *(гормон роста)*

Dd
daffodil *n.* нарцисс ложный *(Narcissus pseudonarcissus)*
dam *n.* плотина; high ferroconcrete ~ высокая железобетонная плотина
damage *n.* вред, повреждение, *v.* повреждать, приносить ущерб; hail ~ повреждение градом
damping-off *n.с.х.* вымокание *(гибель сеянцев, саженцев от избыточного увлажнения); фтп.* выпревание; черная ножка
dangerous *adj.* опасный, рискованный
dank *adj.* буйнорастущий *(о травах)*
daylight *n.* дневной свет; естественное освещение
dead *adj.* увядший, засохший; *pl. n.* растительные остатки; ~ plant part отмершая часть растения
debris *n.* растительные остатки; crop ~ послеуборочные остатки
decay *n.* гниль; гниение, разложение; *v.* засыхать, увядать, гнить, разлагаться *(об органических веществах)*
deciduous *adj.* опадающий *(о листьях),* теряющий на зиму листву, лиственный, листопадный *(о деревьях)*
decipher *v.* декодировать, раскодировать, расшифровывать; ~ DNA's structure *ген.* расшифровать структуру молекулы ДНК
decompose *v.* разлагать(ся), растворять; гнить, портиться

decomposition *n.* разложение, разложение; гниение, распад; разрушение; bacterial ~ разложение под воздействием бактерий; ~ course процесс разложения
decontamination *n.* деконтаминация; дезактивация; очистка; обеззараживание
decorative *adj.* декоративный, *syn*. ornamental
deep *adj.* глубокий; ~ rooted с глубокой корневой системой
defence *n.* защита; ~ mechanism защитный механизм
deficiency *n.* дефицит, недостаток, недостаточность, голодание
deflation *n.* выветривание породы; выдувание; ветровая эрозия
defoliation *n.* дефолиация *(удаление листьев);* опадение листьев; сброс листвы; листопад
defoliator *n.* средство, уничтожающее растительность, дефолиатор; насекомое, уничтожающее растительность; *техн.* машина для удаления ботвы
deforest *v.* вырубить леса, обезлесить
deforestation *n.* вырубка леса
deformed *adj.* деформированный; ~ fruits плоды неправильной формы *(уродливые)*
degradation *n.* деградация, ухудшение, вырождение, разрушение, расщепление, распад; soil ~ *экол.* падение плодородия почвы; деградация почвы; деградация структуры почвы
dehydration *n.* обезвоживание; preservation by ~ консервирование обезвоживанием
dehydrator *n.* сушилка, установка для обезвоживания
delay *v.* замедлить, задержать
delayed *adj.* замедленный; запаздывающий; ~ flowering запаздывание цветения
delivery *n.* транспортировка; доставка; поставка
delouse *v.* дезинсектировать; уничтожать насекомых; избавлять от вшей
delta-carotene *n.* дельта-каротин
demo *n.* демонстрационный образец; ~ field демонстрационное поле
dendrology *n.* дендрология *(раздел ботаники, изучающий древесные растения)*
dense *adj.* плотный, густой; сомкнутый; дремучий; ~ *биол.* internal structure плотная внутренняя структура *(плода);* ~ soil consistency *почв.* компактное сложение почвы в любом состоянии
density *n.* густота, плотность *(травостоя, посева);* концентрация; ~ of trees плотность, густота деревьев
depletion *n.* опустошение; истощение; ~ of nutrients потеря *(вымывание, вынос)* питательных веществ из почвы
deposit *n.* отстой, осадок, нанос, отложение, налет; *v.* давать осадок
depth *n.* глубина, толща, толщина; мощность *(почвы);* ~ of soil толщина плодоносного слоя почвы
descent *n.* происхождение; родословная; снижение; понижение; evolutionary ~ эволюционное происхождение

description *n.* описание; ~ of plant cover описание растительного покрова; initial ~ первоначальное описание
desert *n.* пустыня; *adj.* пустынный; arctic ~ арктическая пустыня
desertification *n. экол.* опустынивание; превращение в пустыню; дезертификация
design *n.* дизайн; landscape ~ ландшафтное проектирование; ландшафтный дизайн; проект ландшафтного стиля планировки (сада); проект пейзажного стиля планировки (сада); планировка ландшафта; проектирование ландшафта
desirable *adj.* желательный
desorption *n.* десорбция; field ~ полевая десорбция
destroy *v.* уничтожать; ~ emerging weeds уничтожить прорастающие сорняки
destruction *n.* разрушение, уничтожение
detection *n.* выявление, обнаружение, открытие; регистрация
deterioration *n.* ухудшение; порча
determinate *adj.* определенный, точно установленный; ограниченный, имеющий предел; детерминантный; ~ development *биол.* детерминированное развитие; ~ inflorescence *биол.* верхоцветное соцветие; ~ growth *лес.* ограничиваемый рост; ~ tomato varieties *с.х.* детерминантные сорта томата
determine *v.* определять, устанавливать
deterrent *n.* отпугивающее средство; pest ~ средство от вредителей и паразитов
detritus *n.* детрит *(кашицеобразный продукт распада тканей)*
devastate *v.* опустошать
develop *v.* развивать(ся), совершенствовать; создавать; выводить *(сорт, породу),* разрабатывать
development *n.* создание *(сорта);* окультуривание *(о почве),* мелиорация; disease ~ развитие болезни; leaf ~ рост листьев; little ~ незначительное развитие; rapid ~ быстрое развитие; root ~ развитие корневой системы; vegetative ~ вытягивание
deviation *n.* отклонение *(от нормы);* light ~ незначительное отклонение; sharp ~ резкое отклонение
dew *n.* роса; *v.* орошать, увлажнять
dewfall *n.* выпадение росы
diagnostic *adj.* диагностический, отличительный; ~ feature признак, по которому диагностируют
dibble *n. с.х.* ямкоделатель, сажальный кол; *v.* сажать под кол, делать ямки в земле
differentiate *v.* различать(ся), отличать(ся), видоизменять(ся)
dig (dug, dug) *v.* копать
digestible *adj.* переваримый, усвояемый
digestion *n.* перегнивание, компостирование, усвоение
dike *n.* сточная канава, ров, *syn.* ditch
dill *n.* укроп огородный *(Anethum graveolens)*

dilute *v.* разбавлять, разводить; разбавленный, разведенный; ~(d) solution разбавленный раствор
dioxide *n. хим.* двуокись; nitrogen ~ диоксид азота
direct *adj.* прямой; ~ sun radiation прямые солнечные лучи
disaster *n.* бедствие, катастрофа; natural ~ стихийное бедствие
disastrous *adj.* разрушительный; ~ effects катастрофические последствия
discards *n.* брак; забракованная продукция; отходы
discoloration *n.* изменение цвета или окраски; обесцвечивание, выцветание, пятно
disease *n.* болезнь; ~ -producing organism (*syn.* pathogen) возбудитель болезни *(патоген);* early in ~ development на ранней стадии развития заболевания; ~ control меры борьбы с болезнью; have ~ package иметь комплексную устойчивость к заболеваниям; potato blackleg ~ черная ножка картофеля
disinfectant *n.* протравитель семян
disinfected *adj.* дезинфицированный
disk *n.* дисковое орудие; *v.* дисковать *(почву);* ~ harrow дисковая борона
disorder *n.* расстройство, нарушение
disperse *v.* рассеивать, разбрасывать, распространять
dispose ***v.*** помещать, размещать, располагать, распределять, расставлять
disrupt *adj.* разорванный *(на части);* разрушенный, нарушенный
dissolve *v.* растворять(ся)
dissolved *adj.* растворенный
distal *adj.* дистальный
distribution *n.* разбрасывание *(семян);* внесение *(удобрений, ядохимикатов);* распространение; ~ channel *экон.* торговая сеть
distributor *n.* разбрасывающее устройство
ditch *n.* канава; ров; траншея; lined ~ облицованный канал
diurnal *adj.* дневной, открывающийся только днем; деятельный только днем
diversity *n.* разнообразие, многообразие; разновидность
division *n.* тип (растений); *ген.* деление; cell ~ деление клетки
DNA (deoxyribonucleic acid) *n.* ДНК, дезоксирибонуклеиновая кислота; ~ chimera химерная ДНК; ~ construct ДНК-конструкция; ~ fragment фрагмент ДНК; ~ sequence последовательность ДНК
do (did, done) well (better, best) *v.* произрастать; хорошо расти *(лучше, лучше всего)*
dock *n.* щавель *(Rumex)*
dodder *n.* повилика *(Cuscuta)*
dolomite *n. ланд.* доломит
dome *n.* купол; ~ shaped куполообразной формы
domestic *adj.* внутренний; отечественный, находящийся в пределах страны; ~ plant культурное растение
domesticate *v. с.х.* окультуривать *(растения)*
dominant *n.* доминант; массовый вид, преобладающая, доминирующая форма; ~ genotype *раст.* доминирующий генотип; ~ species *ген.* доминантные

виды; ~ stand господствующее насаждение; ~ tree господствующее дерево; маячное дерево *(господствующее над общим уровнем леса);* co- ~ tree *лес.* согосподствующее дерево
dominate *v.* преобладать, доминировать
dormant *adj.* дремлющий, спящий, бездействующий
dormancy *n.* покой *(семян, растений),* состояние покоя, спячка
dosage *n.* дозирование, дозировка; норма; доза
double *adj.* двойной; махровый *(о цветке);* ~ fertilization двойное оплодотворение
downy *adj. бот.* опушенный; ~ mildew ложная мучнистая роса *(возбудители – грибы Peronosporales), syn.* false mildew
drag *n.* борона; бороновать, боронить
dragonfly *n.* стрекоза
drain *n.* осушитель, дренажная труба; *v.* дренировать, осушать *(почву);* ~ wall водосборный колодец; tile ~ керамическая дрена; vertical ~ вертикальная дрена; скважина вертикального дренажа
drainage *n.* дренаж, дренирование, осушение; дренажная система, сток, дренажная канава; ~ capacity дренирующая способность; ~ water дренажная вода; plastic pipe ~ system дренажная система из пластиковых труб; soil ~ дренаж почвы
drained *adj.* дренированный; осушенный; высохший
draw *n.* молодой побег
drawn *adj.* вытянувшийся, истонченный *(о всходах, о рассаде)*
dredging *n.* драгирование; подводная выемка грунта, землечерпательные работы; дноуглубительные работы; грунт, вынутый драгой
dress *v.* обрабатывать *(землю);* удобрять навозом *(почву);* подкармливать *(растения);* протравливать *(семена);* сортировать
dressing *n.* удобрение, навоз; протравливание *(семян);* сортировка; подкормка *(растений),* внесение удобрений; broadcast ~ разбросное внесение удобрений; side ~ междурядная подкормка; soil ~ корневая подкормка; top ~ поверхностная подкормка
drill *n.* высевающий аппарат; сеялка; борозда, рядок; ~ row ряд посева; *v.* высевать, сеять, вносить удобрения в рядки; seed-cum-ferti ~ зернотуковая сеялка
drilling *n.* рядковый посев, рядковое внесение удобрений; посев рядовой сеялкой
drip *n. Br. E.* капельница; ~ irrigation капельный полив
driveway *n. ланд.* дорога, проезд, путь; подъездная дорожка; masonry ~ каменная подъездная дорожка
drooping *adj.* повислый, пониклый
drop *n.* осыпание, опадение *(цветков, завязей, плодов);* падалица
droplet *n.* капелька
drought *n.* засуха, сушь; prolonged ~ продолжительная засуха
drought-induced *adj.* вызванный засухой

drought-resistant *adj.* засухоустойчивый
droughty *adj.* засушливый, сухой, безводный
dry *adj.* сухой; *v.* высыхать, вянуть; ~ farming n. богарное земледелие; ~ fodder сухой корм; сено; ~ matter сухое вещество; ~ rot сухая гниль; ~ weight вес в сухом состоянии, сухой вес
dryer *n.* сушильный аппарат; drum ~ барабанная сушилка; spray ~ распылительная сушилка
dryness *n.* сухость; *лес.* содержание сухого вещества; ~ index *лес.* показатель засушливости
due *adj.* обусловленный, должный, соответствующий, надлежащий
due to *prep.* из-за, вследствие, благодаря; *v.* обуславливается, объясняться
dung *n.* помет; навоз; компост; органическое удобрение; *v.* удобрять навозом; унаваживать
dunged *adj.* удобренный навозом
dunging *n.* внесение навоза, применение органических удобрений
duration *n.* длительность, продолжительность; вегетационный период
dust *n.* вещество в пылеобразном состоянии; дуст, пылевидный препарат; *Br. E.* с.-х. отходы, с.-х. опилки; *v.* опыливать; *adj.* порошковидный; blossom ~ пыльца; fungicidal ~ фунгицидный дуст, пылевидный фунгицид; insecticidal ~ инсектицидный дуст; ~ storm пыльная буря
dusting *n.* опыление *(напр. инсектицидами)*
dwarf *n.* карликовое растение; *v.* мешать росту, останавливать развитие; ~ shoot карликовый, миниатюрный, малорослый побег
dwarfish *adj.* карликовый, низкорослый, недоразвитый
dysgenic *adj.* дисгенический *(ведущий к ухудшению наследственных признаков);* вырождающийся; способствующий вырождению

Ee

ear *n.* колос; початок *(у кукурузы); v.* колоситься; ~-bed рассадочная грядка с семенами, взятыми с одного и того же початка
earing *n.* колошение, выколашивание
earliness *n.* раннеспелость, скороспелость; способность быстро прорастать
early *adj.* ранний, раннего срока созревания; раннеспелый, скороспелый; ~ variety сорт раннего срока созревания
earth *n.* земля, почва
earth up *v.* окучивать, обкладывать землей
earwig *n. зоол.* уховертка
easily *adv.* легко; ~ worked легко обрабатываемый
easy to-root *adj.* легко укореняющийся
earthworm *n.* дождевой червь
ecosystem *n. биол.* экосистема, экологическая система; биогеоценоз
edaphology *n.* почвоведение; *syn.* soil science
edible *adj.* съедобный, годный в пищу
edge *n.* край; ~ stone *ланд.* бордюрный камень; forest ~ *лес.* опушка леса

effect *n.* следствие; действие, влияние, воздействие; *v.* осуществлять *(действие, влияние, воздействие)*
efficient *adj.* действенный, эффективный; *syn.* efficacious, effectual
eggplant *n.* баклажан; *syn.* aubergine, guinea squash
eleagnus anguistifolia *лат.* лох узколистный, *syn.* Russian olive
eliminate *v.* исключать, уничтожать, ликвидировать
elimination *n.* устранение, удаление, элиминация
elevated *adj.* приподнятый, надземный *(о растениях);* ~ level повышенный уровень
elevation *n. ланд.* поднятие, возвышение; высота
elm *n.* вяз, ильм, берест, карагач; American ~ ильм американский, ильм белый *(Ulmus americanus)*
elongated *adj.* удлиненный
elongation *n.* удлинение, вытягивание, растяжение; рост в длину; *биохим.* элонгация; ~ of internode удлинение междоузлия; ~ of spikes удлинение колосьев; stem ~ выход в трубку *(у злаков)*
emasculate *v.* кастрировать, делать вялым, бесцветным; обессилить; ослабить, *syn.* castrate
embellishment *n.* украшение; декорирование, *syn.* decoration, ornamentation
embryo *n.* эмбрион, зародыш; abortive ~ абортивный зародыш, недоразвитый зародыш; adventive ~ адвентивный зародыш, придаточный зародыш; animalized ~ анимализованный зародыш; mature ~ зрелый зародыш, сформировавшийся зародыш; multicellular ~ многоклеточный зародыш; vegetalized ~ вегетализованный зародыш
emerge *v.* появляться, возникать
emergence *n.* появление, возникновение; всходы; ~ of seedlings прорастание; появление всходов, *syn.* seedling ~; ear ~ колошение; root ~ проклевывание корешка
emitter *n.* капельница, капельный выпуск воды; ~ lateral поливной трубопровод системы капельного орошения; self-draining ~ самопромывающаяся капельница, *syn.* self-flushing dripper
emission *n.* выделение; эмиссия, испускание, излучение; распространение; выброс; greenhouse gas ~ *экол.* выбросы парникового газа; regulated ~ регулируемый выброс
employ *v.* употреблять, применять, использовать
end *n.* конец; ~ product конечный *(промышленный)* продукт, готовый продукт *(производства, переработки)*
endemic *n.* эндемик; *adj.* эндемический
endosperm *n.* эндосперм; cellular ~ клеточный эндосперм; nuclear ~ ядерный эндосперм; ruminate ~ руминированный эндосперм
endurance *n.* выносливость, сопротивляемость; ~ limits пределы выносливости
endure *v.* переносить, выдерживать, противостоять
enduring *adj.* выносливый, стойкий *(о растениях)*

energy *n.* энергия; absorbed energy поглощенная энергия; ~ screen энергосберегающее покрытие; тепловой занавес в теплице; fermentation ~ энергия брожения; germinative ~ энергия прорастания; Gibbs free ~ свободная энергия Гиббса; internal ~ внутренняя энергия; metabolizable ~ обменная энергия, метаболическая энергия; nitrogen-corrected metabolizable ~ обменная энергия, скорректированная по азоту; potential ~ потенциальная энергия; productive ~ продуктивная энергия; solar ~ солнечная энергия
enhance *v.* увеличивать, усиливать
enrich *v.* обогащать, улучшать; ~ soil удобрять почву
ensilage *n.* силосование; силосованный корм, силос; *v.* силосовать; *syn.* ensile, silo *v.*
ensure *v.* обеспечивать
entomophage *n.* энтомофаг, насекомоядное животное
environment *n.* окружающая среда
environmentally *adv.* с точки зрения окружающей среды; экологически; ~ aware *экол.* природосберегающий; ~ destructive *экол.* вредный для окружающей среды
enzyme *n.* фермент, энзим; *syn.* ferment
epicormic *adj.* развивающийся из спящей почки; ~ branch водяной побег; побег, развившийся из спящей почки; ~ knot сучок от водяного побега
epidermis *n.* эпидермис; эпидерма
epinastic *adj. бот.* искривленный *(о растении);* эпинастический; ~ response *лес.* реакция искривления ветвей; реакция отклонения ветвей
equipment *n.* оборудование, установка, оснащение
equilibrium *n.* баланс, равновесие
erect *adj.* прямостоящий, прямой, вертикальный; ~ leaves прямостоячие листья; ~ plant type прямостоячее растение
erode *v.* эродировать, выветривать, размывать, разрушать
erosion *n.* эрозия, размывание; soil ~ смыв плодородного слоя почвы
erosive *adj.* эрозийный, вызывающий эрозию; выветривающий; размывающий
essential *adj.* существенный, весьма важный
establish *v.* создавать, устанавливать, укореняться, приниматься, разбивать, закладывать; ~ forest plantations основывать, создавать лесопосадки
establishment *n.* посев, посадка, создание травостоя; приживаемость, закрепление самосева; укоренение *(растения)*
ester *n. хим.* сложный эфир
ethanol *n.* этиловый спирт, этанол *(C_2H_5OH); adj.* этиловый
ethylene *n.* этилен; *adj.* этиленовый
eucalyptus *n.* эвкалипт
evaluate *v.* оценивать; определять количество
evaluation *n.* оценка
evaporate *v.* испарять; выпаривать; упаривать; обезвоживать
evaporating *adj.* испаряющий; ~ crop культура с хорошей испаряющей способностью

evaporation *n.* испарение
evapotranspiration *n. агрохим.* эвапотранспирация *(испарение плюс транспирация); с.х.* суммарное испарение; actual ~ истинное суммарное испарение
evergreen *adj.* вечнозеленый; вечнозеленое растение
evidence *n.* доказательство, подтверждение, свидетельство, данные
exacerbate *v.* обострять, осложнять, углублять, усиливать
excess *n.* избыток, излишек, излишнее количество
excessive *adj.* избыточный, чрезмерный; ~ foliage густая листва
exhaust *v.* истощать *(почву),* изнурять; высасывать; опустошать
experience *n.* опыт; early ~ ранее приобретенный опыт; previous ~ предшествующий опыт
experimental *adj.* опытный, экспериментальный; ~ plot опытный участок
expose *v.* выставлять на свет, подвергать воздействию внешней среды
exposed *adj.* открытый; незащищенный; доступный; ~ soil areas without vegetation *ланд.* участки обнаженной почвы без растительности
exposure *n.* подвергание воздействию; выставление, оставление *(на солнце, под дождем, на холоде),* обнажение; environmental ~ воздействие факторов окружающей среды; survivable ~ несмертельное воздействие
extension *n.* удлинение, растягивание, вытягивание; расширение, распространение; предел распространения; ~ centre центр неформального образования для фермеров *(для внедрения научных исследований и наиболее современных знаний в области сельского хозяйства в фермерскую практику); ~* factor ген-усилитель; grain-hopper with ~ зерновой бункер с расширением; growing season ~ продление урожайного сезона
extensive *adj.* экстенсивный, обширный, громадный
external *adj.* наружный, внешний; long/short ~ core удлиненная / короткая внешняя кочерыга
extinction *n.* вымирание; угасание; исчезновение
extra *adj.* добавочный, дополнительный
extraction *n.* экстрагирование, извлечение
extreme *n.* крайность; temperature ~s максимальные и минимальные температуры
exudate *n.* эксудат, выделение *(жидкости);* root ~ *агрохим.* выделение корней; xylem ~ *бот.* пасока
eye *n.* глазок; wintering ~ зимующий глазок

Ff
facility *n. (обычно pl.)* средства обслуживания, удобства; услуги, оборудование, приспособления, аппаратура; здания *(заводов, фирм и т.п.),* сооружения, учреждения
fade *v.* увядать, вянуть; обесцвечивать(ся)
fail *v.* не уродиться *(о культуре)*
fall *n.* осыпание *(семян);* осень; *v.* падать, опадать, осыпаться; ~ out of cultivation дичать; терять культурную форму

fallow *n.* пар, паровое поле; заброшенная пашня, залежь
farm *n.* ферма, хозяйство; питомник; заповедник; *v.* обрабатывать землю; sewage ~ поля орошения; ~ crop с.-х. культура; ~ equipment с.-х. машины и оборудование, инвентарь; ~ implement с.-х. орудие; с.-х. инвентарь; ~ machinery с.-х. техника
farmer *n.* фермер
farming *n.* земледелие, полеводство, возделывание с.-х. культур; ведение с.х.; ~ land пашня; fruit ~ плодоводство; mixed ~ многоотраслевое хозяйство; organic ~ *с.х.* органическое земледелие; seed ~ семеноводство
farmyard *n.* двор фермы; ~ worker скотник, пастух, *syn.* cowherd; ~ manure хлевный / стойловый навоз
fascicle *n.* пучок, гроздь
favour *v.* благоприятствовать
favourable *adj.* благоприятный
feature *n.* признак, характерная черта; ancestral ~ наследственный признак, наследственная черта; distinctive ~ отличительная черта; water ~ *ланд.* водное сооружение; водный элемент дизайна; элемент водного дизайна
feed *n.* корм; *v.* кормить; combined ~ комбинированный корм, комбикорм; dry ~ сухой корм; pelleted ~ гранулированный корм
feeding *n.* кормление, питание, кормежка; нагульный *(напр. о скоплении рыб);* фидинг, подпитка *(периодическое обновление среды в культуре клеток); adj.* кормовой; artificial ~ искусственное питание; искусственное вскармливание; balanced ~ сбалансированное питание; culture ~ подпитка культуры, подкормка культуры; improper ~ нерациональное питание; ~ value кормовая ценность
feeding-stuff *n.* кормовые вещества; кормовой продукт, корм
feldspar *n.* полевой шпат
felling *n.* рубка, валка *(леса);* annual ~ годичная рубка; intermediate ~ промежуточная рубка; sanitary ~ санитарная рубка; striped ~ каемчатая рубка; successive ~ постепенная рубка
female *adj.* женский
femleaf *n.* лист папоротника; develop a ~ appearance *фтп.* приобретать форму папоротника *(отдельные участки листа становятся нитевидными)*
fence *n.* забор, изгородь, ограждение; living ~ *с.х.* живая изгородь; зеленая изгородь; white picket ~ *ланд.* декоративный белый заборчик вокруг дома с садом
fennel *n.* фенхель *(сладкий укроп)*
fermentation *n.* ферментация, брожение; сбраживание; *v.* выращивание, культивирование *(микроорганизмов)*
fertigation *n.* фертигация, удобрительное орошение
fertile *adj.* плодородный *(о почве),* изобильный, урожайный
fertility *n.* плодородие *(почвы);* изобилие; фертильность, плодовитость; способность к зачатию; продуктивность
fertilization *n.* внесение удобрений, подкормка удобрениями, оплодотворение; опыление; artificial ~ искусственное оплодотворение; cross ~ перекрест-

ное оплодотворение; excessive ~ избыточное внесение удобрений; selective ~ избирательное оплодотворение
fertilize *v.* удобрять, вносить удобрение, унаваживать
fertilizer *n.* удобрение *(минеральное);* ~ application внесение удобрений; ~ requirements потребность в удобрениях; ~ solution питательный раствор
fescue *n.* овсяница *(Festuca)*
fiber *n.* волокно, клетчатка; crude ~ сырая клетчатка *(целлюлоза)*
fibrous *adj.* мочковатый *(корень);* волокнистый
field *n.* поле, делянка; ~ crop полевая культура, культура открытого грунта, *syn.* outdoor crop; ~ management уход за полями; ~ cultivation выращивание в открытом грунте; ~ holding ability способность сохранения на корню, сохраняться на растениях, сохранность плодов на растениях; corn-~ нива, поле под зерновыми культурами; demonstration ~ work полевые исследования; plowed ~ пахотные земли; tilled ~ пашня; ~ evaluation полевая оценка
filament *n. биол.* филамент, нить; волоконце; волокно; тычиночная нить; гифа
filling *n.* налив *(зерна, плодов)*
film *n. биол.* пленка; налет; поверхностный тонкий слой; polyethylene ~ полиэтиленовая пленка
fine *adj.* мелкий; высококачественный, мелкозернистая *(о почве)*
fine-grained *adj.* мелкозернистый
fir *n. лес.* пихта *(Abies);* ель *(Picea);* лжетсуга *(Pseudotsuga);* Alpine ~ альпийская пихта *(Abies lasiocarpa);* balsam ~ пихта бальзамическая *(Abies balsamea);* bristlecone ~ пихта прелестная *(Abies venusta);* Douglas ~ дугласия, лжетсуга тиссолистная *(Pseudotsuga taxifolia);* silver ~ пихта белая *(Abies alba)*
fire *n.* огонь, пожар; пал; ~ suppression подавление пожаров; creeping ~ низовой пожар *(леса), syn.* ground / surface ~; crown ~ верховой пожар *(леса);* grassland ~ луговой пожар, пал; natural ~ естественный пожар; peat-bog ~ торфяной пожар
firm *adj.* осевшая, уплотненная почва; *v.* трамбовать, утрамбовывать землю
firmness *n.* твердость; крепость, прочность; устойчивость; head ~ плотность *(кочана)*
first *adj.* самый ранний; ~ harvest сбор первого урожая, начало сбора урожая
fit *adj.* пригодный; ~ for tillage пригодный для пахоты
fixation *n.* фиксация; закрепление; укрепление; усвоение *(веществ);* сгущение; carbon ~ *биохим.* связывание углерода; nitrogen ~ азотфиксация, фиксация азота
flaccid *adj. бот.* слабый, вялый, увядший, поникший
flagstone *n. ланд.* камень-плитняк; каменная плита для мощения
flake *n.* вкрапление *(небольшое);* чешуйка; *v.* отслаиваться, шелушиться, откалывать(ся)
flat *adj.* плоский; нерельефный; однообразный; ровный; гладкий; ~ round плоскоокруглый

flatroot *n. лес.* плоский корень
flattened *adj.* уплощенный; сплющенный
flattening *n.* уплощение
flavor *n.* аромат, вкусовые характеристики; *Am. E.* flavour
flax *n.* лен *(растение), syn.* flax-plant
fleece *n.* флис; horticultural ~ укрывной материал
flexibility *n.* пластичность, гибкость, легко формируется; adaptive ~ адаптивная пластичность; developmental ~ пластичность в процессе индивидуального развития; genetic ~ генетическая пластичность; phenotypic ~ фенотипическая пластичность
flood *n.* наводнение, потоп; половодье; паводок; разлив; *v.* затоплять, заливать; ~ing irrigation полив затоплением
floret *n.* цветок, цветочек *(в корзинке сложноцветных или в колосе);* маленький цветок, цветочек, *syn.* floweret; гроздь цветочных бутонов на ножке *(как у цветной капусты)*
flourish *n.* цветение плодового дерева; дерево в цвету; *v.* цвести, расцветать; пышно расти, разрастаться; давать побеги, ветвиться
flower *n.* цветок; цветущее растение; цветение; *v.* цвести; распускаться *(о бутоне);* apetalous ~ безлепестковый цветок; barren ~ бесплодный цветок, пустоцвет; disk ~s трубчатые цветки *(у сложноцветных);* long-stamined ~ цветок с длинными тычинками; trap ~ цветок-ловушка *(закрывающийся и удерживающий насекомое для совершения опыления);* tripped ~ раскрывшийся цветок; unisexual ~ однополый цветок; wasp ~ цветок, опыляемый осами; ~ bud цветочная почка, бутон; ~ drop опадение цветков; ~ initiation начало цветения
flowerbed *n.* клумба, *syn.* garden-bed
flowering *n.* цветение; *adj.* цветущий; ~ stage фаза цветения; early ~ period фаза раннего периода цветения
flowerless *adj.* бесцветковый; споровый
flowery *adj.* покрытый цветами
fluctuation *n.* колебание; неустойчивость; temperature ~ колебания температуры
fluid *n.* жидкость; *adj.* жидкий, текучий; подвижный, изменчивый; ~ manure spreader машина для внесения навозной жижи
flume *n. техн.* наклонный желоб, подводящий канал
fly *n.* муха; двукрылое; крылатое насекомое; carrot rust ~ муха морковная *(Psila rosae); pl.* flies; tachina ~ тахины, ежемухи *(Tachinidae);* hover ~ цветочницы *(Anthomyiidae),* журчалки *(Syrphidae), syn.* flower ~
fodder *n.* корм для скота; фураж; кормовое растение; *v.* задавать корм *(скоту);* ~ beet кормовая свекла; ~ crop кормовая культура
foliage *n.* листва, ботва, надземные органы растения, *syn.* leafage, leaves
foliar *adj.* лиственный, *syn.* deciduous; changes in the ~ chemical composition изменения химического состава листвы; ~ nutrition питание через листья, некорневая подкормка

food *n.* пища; питание; корм; ~ plant пищевое растение
foodstuff *n.* пища; корм; пищевой продукт; кормовой продукт
forage *n.* еда, корм *(для животных);* фураж, *syn.* fodder, provender; фуражировка, кормодобывание; *v.* фуражировать, добывать корм; natural ~ естественный корм; pasture ~ подножный корм, пастбищный корм
forb *n. ланд.* полукустарник; ~ meadow разнотравный луг; tall ~ community крупноразнотравник
forceps *n.* пинцет
forcing *n.* стимуляция роста; тепличная выгонка, тепличное выращивание растений
forest *n.* лес; охотничий заповедник; *adj.* лесной; ~ growth рост, прирост леса; ~ litter лесная подстилка; лесной опад; ~ products лесные отходы; отходы лесоперерабатывающей промышленности; изделия из древесины; лесной материал; лесоматериал(ы); лесопродукция; alder ~ ольшаник; aspen ~ осинник; birch ~ березняк, березовый лес; bog moss pine ~ сфагновый сосняк; boreal coniferous ~ тайга, бореальный хвойный лес; bottomland ~ пойменный лес; broad-leaved ~ широколиственный лес, чернолесье; burned-out ~ гарь; cedar ~ кедровник; conifer / coniferous ~ хвойный лес, краснолесье; coppice ~ низкоствольный лес, порослевый лес; deciduous ~ листопадный лес; evergreen ~ вечнозеленый лес; exploitable ~ эксплуатируемый лес; frontier ~ пограничный лес; mixed ~ смешанный лес; mixed temperate ~ смешанный лес умеренного климата; monoculture ~ монокультурный лес; native ~ естественный лес; needle-leaved ~ хвойный лес, краснолесье; oldgrowth ~ девственные леса; леса, не тронутые рукой человека; original ~ начальный, первоначальный, исходный лес; primary ~s первобытные *(девственные)* леса; protection ~ защитный лес; recreational ~ лесопарк; resulting ~ полученный лес; spruce ~ еловый лес, ельник; subtundra ~ лесотундра; succeeding ~ последующий лес; unexploited ~ неосвоенный лес; virgin ~ девственный *(первобытный)* лес
forestry *n.* лесоводство; лесное хозяйство, *syn.* forest area; лесничество; ~ officer лесник, лесничий; егерь, *syn.* forester, forest guard; ~ specialist лесовод, *syn.* arboriculturist; environmentally responsible ~ *экол.* экологически ответственное лесоводство; farm ~ агролесоводство
fork *n. лес.* разветвление, ответвление; раздвоение; stem ~ раздвоенный ствол
forking *n.* вильчатое ветвление, дихотомическое ветвление
fountain *n. ланд.* фонтан, канал
fraction *n.* доля, порция, часть
fragrance *n.* аромат, благоухание, *syn.* smell
frame *n.* парник; парниковый сруб
freeze (froze, frozen) *v.* замерзать; замораживать; застывать, затвердевать
frequency *n.* частота, повторяемость; irrigation ~ план поливов, частота поливов, интервал между поливами
fresh *adj.* свежий; пресный *(о воде);* ~ market рынок свежих продуктов

friability *n.* рыхлость; ломкость, хрупкость; ~ of soil рыхлость, эрозийность почв
frost *n.* мороз; заморозок; мерзлота *(в почве);* замораживание; замерзание; *v.* побивать морозом *(растения);* замораживать; замерзать; ~ date срок наступления заморозков; ~ day день с отрицательной температурой *(на поверхности почвы или растений);* ~-hardy морозостойкий, *syn.* frost-resistant; ~-killing вымерзание *(растений)*
frostproof *adj.* морозостойкий, морозоустойчивый; ~ date срок минования весенних заморозков, беззаморозковый период
fruit *n.* плод; фрукт; *v.* плодоносить; to bear ~ плодоносить; to ~ off снимать плоды; to set the ~s завязывать плоды; fleshy ~ сочный плод; immature ~ недозрелый плод; mellow ~ зрелый плод; small ~ кустовая плодовая или ягодная культура; stone ~ косточковый плод; windfall ~ падалица; ~ bearing crop плодоносящая культура; ~ expansion period фаза роста плодов; ~ formation плодообразование *(формирование плодов);* ~ setting завязывание плодов; ~ weight масса плода
fruitification *n.* плодообразование; плодоношение
fruitful *adj.* плодоносный, плодоносящий, продуктивный, плодородный
fruit-grower *n.* плодовод, садовод
fruit-growing *n.* плодоводство, садоводство
fruitless *adj.* бесплодный, неплодоносящий, *syn.* unfruitful, sterile
fruit-tree *n.* плодовое дерево
fuel *n.* топливо; fossil ~ ископаемое топливо; ladder ~s *пож.* ступенчатые лесные горючие матриалы, служащие ступеньками для перехода низового пожара в верховой
fuelwood *n. лес.* топливная древесина, дрова, древесное топливо
fumigate *v.* окуривать; дезинфицировать, обеззараживать, *syn.* sterilize, disinfect
fungicide *n.* фунгицид; ~ treatment обработка фунгицидом
fungous *adj.* грибной, грибковый
fungus (*pl.* fungi) *n.* гриб, грибок, плесень
furrow *n.* борозда; *v.* пахать; нарезать борозды; бороздовать; ~ applicator машина для внесения ядохимикатов на дно борозды; ~ irrigation полив напуском по бороздам; ~ making device бороздоделатель; ~ planter бороздовая сеялка; ~ spacing расстояние между бороздами
fusarium blight *n.* фузариоз; фузариозная гниль; фузариозное увядание; ~ crown and root rot фузариозная гниль корневой шейки и корней; ~ dry rot of potato фузариоз картофеля
futile бесполезный, напрасный, тщетный; несерьезный, поверхностный, пустой

Gg

gain *n.* прирост; *v.* увеличение, приобретать
gall *n. фтп.* галл; галлообразующее насекомое
gappy *adj.* редкий; неполный; с пробелами; с промежутками; ~ stand *лес.* насаждение с просветами; низкополнотное насаждение

garbanzo *n.* нут обыкновенный, бараний горох *(Cicer arietinum),* турецкий горох *(Cicer arietinum)*
garden *n.* сад; ~ bed грядка; клумба; botanic ~ ботанический сад; English ~ *ланд.* английский ландшафтный парк; French ~ *ланд.* регулярный стиль парка *(стиль парков XVIII века);* front ~ *ланд.* палисадник; садик перед домом; зеленые насаждения перед домом; home ~ *ланд.* приусадебный огород; приусадебный сад; rock ~ *ланд.* сад камней; сад с декоративными каменными горками; альпинарий; горный каменистый сад; winter ~ зимний сад
gardener *n.* садовод; садовник
gardening *n.* садоводство; ~ plant садовое растение, огородное растение; market ~ разведение овощей на продажу; landscape ~ садово-парковая архитектура; декоративное садоводство; settlement ~ озеленение; window ~ комнатное цветоводство
garlic *n.* чеснок *(Allium sativum)*
gas *n.* газ; *v.* выделять газ; насыщать газом; ~ condenser газоохладитель; manure ~ биогаз
gassing *n.* газовая дезинфекция, окуривание газом
gather *n.* сбор, урожай; *v.* снимать, собирать, убирать *(урожай)*
gazebo *n.* беседка; окно от пола до потолка, *syn.* french window
gelisol *n. почв.* гелисоль; криозем; криосоль
gene *n.* ген; dominant ~ доминантный ген; mutable ~ мутабильный ген; paternal ~ отцовский ген; supplementary ~ дополнительный ген
general-purpose *adj.* универсальный; ~ crop универсальная культура
generation *n. ген.* генерация, поколение; род; потомство; размножение; filial ~s дочерние поколения; first filial ~ первое поколение гибридов *(F1);* second filial ~ второе поколение *(F2);* second selfed ~ второе самоопыленное поколение; successive ~ последующее поколение
generative *adj.* генеративный
genetic *adj.* генетический; ~ background генетическая среда; ~ material *ген.* генетический материал; генофонд; генетический фонд
genetically *adv.* генетически; по происхождению; с генетической точки зрения
genome *n. ген.* геном; *adj.* геномный
genotype *n. ген.* генотип; residual ~ остаточный генотип
genus (*pl.* genera) *n.* род; сорт; вид
geomorphology *n.* геоморфология
germ *n.* зародыш, семя, проросток, почка; микроорганизм; инфицирующее начало; ~ tube *бот.* проростковая трубочка, ростковая трубочка, зародышевая трубочка; disease-producing / pathogenic ~ патогенный микроорганизм
germinate *v.* прорастать, развиваться, давать почки
germinating *adj.* всхожий; ~ power всхожесть *(семян);* энергия прорастания
germination *n.* прорастание *(семян),* всхожесть, начало роста; ~ of the pollen прорастание пыльцы; ~ readiness энергия прорастания семян; ~ test тест на всхожесть; gappy ~ неравномерные входы; light ~ прорастание на свету
germplasm (germinal plasm) *n.* зародышевая плазма; *ген.* идиоплазма

gibberellin *n.* гиббереллин *(вещество, способствующее росту растений)*
glade *n. лес*. прогалина, просека *(в лесу); Am. E.* пойменный лес; сфагновое болото с кочками, леговина; полынья; проталина
glasshouse *n. Br. E.* теплица под стеклом, оранжерея; ~ culture тепличное растение; ~ production выращивание в закрытом грунте
glassy *adj.* стекловидный; гиалиновый, прозрачный; ~ blotches «стекловидные« пятна
gleyzation *n. биохим.* глееобразование; *почв.* оглеение *(почвы)*
gliadin *n.* белок клейковины; *хим.* глиадин
glossy *adj*. блестящий
glutenin *n. хим.* глютенин
glycoside *n. биохим.* гликозид
goldfish *n.* серебряный карась *(Carassius gibelio);* серебристый карась *(Diplodus argenteus)*
gooseberry *n.* крыжовник
gourd *n.* тыква, любое растение из рода тыквенных; ~ family семейство тыквенных; bitter ~ китайская горькая тыква *(Rudy);* bottle ~ горлянка обыкновенная *(Lagenaria vulgaris, Lagenaria siceraria),* тыква бутылочная; ivy ~ кокциния индийская *(Coccinia indica);* luffa ~ люфа, тыква мочальная; snake ~ трихозантес *(Trichosanthes),* змеиная тыква; wax ~ зимняя восковая тыква
grade *n.* степень; стандарт, норма качества *(продукта),* вид, сорт; *v.* сортировать; классифицировать, сортировать; располагать по степени; commercial ~ товарный сорт; high ~ высший класс / сорт, *syn.* prime ~, ~ A; low ~ низкое качество; medium ~ среднее качество; ~ B flour мука второго сорта; soil structure ~s степени оструктуренности почвы
graded *adj.* сортовой, сортированный, спланированный *(о земле)*
grading *n.* классификация, сортировка по качеству; оценка качества; ~ standard стандарт качества
graft *n.* прививка; привой, привитая часть *(растения); v.* прививать, черенковать, окулировать; ~ union место соединения привитых частей
grafting *n.* трансплантация, пересадка; прививка; выращивание на подвое; root ~ прививка в корень; side ~ прививка в боковой зарез; прививка сближением, аблактировка; top ~ прививка в расщепленную конечную почку, прививка в крону
grain *n.* зерно, хлебный злак, зерновая культура; зернышко; grinded ~ перемолотое зерно; ground ~ дробленое зерно; pollen ~ пыльцевое зерно; standing ~ хлеб на корню; starch ~ крахмальное зерно; threshed ~ обмолоченное зерно; ~ crops зерновые культуры; ~ fill выполненность зерна
granule *n.* гранула; ~ application применение в виде гранул
granular *adj.* гранулярный, гранулированный, зернистый; ~ fertilizers гранулированные удобрения
granary *n.* зернохранилище; хлебородный район
grape *n.* виноград
grass *n.* трава; злак; дерн; *v.* зарастать травой; ~ family семейство злаковых; Bahia ~ гречка заметная *(Paspalum notatum);* cord ~ спартина *(Spartina);* doob

~ свинорой пальчатый *(Cynodon dactylon);* forgo ~ устойчивая к вытаптыванию газонная трава; fountain ~ пеннисетум скальный *(Pennisetum ruppellii);* пеннисетум красный *(Pennisetum purpureum);* Indian ~ айра голубая *(Aira caerulea);* соргаструм поникающий *(Sorghastrum nutans);* Korean lawn ~ зойсия японская *(Zoysia japonica), syn.* Japanese lawn ~; oat ~ овес пустой, овсюг *(Avena fatua);* трищетинник пенсильванский *(Trisetum pensylvanicum);* pampas ~ пампасная трава *(Cortaderia);* reed ~ вейник тростниковидный *(Calamagrostis arundinacea),* канареечник канарский *(Phalaris canariensis);* ribbon ~ двукисточник тростниковидный *(Digraphis arundinacea);* sedge ~ осока пенсильванская *(Carex pennsylvanicum);* хвощ полевой *(Equisetum arvense);* аир тростниковый *(Acorus calamus);* switch ~ просо прутьевидное *(Panicum virgatum);* tufted hair ~ луговик дернистый *(Deschampsia cespitosa)*

grasscutter *n.* газонокосилка

grasshopper *n.* саранча, кузнечик

grassland *n.* сенокосное угодье; лугопастбищное угодье

gravel *n. ланд.* гравий; галька, галечник; crushed ~ дробленый гравий; щебень из гравия

gravity-flow *n.* гравитационное течение, самотек; ~ system самотечная система

grazing *n.* выпас, пастбище, выгон

greenhouse *n.* теплица, оранжерея; ~ gases газы с тепличным / парниковым эффектом

green *n.* растительность; листва; *adj.* зеленый, покрытый зеленью; сочный *(о корме);* незрелый, неспелый; ~ building *экол.* зеленое строительство; экостроительство; экологическое строительство; ~ feed *с.х.* зеленый корм; ~ manure crop культура на зеленое удобрение, сидеральная культура

greenback *n.* зеленое пятно у основания плода или плодоножки томата

grey *adj.* серый; ~ mould серая гниль

grid *n.* сетка; решетка; сеточка, объектодержатель; seed ~ семенная гребенка волокноотделителя

grind (ground, ground) *v.* молоть; дробить

grinding-mill *n.* мельница; дробилка

grit *n.* песчаник; мелкий песок; песчинки; овсяная мука грубого помола; *v.* измельчать; *adj.* грубозернистый

groove *n.* борозда

ground *n.* почва, грунт; участок земли; ground ~ напочвенный покров *(иногда вместе с подстилкой); лес.* живой покров; dry ~ сухая земная поверхность; open ~ *овощ.* открытый *(незащищенный)* грунт; trial ~ *овощ.* опытный участок; vegetative ~ cover *раст.* почвенно-растительный покров

groundwater *n.* подземные воды; подпочвенные воды; почвенно-грунтовая вода; ~ table *тех.* уровень грунтовых вод; уровень подземных вод; свободная поверхность грунтовых вод; зеркало грунтовых вод

grow (grew, grown) *v.* расти, произрастать; выращивать, культивировать

grower *n.* растениевод; плодовод

growing *n. раст.* выращивание; культивирование; *adj.* растущий; способствующий росту, стимулирующий рост; ~ manual руководство по выращиванию; ~ media, *syn.* grow bag субстрат, мат для выращивания; ~ period / season вегетативный период, период вегетации; ~ point точка роста; ~ power энергия роста; ~ system способ выращивания; ~ technology технология выращивания; ~ tip верхушка побега
growth *n.* рост, развитие, произрастание; выращивание; растительность; поросль; ~ band защитная полоса *(делянка);* ~ cell замыкающая клетка *(в устьице);* ~ rates темпы роста; ~ row защитный ряд *(растений);* annual ~ годичный прирост; gross ~ общий прирост; heavy ~ обильный рост, пышный рост, бурный рост; old ~ спелое лесонасаждение; poor ~ слабый рост, скудный рост; second ~ молодое насаждение, вторичный *(производный)* лес; seedling ~ самосев; подсад; vegetative ~ вегетативный рост; white fluffy ~ of the fungus белый пушистый мицелий гриба
grub *n.* червовидная личинка; *v.* выкапывать; выкорчевывать; white ~ личинка хруща
guano *n.* гуано; artificial ~ искусственное гуано *(компост);* fish ~ рыбий тук
guard *v.* защищать, охранять
guide *v.* направлять; ~ side shoots направлять боковые побеги
gully *n.* овражек; канава, ров; ~ erosion овражная эрозия
gymnosperms *n. лес.* голосемянные растения
gynoecious *n.* гинецей *(женский тип цветения), syn.* gynaeceum
gypsum *n.* гипс, сульфат кальция

Hh
habit *n.* привычка, свойство; особенность развития растения; габитус; erect ~ прямостоячий габитус; gregarious ~s стадный образ жизни; growth ~ форма роста; prostrate ~ распростертый габитус
habitat *n.* естественная среда, место распространения, произрастания; ~ for organisms естественная среда обитания организмов; ~ for wildlife место обитания живой природы
hairs (of roots) *n.* корневые волоски
halt *n.* остановка; прекращение; *v.* останавливать(ся)
harden *v.* становиться жестким, твердеть
hardscape *n. ланд.* малая ландшафтная архитектура; искусственный ландшафт
hariali grass *n. бот.* полевица собачья; пырей ползучий, *syn.* dog's grass
harmful *adj.* вредный, опасный
harmless *adj.* безвредный, безопасный
handle *n.* конец плода *(напр. огурца)* у плодоножки; *v.* возделывать, выращивать *(растения);* обрабатывать *(почву);* убирать *(урожай);* приручать *(животное);* сортировать
hardiness *n.* выносливость; крепость; устойчивость; жизнестойкость; закаливание *(растений);* стойкость к неблагоприятным внешним условиям; cold

~ холодоустойчивость; frost ~ морозостойкость; winter ~ зимостойкость; ~ degree степень выносливости; ~ zone зона морозостойкости
hardwood *n.* твердая древесина; дерево с твердой древесиной; широколиственное дерево; *лес.* древесина твердолиственных пород; лесоматериалы лиственных пород; лиственные насаждения; лиственные породы *(деревьев);* лиственная древесина; ~ cutting рубка твердолиственных пород; ~ forest лиственный лес с опадающей на зиму листвой; ~ sprouts порослевые побеги лиственных пород
hardy *adj.* стойкий, выносливый; открытого грунта *(о растениях);* ~ plant выносливое растение
harrow *n.* борона; *v.* боронить
harsh *adj.* жесткий; грубый *(на ощупь);* резкий, неприятный *(на вкус)*
harvest *n.* урожай; жатва, уборка хлеба; *v.* собирать урожай, жать; ~ date срок уборки урожая; ~ period период *(сроки)* сбора урожая; ~ planning планирование *(времени, сроков)* уборки урожая; to ~ timber заготавливать древесину; stable in ~ стабильный в сроке уборки урожая
harvester *n.* комбайн
hatch *n.* высиживание; выведение *(цыплят)* в инкубаторе; выводок; *v.* вылупляться, выводиться *(из яйца, икринки)*
hay *n.* сено, заготавливать сено; ~ crop культура, идущая на сено; ~stack стог сена; to make ~ косить, ворошить и сушить сено
haylage *n.* сенаж, травяной силос; культура на зеленый корм
hayland *n.* сенокос, *syn.* haymaking
hazard *n.* опасность
head *n.* колос, метелка *(у злаковых);* кочан *(капусты);* верхушка; крона *(у дерева);* корзинка *(тип соцветия); v.* колоситься; завиваться в кочан; формировать крону *(дерева);* ~ row ряд, засеянный семенами одного колоса или одной метелки
headland *n.* край поля; межа; защитная полоса *(делянки)*
headwaters *n.* главный водосбор; головное водохранилище
heal *v.* излечивать, исцелять; способствовать заживлению или рубцеванию
healthy *adj.* здоровый; имеющий хороший набор устойчивости к болезням, комплексную устойчивость; ~ variety устойчивый к заболеваниям сорт
heart *n.* сердцевина, ядро
heartroot *n. лес.* мочковатая корневая система *(деревьев)*
heat *n.* тепло(та), жара; ~ stability термоустойчивость; ~-tolerant жаростойкий; ~ treated термически обработанный; *v.* нагревать(ся)
heater *n.* обогреватель; нагревательный прибор
heating *n.* нагревание; подогревание; отопление; *adj.* согревающий, обогревающий
heavy *adj.* тяжелый; обильный, буйный *(о растительности);* ~ soil тяжелая почва; почва тяжелого механического состава
hectare *n.* гектар
height *n.* высота; рост

hemlock *n.* тсуга *(американское хвойное дерево);* mountain ~ тсуга Мертенса *(Tsuga mertensiana)*
hemp *n. бот.* конопля *(Cannabis);* конопля посевная *(Cannabis sativa);* sunn ~ кроталярия ситниковая *(Crotalaria juncea), syn.* false ~
herb *n.* трава, травянистое растение; надземная часть растений; *pl.* зелень; ~ meadow разнотравный луг
herbaceous *adj.* травяной; травянистый, *syn.* grass; ~ border цветочный бордюр
herbage *n.* травы, травостой; ботва, зеленая масса (растений); травяной покров; tall ~ высокотравье
herbal *adj.* травяной, *syn.* grass, herbaceous; ~ plants *с.х.* целебные травы, лекарственные растения
herbicide *n.* гербицид
herbivore *n.* травоядное *(животное)*
heredity *n. ген.* наследственность
heritable *adj.* наследственный, наследуемый; ~ combination *ген.* наследуемые комбинации
heritage *n.* наследуемые признаки
hermaphrodite *n.* гермафродит; ~ flower обоеполый цветок, двуполый цветок
heterogeneity *n.* гетерогенность, разнородность, неоднородность; immunochemical ~ иммунохимическая гетерогенность, антигенное разнообразие
heterosis *n.* гетерозис; mutational ~ мутационный гетерозис
heterotic *adj.* гетерозисный
heterozygous *adj. ген.* гетерозиготный, гибридный
hickory *n.* гикори *(род североамериканского орешника);* bitternut ~ кария сердцевидная *(Carya cordiformis)*
high *adj.* высокий, большой; ~ number of fruits обильное плодоношение
high-grade *adj.* высокосортный; первоклассный; высокого качества; высококлассный; высокопроцентный; высококачественный; ~ ing выборочная рубка лучших деревьев
high-quality *adj.* высококачественный; *ant.* poor-quality
high-speed *adj.* быстрый, быстроходный, скоростной; ~ blades высокоскоростные лопасти
high-volume *adj.* крупносерийный; массовый *(о производстве);* многостадийный
high-yielding *adj.* высокодоходный; высокопродуктивный; высокоурожайный; ~ varieties высокоурожайные сорта сельскохозяйственных культур
hill *v.* окучивать
hive *n.* улей; пчелиный рой; *v.* запасать мед; ~ products продукция пчеловодства
hoe *n.* мотыга; культиваторная лапа; *v.* мотыжить, разрыхлять, *syn.* mattock
holding ability *n.* удерживающая способность; сохранение товарных качеств, сохранность плодов на растении; ~ on the field сохраняемость на корню
hole *n. овощ.* лунка; *лес.* отверстие *(проделанное в древесине насекомыми);* insect ~ ход насекомого; planting ~ посадочная лунка; shot ~ *фтп.* листовая

пятнистость, образующая пустоты *(от выпадения отмирающих частей);* worm ~ червоточина
hollow *n.* полость, пустота; *adj.* полый, пустой; ~ areas местами полый; ~ gaps пустоты; ~ stem пустотелость стебля; ~ ness впалость
homogeneous *adj.* однородный; гомогенный
homozygous *adj. ген.* гомозиготный
honeydew *n.* медвяная роса; падь; клейкая жидкость, выделяемая мицелием спорыньи
hopper burn *n. фтп.* побурение и высыхание ботвы картофеля, вызванное прыгающими насекомыми
hormone *n.* гормон
hornworm *n.* гусеница с рогом; бражник; tomato ~ бражник пятиточечный
horse chesnut *n.* конский каштан обыкновенный *(Aesculus hippocastanum)*
horse nettle *n.* паслен каролинский *(Solanum carolinense)*
horseradish *n.* хрен обыкновенный *(Armoracia rusticana)*
horticulture *n.* садоводство, плодоводство
hose *n.* шланг для полива; *v.* поливать из шланга
host *n.* культура – носитель *(хозяин)* возбудителя болезни; растение, поражаемое заболеванием; хозяин *(паразита);* носитель *(напр. вируса);* реципиент
hotbed *n.* парник, паровая грядка
hothouse *n.* оранжерея, теплица, *syn.* greenhouse, conservatory
hull *n.* шелуха, оболочка, пустые стручки; *v.* очищать от шелухи, лущить
human-assisted *adj.* с участием человека
humble bees *n.* шмели
humid *adj.* влажный, сырой
humidity *n.* влажность; влага; relative ~ относительная влажность
humus *n.* гумус, перегной; чернозем, *syn.* black earth, chernozem
husbandry *n.* сельское хозяйство, землепашество; хозяйствование; animal ~ животноводство; скотоводство; forest ~ лесоводство; poultry ~ птицеводство; dairy ~ молочное хозяйство field- ~ полеводство, syn. farming
husk *n.* шелуха; скорлупа; мякинная оболочка; *v.* лущить; шелушить
hybrid *n. ген.* гибрид, помесь; ~ between lines межлинейный гибрид; graft ~ прививочный гибрид, вегетативный гибрид; intergeneric ~ межродовой гибрид; true ~ истинный гибрид
hybridize *v. ген.* скрещивать
hybridization *n. ген.* гибридизация, скрещивание; *syn.* crossing, cross
hydraulic *adj. техн.* гидравлический; ~ engineering гидротехническое строительство; *экол.* инженерные средства и методы строительства гидротехнических сооружений
hydrogen *n. хим.* водород
hydrologist *n.* гидролог
hydrolysis *n.* гидролиз; acid ~ кислотный гидролиз; alkaline ~ щелочной гидролиз; enzymic ~ ферментативный гидролиз

hydroponic *n.* гидропонный; ~ bed гидропонный стеллаж; ~ culture гидропоника; ~ plant гидропонная установка
hydroxyl *n. хим.* гидроксил
hypocotyl *n. бот.* гипокотиль, подсемядольное колено

Ii
ice *n.* лед; *v.* покрывать льдом; замораживать; замерзать; *adj.* ледяной; ледовый; ~ cap ледниковый покров
ichneumon *n.* ихневмон, фараонова мышь, мангуста; ~ fly / wasp наездник *(Ichneumonidae)*
immature *adj.* незрелый, неспелый; слаборазвитый *(о почве);* ~ stage техническая спелость *(неспелый),* зеленый
immobilization *n.* обездвиживание, лишение подвижности; иммобилизация, фиксация; enzyme ~ иммобилизация ферментов
immunity *n.* невосприимчивость, иммунитет
impact *n.* сильное воздействие; влияние
imperishable *adj.* прочный, стойкий, непортящийся
implement *n.* инструмент; орудие; *syn.* tool; *pl.* принадлежности; инвентарь
import *n.* импорт; импортирование; ~ Quarantine Permit импортное карантинное разрешение
improper *adj.* непригодный, неподходящий
improve *v.* улучшать(ся); совершенствовать(ся)
improved *adj.* улучшенный, усовершенствованный; ~ uniformity улучшенная однородность
improvement *n.* улучшение, усовершенствование
in *prep.* внутри, в, **vitro** *лат.* в пробирке; вне организма; в лабораторных условиях
in vivo *лат.* в живом организме
inbred *adj.* инбредный; elite ~ line элитная инбредная линия; fertile ~ line фертильная инбредная линия; ~ plant инбредное растение *(принудительно самоопыленные)*
inceptisol *n. почв.* инсептисоль *(почва)*
incidence *n.* заболеваемость, коэффициент заболеваемости; ~ of disease частота заболеваний, заболеваемость, распространение болезни
inch *n.* дюйм *(= 2,5 см)*
include *v.* содержать, включать; заключать, содержать в себе; *syn.* comprise, contain, involve
income *n.* прибыль; заработок; поступление; поступления; доход, выручка;
inconspicuous *adj.* незаметный, неприметный; неяркий, бледный *(о цвете)*
incorporate *v.* вносить, заделывать *(напр., удобрения);* смешивать; *ген.* встраивать; включать; инкорпорировать
increase *n.* увеличение; размножение; рост, прирост *(чего-л.); syn.* growth; *v.* возрастать, увеличивать(ся); *syn.* grow, raise, enlarge, extend; ~ in yield прибавка *(урожая);* ~ of fertility повышение плодородия почвы; ~ of salinity повышение засоления

incubate *v.* культивировать *(микроорганизмы),* выращивать
incubative *adj.* инкубационный; ~ period of a plant disease инкубационный период болезни растений
index *n.* показатель, коэффициент; ~ of irrigation need показатель потребности в орошении; hybrid ~ показатель гибридности; salt ~ солевой индекс; показатель солевого ожога растений; yield ~ показатель урожайности
indeterminate *adj.* неопределенный; *овощ.* индетерминантный; ~ variety не реагирующий на длину дня сорт *(напр. томата)*
indigenous *adj.* аборигенный, туземный, местный, автохтонный
indigestible *adj.* неудобоваримый, трудноперевариваемый
indirect *adj.* непрямой, косвенный
indoor *adj.* домашний, комнатный; находящийся или происходящий в помещении; внутренний
induce *v.* стимулировать
infancy *n.* ранняя *(начальная)* стадия развития *(растения)*
inferior *adj.* худший *(по качеству);* плохой
infected *adj.* зараженный; severely ~ сильно пораженный
infection *n.* инфекция; ~ site очаг инфекции; airborne ~ воздушная инфекция; bird-borne ~ инфекция, передаваемая птицами; insect-borne ~ инфекция, переносимая насекомыми; systemic ~ общая инфекция
infested *adj.* зараженный, инвазированный; заросший сорняками; ~ soil зараженная почва
infestation *n.* засоренность *(посевов);* нашествие *(вредителей);* инвазия; повреждение *(древесины насекомыми);* поражение
infiltration *n.* инфильтрация; просачивание; инфильтрат; фильтрат; water ~ просачивание воды *(поверхностной и атмосферной)*
inflorescence *n.* цветорасположение *(на оси);* соцветие; цветение; female ~ женское соцветие
influence *n.* влияние, действие; воздействие на что-то; *v.* влиять
inhabit *v.* населять; обитать
inhabitant *n.* организм, населяющий данную местность
inherit *v.* наследовать
inheritance *n.* наследственность
inhibit *v.* подавлять, сдерживать; тормозить; задерживать; запрещать
inhibition *n.* ингибирование, торможение, подавление, угнетение; yield ~ снижение урожая
initiate *v.* начинать, положить начало; стимулировать, побуждать; ~ disease первичное распространение заболевания
injure *v.* повреждать
injury *n.* вред, повреждение; hail ~ вред, причиненный градом; mechanical ~ механическое повреждение *(плодов)*
inland *n.* внутренняя часть страны, территория, удаленная от моря или границы; adj. внутриматериковый, континентальный
inlet *n. техн.* впуск, вход; входное, вводное отверстие; ~ pipe впускная труба

inner *adj.* внутренний; ~ leaves внутренние листья
inoculation *n.* инокуляция, посев, внесение посевного материала
inoculum *n.* инокулят, посевной материал, посевная культура; subculture ~ исходный материал для пересева
input *n.* вход; расход, потребление; *Pl.* производственные ресурсы; сырье и материалы; fertilizer ~ *с.х.* загрузка удобрений; подача удобрений; *экон.* расход удобрений
insect *n.* насекомое; ~ outbreak нашествие насекомых; beneficial/useful ~ полезное насекомое; chewing ~ грызущее насекомое; crop-destroying ~ насекомое-вредитель с.-х. культур; injurious ~ насекомое-вредитель
insecticide *n.* средство от насекомых; инсектицид; средство для истребления насекомых
insensitive *adj.* нечувствительный, невосприимчивый, *syn.* insensible
insertion *n. мол. биол.* вставка, инсерция; *бот.* место прикрепления; *биохим.* включение; branch ~ angle *лес.* угол врастания
insipid *adj.* безжизненный, вялый, *syn.* faded; безвкусный, *syn.* tasteless
intact *adj.* интактный, нетронутый, невредимый, целый
integrity *n.* целостность; сохранность; ecosystem ~ *экол.* целостность экосистемы
intensive *adj.* интенсивный; ~ grazing интенсивный выпас
interaction *n.* взаимодействие; chemical ~ химическая реакция; химическое взаимодействие
intercrop *n.* промежуточная междурядная культура
interculturing *n.* выращивание культуры под многолетними культурами *(напр. рис под кокосовыми пальмами)*
interlock *v.* соединять; сцеплять; соединяться; *лес.* смыкаться *(о ветвях и кроне деревьев);* сцепляться
intermediate *n.* промежуточный вид, промежуточная форма; промежуточный продукт; быть посредником; *adj.* средний; ~ hybrid *ген.* промежуточный гибрид; ~ planting *раст.* промежуточная посадка; ~ root *с.х.* переходный корень; ~ variety *овощ.* сорт со средним вегетационным периодом; среднеспелый сорт
internal *adj.* внутренний; ~ colour окраска внутренних тканей *(листьев, сердцевины);* ~ white part белая часть у основания плода *(у томата)*
internode *n.* междоузлие
interplanting *n.* уплотненный посев, подсев, дополнительная посадка
inter-row *adj.* междурядный; ~ cultivation междурядная обработка; ~ space междурядье
interveinal *adj.* междужилковый, межжилковый; ~ chlorosis междужилковый хлороз; ~ necrosis междужилковый некроз
introduction *n.* интродукция, введение, внедрение *(нового сорта, вида)*
inundation *n.* наводнение; затопление; ~ meadow пойменный луг; ~ plan карта затопления
invasion *n.* инвазия; заселение, вторжение; desert ~ опустынивание; forest ~ облесение, наступление леса; grass ~ остепенение; weed ~ зарастание сорняками

inventory *n.* материальный запас; производственные ресурсы; товарно-материальные ценности; оборотный капитал
involution *n.* дегенерация; закручивание, завертывание *(листьев)*
involve *v.* включать в себя, содержать; *syn.* include, contain
iron *n.* железо
irradiation *n. ген.* облучение; иррадиация; *биол.* излучение; ultraviolet ~ облучение ультрафиолетовыми лучами
irregular *adj.* имеющий неправильную форму, несимметричный, неровный, неправильный, искривленный; неравномерный, расплывчатый
irreversible *adj.* необратимый; ~ consequence необратимые последствия
irreversibility *n.* необратимость; ~ of evolution необратимость эволюции
irrigate *v.* орошать, поливать
irrigation *n.* орошение; ирригация; полив; оводнение; ~ adequacy степень увлажнения почвы при поливе; ~ by sprinkler орошение дождеванием; ~ depth поливная норма; ~ efficiency коэффициент полезного использования воды при поливе; ~ hose шланг для полива; ~ layout схема оросительной системы; ~ network *техн.* ирригационная сеть; *экол.* оросительная сеть; ~ system оросительная система; ~ timetable график орошения; ~ water вода для орошения; drip ~ *с.х.* точечный полив; *техн.* капельное орошение; flood ~ лиманное орошение; орошение затоплением; *экол.* орошение напуском; impounding ~ орошение водой из водохранилища; subterrestrial ~ подземное орошение; well ~ орошение из колодцев
ISO (International Organization for Standardization) Международная организация по стандартизации
isolation *n.* изоляция, изолирование; разобщение, отделение; выделение; genetic ~ генетическая изоляция
isotherm *n.* изотерма
ISTA (International Seed Testing Association) Международная ассоциация по контролю за качеством семян
isozyme *n. биохим.* изозим, изофермент

Jj

jacket *n.* кожура, оболочка, покрывающие листья, листовая розетка
jactitation *n.* высыпание семян при раскачивании плода
jay *n.* сойка; сойка *(Garrulus);* pinyon ~ западноамериканская сойка *(Gymnorhinus)*
jimsonweed *n.* дурман обыкновенный *(Datura stramonium L.)*
joint *n.* соединение; сочленение
juglone *n.* юглон
juiciness *n.* сочность
juicy *adj.* сочный, спелый, мясистый
junction *n.* соединение; место соединения
juvenile *n.* молодая особь; *adj.* ювенильный, недоразвитый; ~ leaves молодые листья

Kk

kale *n.* кормовая капуста

keep (kept, kept) *v.* держать, содержать *(животных),* хранить, сохранять; ~ down уничтожать *(сорняки);* ~ the size сохранять размер; ~ growing продолжать свой рост, расти; ~ up the fertility поддерживать плодородие почвы; *n. Br. E.* пастбище, подножный корм, запас кормов

keeper *n.* сторож; хранитель; смотритель; санитар; лаборант; лесник *(особенно охраняющий заповедник),* егерь; cow ~ скотовод, скотник; hay ~ сенохранилище; poultry ~ птицевод

kernel *n.* зерно; зернышко *(злаковых);* сердцевина *(плода);* ядрышко; косточка *(в плодах);* ядро *(ореха);* зародыш; *adj.* базовый; основной; центральный; blighted ~ поврежденное зерно; laden ~ налитое зерно; spare ~ щуплое зерно; sprouted ~ проросшее зерно; thousand-~ weight абсолютный вес зерна *(вес тысячи зерен);* ~ milk line молочная спелость зерна *(у кукурузы);* ~ percentage озернённость колоса в %; ~ size величина зерна; ~ smut головня зерен

kidney *анат. n.* почка; ~ bean фасоль обыкновенная

kill *v.* уничтожать *(сорняки, вредителей);* ослаблять

killer *n.* препарат для уничтожения (сорняков, вредителей); insect ~ инсектицид; weed ~ гербицид

killing *adj.* смертоносный, смертельный; убийственный; ~ frosts губительный мороз; summer ~ летнее похолодание, заморозки

king *n.* главный стебель; ~ fruit главный *(очень крупный)* плод, царь-плод

kind *n.* вид, сорт, отличительный признак

kinking *n.* сгибание; образование изгибов, перегибов или переломов; загиб; ~ of tomato trusses извитость кистей томата

kitchen-garden *n.* огород, *syn.* vegetable garden

knife *n.* нож; режущий аппарат; budding ~ окулировочный нож

knot *n.* узел; нарост, кап; сук, сучок, свиль *(о древесине);* root ~ корневой нарост

kohlrabi *n.* кольраби

kraut *n.* квашеная капуста, *syn.* sauerkraut

Ll

label *n.* ярлык, этикетка, наклейка, бирка; *v.* категоризировать

labour *n.* труд, работа; ~ friendly удобный для обработки; low ~ input низкие трудозатраты; ~-intensive трудоемкий; agricultural ~ полевые работы; seasonal ~ сезонные рабочие

lacewing *n.* златоглазка *(Chrysopidae); (настоящие)* сетчатокрылые *(Neuroptera)*

lack *n.* недостаток; отсутствие *(чего-л.);* ~ in structure бесструктурный *(о почве);* ~ of water нехватка/ отсутствие воды

lactic *adj.* молочный; ~ acid молочная кислота; ~ bacterium молочнокислая бактерия

lactose *n. биол.* лактоза, молочный сахар
ladybird *Br. E. n. (божья)* коровка *(Coccinellidae), syn. Am.E.* ladybug
lamb's quarter *n. бот.* марь белая *(Chenopodium album), syn.* fat hen
lamina *n.* листовая пластинка
land *n.* земля, почва; грунт; делянка; землевладение; ~ use землепользование; barren ~ пустошь; cropped ~ земля под культурой; disturbed ~ земля с нарушенным покровом; fallow ~ земля под паром; leased ~ арендованная земля; raw/virgin/wild ~ целинная земля, целина; undeveloped ~ неосвоенная земля
landfill *n.* закапывание мусора, отходов; sanitary ~ *экол.* санитарная свалка; санитарно-технический полигон; свалка мусора с применением санитарно-гигиенической обработки; свалка мусора с грунтовой засыпкой
landowner *n.* землевладелец
landscape *n.* ландшафт, пейзаж; *v.* озеленять; благоустраивать участок; decorative ~ *ланд.* декоративное озеленение; low-maintenance ~ благоустроенный и озелененный участок *(сад)* малого ухода; residential ~ озеленение земель населенных пунктов; ландшафт участков с жилыми домами; ostentatious traditional ~ design показной традиционный ландшафтный дизайн
landscaping *n.* ландшафтный дизайн, зеленые насаждения; благоустройство и озеленение; ландшафтная садовопарковая архитектура; создание антропогенного ландшафта; soil ~ почвенный покров
larch *n.* лиственница; древесина лиственницы; Siberian ~ лиственница сибирская
large *adj.* крупный; большой; широкий; массовый, многочисленный; ~ fruits крупные плоды; ~ seeded крупносеменной; ~ sized heads крупный размер кочанов
large-leaved *adj.* крупнолистный
larva *n.* личинка; гусеница, *Pl.* larvae
late *adj.* поздний; ~ autumn production позднеосеннее возделывание; ~ blight фитофтороз; ~ mature variety сорт позднего срока созревания
latent *adj.* латентный, скрытый; покоящийся; *бот.* спящий
lateral *n.* боковой побег; боковая плеть; латеральный; ~ branch боковая ветвь
latitude *n.* широта *(географическая)*
lawn *n.* лужайка, газон; plush ~ шикарный газон
layer *n.* слой, пласт *(земли); бот.* отводок; стелящийся побег; ярус растительности; *v.* разводить *(размножать растения)* отводками; soil ~ почвенный горизонт; tilled ~ обрабатываемый слой
layerage *n.* размножение *(растений)* отводками, ярусность *(растительности), syn.* layering
leach *v.* выщелачивать; высолаживать, вымывать; *n.* зола; ~ soil выщелачивать почву
leaf *n.* лист *(растения);* ~ area листовая площадь / поверхность; ~ edge край листа; ~ expansion развертывание листьев; ~ hairs волоски на листьях; ~ hopper цикадка; cut ~ рассеченный лист; *pl.* leaves; erect ~ прямостоячие ли-

стья; inner ~ внутренние листья; outer ~ кроющие / наружные листья; tender ~ нежные листья; thin ~ тонкие листья; true ~ настоящие листы
leafblade *n. бот.* пластинка листа
leafbud *n. бот.* листовая почка
leafed *adj.* лиственный; покрытый листьями; облиственный, *syn.* leaved; closely ~ загущеннолистный; leathery ~ кожистолистный; sparsely ~ с изреженной кроной; woolly ~ пушистолистный
leaflet *n. бот.* листочек *(сложного листа);* молодой лист
leafminer *n. биол.* минирующие мушки, листовой минер
leafstalk *n. бот.* черешок листа; blanched ~s отбеленные черешки листьев *(сельдерея)*
leafy *adj.* облиственный *(о стебле),* с хорошо развитой ботвой; лиственный
lean *adj.* обедненный *(о почве);* неурожайный *(год)*
leathery *adj.* кожистый; ~ -leaved кожелистный; ~ pod кожистый боб *(у овощной фасоли)*
leek *n.* лук-порей
leggy *adj. бот.* имеющий длинный и тонкий стебель; вытянувшийся *(о рассаде)*
legume *n.* растение из семейства бобовых *(Leguminosae);* боб; плод бобовых; зеленый горошек; столовые овощи; фасоль
leguminous *adj.* бобовый
lemon *n.* лимон *(Citrus limon)*
Lepidoptera *n. энт., лат.* бабочки; чешуекрылые
lesion *n.* поражение, пятно
lettuce *n.* салат; crisp ~ кудрявый салат; iceberg ~ кочанный салат; leaf ~ листовой салат
level *n.* уровень; *adj.* ровный, гладкий; *v.* выравнивать; ~ of potassium уровень калия; at some ~ при / на некотором уровне; frost ~ глубина промерзания *(почвы)*
liberally *adv.* обильно, в огромном количестве
lichen *n.* лишайник
life *n.* жизнь; ~ sciences биологические науки; ~ cycle жизненный цикл; shelf / storage ~ срок хранения
lift *n. мелиор.* высота подъема воды; *v.* выкапывать, копать *(картофель);* снимать урожай *(корнеплодов)*
lifter *n.* подъемник; машина для уборки корнеплодов; potato ~ картофелекопатель, *syn.* potato digger
light *n.* свет; освещение; ~ conditions освещенность; *adj.* легкий; легковесный; светлый; ~ brown светло-коричневый; ~ intensity интенсивность света; интенсивность освещения; ~ soil легкая почва, почва легкого механического состава; artificial ~ искусственный свет; day ~ дневной свет; stray ~ рассеянный свет; supplementary ~ дополнительное освещение; ultraviolet ~ ультрафиолетовый свет, УФ-свет
lilac *n.* сирень

lime *n.* известь, известковое удобрение; *бот.* лайм; липа; agricultural ~ *с.х.* известковое удобрение; известь, используемая в сельском хозяйстве; hydrated ~ *агрохим.* гашеная известь; едкая известь
limestone *n.* известняк
line *n.* линия; происхождение, родословная; генеалогическая линия; черта; ~ of breeding генеалогическая линия; female ~ *ген.* женская линия; germ ~ *ген.* зародышевая линия *(клеток);* inbred ~ инбредная линия; maternal ~ материнская линия; parental ~ родительская клеточная линия; purebred ~ чистопородная линия; selected ~ *с.х.* отселекционированная линия; tree ~ *лес.* верхняя граница произрастания лесов; линия распространения лесов; верхняя граница леса *(в горах); экол.* граница древесной растительности *(вертикальная или широтная);* граница произрастания древесной растительности
linkage *n. ген.* связь, сцепление; genetic ~ сцепление генов; группа сцепленных генов
linseed *n.* льняное семя; лен обыкновенный
liquid *adj.* жидкий; текучий; *n.* жидкость; ~ fertilizer жидкое удобрение; nutrient ~ питательный раствор
litter *n. лес.* подстилка; branch ~ слой порубочных остатков; forest ~ лесная подстилка; leaf ~ листовая подстилка, листовой опад; needle ~ хвойная подстилка; raking ~ сгребание подстилки
livestock *n.* домашний скот; живой инвентарь; поголовье; скот; живность; *adj.* зоотехнический; ~ breeding *с.х.* племенное животноводство
lixiviation *n.* выщелачивание
loaf *n.* кочан *(капусты, салата); v.* образовывать кочан
loam *n.* суглинистая почва; супесь; суглинок; leguminous ~ бобовый суглинок; rich ~ плодородный суглинок; sandy ~ опесчаненный суглинок; супесь; ~ -peat compost торфо-глинистый компост
locule *n.* камера
lodge *v.* полегать *(о хлебах, посевах)*
logging *n.* заготовка леса; трелевка *(леса);* транспортировка леса; заготовка и транспортировка дров; валка леса; вывозка леса; лесозаготовки; производство лесоматериалов; вырубка
long-day *adj.* длиннодневный *(о растении);* ~ onion лук длинного дня
long-lived *adj.* долгоживущий, долговременный; долговечный, долголетний, *syn.* perennial, durable
longevity *n.* долговечность, продолжительность жизни; ~ of seeds продолжительность сохранения жизнеспособности семян; leaf ~ долговечность листа
loose *adj.* рыхлая; сыпучая *(порода); n.* одиночно собираемые плоды
loosen *v.* разрыхлять *(почву)*
lose *v.* не сохранять, терять; утрачивать, лишаться; ~ the uniformity терять однородность
loss *n.* потеря, утрата; убыток, ущерб, потеря; crop / yield ~ es потери урожая; field / harvesting ~ es потери при уборке урожая; soil ~ es потери *(смыв)* почвы

lot *n.* участок *(земли);* делянка; серия, партия *(какого-л. товара);* seed ~ партия семян; *v.* разбивать на делянки
low *adj.* небольшой, недостаточный; низкий, невысокий; ~ production низкая продуктивность *(урожайность)*
lucerne *n.* люцерна, *syn.* alfalfa
lumber *n. лес.* пиломатериалы; строевой лес, бревна; ~ harvest лесозаготовка; ~ wood неотесанные строевые лесоматериалы; ~ yield выход пиломатериала; clear ~ бессучковый лесоматериал; высококачественные пиломатериалы *(без выхода сучков на поверхность);* softwood ~ пиломатериалы хвойных пород
lumpy *adj.* комковатый *(о почве)*
lush *adj.* густой, буйный, пышный *(о растительности);* покрытый буйной растительностью; ~ garden *ланд.* сад с пышной растительностью
lycopene *n. биохим.* ликопин *(каротиноидный пигмент)*

Mm
machinery *n.* машины; техника; техническое оборудование
magnesium *n.* магний; ~ ammonium nitrate магниево-аммиачная селитра; ~ carbonate карбонат магния; ~ nitrate магниевая селитра; ~ sulfate сульфат магния
mahogany *n.* красное дерево; древесина красного дерева
main *adj.* главный; ~ stem главный стебель
maintain *v.* поддерживать, сохранять, обслуживать; содержать в исправности
maintenance *n.* поддержание; сохранение
maize *n.* кукуруза; маис, *syn.* corn
make (made, made) *v.* делать; работать; созидать; ~ a growth расти, развиваться; ~ a head завязываться *(о кочане капусты)*
making *n.* работа; ремесло; необходимые переработка; процесс изготовления; производство; hay ~ сенокос; wine ~ виноделие
make-up *n.* конституция, сложение; натура, склад *(характера);* состав; genetic ~ *ген.* организация генетического материала, организация генома; генетическая конструкция, рекомбинантная ДНК
male *adj.* мужской; *n.* самец; ~ flower мужской цветок
male-fertile *adj. с.х.* с мужской фертильностью
malformation *n.* неправильное формирование; недостаточное развитие; уродство
mallow *n.* просвирник, мальва *(Malva);* представитель семейства мальвовых *(Malvaceae)*
malt *n.* солод; *v.* солодить; осолаживать; brewer's ~ пивоваренный солод
management *n.* обработка *(почвы);* агротехника; мелиорация; возделывание культуры; landscape ~ *ланд.* управление ландшафтом *(мероприятия по сохранению или изменению почв, растительности, животного мира и др. ресурсов ландшафта); техн.* охрана ландшафтов; планировка ландшафта;

проектирование ландшафта; *экол.* уход за ландшафтом; nutrient ~ использование питательных веществ; применение питательных веществ; pest ~ *экол.* меры борьбы с вредителями; управление борьбой с вредителями; *техн.* защита растений от вредителей; ecological pest ~ биологический метод борьбы с вредителями; integrated pest ~ комплексная защита растений от вредителей *(уничтожение насекомых-вредителей другими полезными насекомыми без применения химикатов);* комплексная борьба с с.-х. вредителями

manganese *n.* марганец

manipulation *n.* обработка; управление *(механизмом)*

mantid *n. энт.* богомол *(Mantidae)*

manufacture *n.* производство; процесс; *v.* изготовлять *(промышленным способом);* обрабатывать, перерабатывать; flour ~ мукомольное производство

manufacturing *n.* производство; выделка; обрабатывающая промышленность; *adj.* промышленный; производственный

manure *n.* навоз; органическое удобрение; удобрение; помет; *v.* унавоживать; удобрять навозом; удобрять (землю); удобрить; унавозить; ~-distributor туковая сеялка

maple *n.* клен; bigleaf ~ клен большелистный (*Acer macrophyllum);* клен крупнолистный *(Acer macrophyllum);* Japanese ~ клен дланевидный, клен веерный *(Acer palmatum);* red ~ клен красный *(Acer rubrum);* sugar ~ клен сахарный *(Acer saccharum);* клен американский, клен ясенелистный *(Acer negundo)*

mapping *n.* картирование; forest site ~ *лес.* картирование лесорастительных условий; genetic ~ *ген.* генетическое картирование; soil ~ *почв.* картирование почв; vegetation ~ *биол.* картирование растительности; геоботаническое картирование

marginal *adj.* краевой; ~ leaf necrosis краевой листовой некроз

marigold *n.* календула *(Calendula);* бархатцы *(Tagetes)*

market *n.* рынок; ~ needs потребности рынка; ~ requirement рыночный спрос

marketable *adj.* ходкий *(о товаре);* товарный; рыночный; ~ fruits плоды товарного вида

marsh *n.* болото, топь, *syn.* bog, ~-bog complex болотистая местность

maternal *adj.* материнский; ~ effect mutation *ген.* мутации с материнским эффектом; ~ groups *лес.* группы растений с материнской стороны; ~ plant *биол.* материнское растение

matter *n. биол.* вещество; dry ~ сухое вещество; organic ~ органическое вещество

maturation *n.* созревание; early ~ скороспелость, раннее созревание

mature *adj.* взрослый; зрелый *(о животном),* созревший, спелый *(о плодах, семени); v.* созревать; вызревать

maturity *n.* спелость, зрелость; ~ crop взрослое растение; at ~ по достижении зрелости или спелости; after ~ биологическая спелость; before ~ техническая спелость; late ~ variety сорт позднего срока созревания; picking ~

уборочная спелость; soil ~ зрелость *(сформированность)* почвы; uniform ~ однородная спелость, зрелость
meadow *n.* луг; луговина; поляна; покос сенокосное угодье; *adj.* луговой; flood / plain ~ заливной луг; native ~ естественный луг
meal *n.с.х.* мука простого помола; размолотое зерно; *v.* размалывать в муку; barley ~ ячменная мука; blood ~ кровяная мука; corn ~ кукурузная мука; corn gluten ~ кукурузная глютеновая мука; cottonseed ~ мука из жмыха семян хлопчатника; high protein ~ мука с высоким содержанием белка; soy bean ~ соевый шрот; соевая мука; sunflower ~ жмых подсолнечника
mealybug *n. биол.* червец; мучнистые червецы, войлочники *(Pseudococcidae)*
measure *n.* мера, система измерений; степень; мероприятие; доза; *v.* измерять; дозировать; land ~ мера земельной площади; plant protection ~s методы защиты растений
measurement *n.* измерение, замер; *pl.* размеры; ~ of quality показатель качества
mechanical *adj.* механический; автоматический; ~ harvesting машинная /механизированная уборка урожая
medium *adj.* средний *(размер);* промежуточный; ~ green умеренно зеленый; ~ late среднепоздний; ~ long storage среднедлительного хранения; ~ tight structure структура отличается средней плотностью
meliorative *adj.* улучшающий, приводящий к улучшению; *рек.* мелиоративный, *syn.* land-improvement
mellow *adj.* плодородный, жирный *(о почве);* рыхлый *(о почве);* выдержанный *(о вине); v.* разрыхлять *(почву);* спеть, созревать
melon *n.* дыня; citron ~ арбуз кормовой; juicy ~ сочная дыня; ripe ~ зрелая дыня; water ~ арбуз столовый
meltdown *n.* расплавление
mentor *n.* воспитатель, ментор, наставник, руководитель; ~ method *биол.* метод ментора
meristem *n.* меристема
metabolic *adj.* метаболический
metaphysical *adj.* метафизический, относящийся к метафизике; не доступный опыту; сверхъестественный, *syn.* supernatural
methi *n. бот.* пажитник сенной *(Trigonella foenum-graecum), syn.* fenugreek
methionine *n. биохим.* метионин
microbe *n.* бактерия, микроб, микроорганизм, *syn.* bacterium, microorganism; mimicking ~ virus *ген.* вирус, мимикрирующий под микроб
microcrack *n.* микротрещина
micromesh *n.* мелкоячеистая сетка
micronutrient *n.* микронутриент, питательный микроэлемент; ~ fertilizers микроудобрения
middle *n.* борозда; междурядье
midi *adj.* средний размер; ~ cucumber укороченный огурец
midrib *n.* средняя жилка листа, главная жилка *(листа)*

mild *adj.* мягкий *(климат);* умеренный; слабый
mildew *n. бот.* милдью, ложная мучнистая роса; cucumber downy ~ ложная мучнистая роса огурцов; tomato powdery ~ мучнистая роса томатов
milkweed *n. бот.* ваточник *(Asclepias);* латук метельчатый *(Lactuca spicata);* латук ядовитый *(Lactuca virosa);* молочай пятнистый *(Euphorbia maculata);* молочай венчиковидный *(Euphorbia corollata)*
mill *n.* мельница; дробилка; мукомольный комбинат; *v.* молоть; дробить *(зерно);* веять; очищать *(семена)*
millet *n.* просо
milling *n.* молотьба; дробление, измельчение
mineral *adj.* минеральный; насыщенный минеральными веществами; *хим.* неорганический; exposed ~ soil *лес.* минерализованная почва; ~ element элемент минерального питания; минеральный элемент; ~ part of soils *почв.* минеральная часть почвы; ~ rock wool минеральная вата
misshapen *adj.* уродливый; ~ fruits плоды неправильной формы
mistletoe *n. бот.* омела белая *(Viscum album);* ~ infestation *лес.* омела *(заболевание)*
mite *n.* клещ
mitigate *v.* смягчать, уменьшать, syn. lessen, mollify; умерять, сдерживать; облегчать
mixed *adj.* смешанный; ~ row смешанный ряд *(растений)*
mixer *n.* смеситель, смешивающий аппарат
mixture *n.* перемешивание, смешивание; смесь; *v.* мешать; смешивать; nutrient ~ *техн.* питательная смесь
moderate *adj.* умеренный
modulator *n.* модулятор; hydrologic flow ~ модулятор гидрологических *(водных)* потоков
mogha *adj.* напрасный, бесполезный
moist *adj.* влажный; сырой; ~ climate сырой, влажный климат
moisture *n.* влага; влажность; сырость; ~ content влагосодержание, влажность, содержание влаги; ~ loss усушка; excess ~ избыточная влага; relative ~ относительная влажность; soil ~ почвенная влага
mold *Am. E. n.* плесень; гниль; *syn. Br. E.* mould; перегной; гумус; *v.* плесневеть; гнить; black ~ черная плесень; cercospora leaf ~ церкоспорозная плесень листвы; leaf ~ кладоспориоз или бурая пятнистость листьев; tomato grey ~ серая гниль томата; white ~ белая гниль, склеротиниоз
molybdenum *n. хим.* молибден
monitor *n.* контроль за состоянием; *v.* контролировать, проверять
monoculture *n.* бессменная культура; однооборотная культура
monoecious *n. бот.* однодомный; обоеполый, гермафродитный; биол. двуполый; обоеполый; смешанного типа цветения; ~ plant *ген.* однодомное растение
monogerm *adj.* однозародышевый; ~ seeds однозародышевые семена
morphology *n.* морфология; developmental ~ эволюционная морфология; soil ~ *агрохим.* морфология почвы

mortality *n.* летальность, отпад
moss *n. бот.* мох, *pl.* мхи; моховое болото; bog ~ торфяной мох, сфагнум
moth *n.* мотылек; моль; бабочка; turnip ~ *энт.* ночница озимая; совка озимая *(Agrotis segetis);* tussock ~s *лес.* волнянки *(Lymantriidae)*
mother *n.* мать; ~ solution исходный раствор, маточный раствор
mow (mowed, mown) *v.* косить; жать; *n.* стог; копна; сеновал
mown-out *adj.* выкошенный
mower *n.* косец, косарь; (сено) косилка; hand ~ ручная косилка; lawn ~ газонокосилка; power ~ электрическая косилка, *syn.* mowing machine
mowing *n.* покос, сенокос, *syn.* hay time, haymaking; ~ practice метод скашивания
mulberry *n.* шелковица, тут *(Morus);* малина душистая *(Rubus odoratus);* paper ~ бумажная шелковица, бруссонеция бумажная *(Broussonetia papyrifera)*
mulch *n.* дерновый грунт с перегноем; мульча *(материал для покрытия почвы); v.* мульчировать
multinodal *adj.* многоузелковый; многомутовчатый *(о типе ветвления ствола дерева);* многоузловой
multiple *adj.* множественный, сложный, со сложной структурой; ~ resistance множественная устойчивость
multiply *v.* размножаться; увеличиваться в числе
multiplication *n.* размножение; seed ~ производство семян
multipurpose *adj.* универсальный; комплексный; многоцелевой; ~ hybrid универсальный гибрид
multitier *adj.* многоуровневый *(напр. о системе управления);* многоярусный *(о стеллаже, складе);* многорядный
mushroom *n.* гриб *(съедобный)*
mustard *n.* горчица; ~ oil горчичное масло
mutagen *n.* мутаген, *syn.* mutagene; chemical ~ *агрохим.* химический мутаген; environmental ~ *ген.* средовый мутаген; physical ~ *биох.* физический мутаген
mutation *n.* мутация; visible ~ видимая мутация; undesirable ~ нежелательная мутация
mycelium *n.* мицелий, грибница
mycorrhiza *n. лес.* микориза; грибокорень
mycosphaerella *n.* грибок, вызывающий пятнистость листьев; черную стеблевую гниль

Nn
name *n.* имя; название; *v.* давать имя; называть; generic ~ родовое название; specific ~ видовое название
narrow *n.* борона
narrow-row *adj.* узкорядный; ~ planter узкорядная сеялка; ~ planting узкорядный посев

native *adj.* аборигенный, местный; врожденный; природный, естественный; нативный *(напр. о препарате)*
nature *n.* природа; основное свойство, сущность
natural *adj.* природный, естественный; некультивированный; натуральный, настоящий; дикий; ~ rock *техн.* естественная горная порода; материнская горная порода; ~ selection *биол.* естественный отбор
neck *n.* шейка *(луковицы);* перехват *(у плечиков корнеплода)*
necrogenic *adj.* некрогенный, развивающийся в мертвом организме; ускоряющий разложение, распад *(о микроорганизмах)*
necrosis *n.* некроз, отмирание; омертвение
nectar *n.* нектар
needle *n.* игла, *pl.* хвоя, иглы
nematode *n.* нематода *(нитчатый червь); pl.* круглые черви, нематоды; golden ~ of potato картофельная нематода; wheat ~ пшеничная нематода
neonicitinoid *n.* неоникотиноид *(инсектицид)*
net *adj.* чистый, нетто *(о весе, доходе);* net ~ *с.х.* «домик из сетки« *(с.-х. конструкция для сезонного выращивания овощных культур);* сеточные дома; ~ weight вес нетто, вес без упаковки
netting *n.* ловля сетями; сетка; сеть
nightshade *n.* паслен *(Solanum)*
nitrate *n.* нитрат, селитра, соль азотной кислоты; ~ nitrogen нитратый азот; ~ of lime азотнокислый кальций, кальциевая селитра; ~ treatment level *агрохим.* уровень обработки нитратом
nitric *adj.* азотный; ~ acid азотная кислота
nitrification *n.* нитрификация
nitrogen *n.* натрий; ~ consumer азотопотребитель; ~ fertilizer азотное удобрение; ~ fixer азотофиксатор *(бактерия);* ~ gatherer *биол.* азотонакопитель; *лес.* азотособиратель
nitrogen-fixing *adj. агрохим.* азотфиксирующий *(о растении);* ~ bacterium *биол.* азотфиксирующая бактерия; ~ capacity азотсвязывающая способность; ~ plant азотфиксирующее растение
nitrogenous *adj.* азотный, азотистый
nitro shooter *n.* машина для внесения жидких азотных удобрений
node *n.* узел *(на стебле у злаков),* колено *(ветки, корня),* нарост; утолщение
nodule *n.* клубенек; узелок; гранула; зерно; нарост на растении
no-grade *adj.* не сортовой
nomenclature *n.* номенклатура, перечень названий; binomial ~ биномиальная номенклатура
non-essential *adj.* заменимый; ~ amino acid заменимая аминокислота; ~ fatty acid заменимая жирная кислота
nonhost *n.* растение, не поражаемое микроорганизмом
non-photosynthetic *adj.* нефотосинтезирующий
non-productive *adj.* неплодородный

no till *n.* нулевая обработка почвы *(перед посевом);* гербицидная обработка почвы *(без вспашки); adj.* беспахотный
novel *adj.* неизвестный, новый, нестандартный; ~ trait *ген.* неизвестный признак; необычный признак
nuclear *n. биол.* ядерный, относящийся к ядру; содержащий ядро; ~ membrane ядерная оболочка
nucleic *adj.* нуклеиновый; ~ acids нуклеиновые кислоты
nucleous *n.* ядро *(клетки);* косточка *(плода),* ядро *(ореха)*
nursery *n.* питомник; рассадник; breeding ~ селекционный питомник; open-bed ~ питомник на открытом грунте; plastic ~ пленочная теплица; pot plant ~ теплица для выращивания растений в горшках; ~ seedlings саженцы, выращенные в питомнике
nursling *n.* сеянец, молодое растение, саженец
nut *n.* орех; плод ореха; *v.* собирать орехи
nutcracker *n.* кедровка, ореховка *(Nucifraga);* поползень *(Sitta);* Clark's ~ североамериканская ореховка *(Nucifraga columbiana)*
nutrient *n.* питательное вещество; adj. питательный; ~ cycle цикл питательных веществ; *экол.* круговорот питательных веществ; ~ intensity концентрация питательных веществ; ~ lack недостаток питательных веществ; ~-poor soil *техн.* бедная почва; ~-rich soil *лес.* питательная почва; ~ solution питательный раствор, питательная среда; ~ storage запас питательных веществ; ~ value питательность; digestible ~ усвояемое питательное вещество; growth-limiting ~ *биол.* вещество, недостаток которого в питании вызывает замедление роста; лимитирующее / ограничивающее рост питательное вещество; plant ~ питательное вещество для растения
nutrient-rich *adj.* питательный; *техн.* плодородный *(о почве);* ~ soil layer *почв.* питательный слой почвы; ~ water *экол.* вода с большим содержанием биогенных веществ
nutritional *adj.* относящийся к питанию; пищевой, питательный; *syn.* nutritive; ~ value питательная ценность
nutritious *adj.* питательный
nymph *n. энт.* нимфа *(личинка в цикле неполного превращения);* бабочка
nymphal *adj. зоол.* нимфальный; окуклившийся; ~ stage нимфальная стадия; предкуколочная стадия; стадия нимфы

Oo
oak *n.* дуб; red ~ дуб красный *(Quercus rubra);* дуб северный *(Quercus borealis);* дуб американский шарлаховый *(Quercus coccinea);* swamp ~ дуб лавролистный *(Quercus laurifolia);* дуб болотный *(Quercus palustris);* tanbark ~ пазания густоцветковая *(Pasania densiflora);* white ~ дуб белый *(Quercus alba)*
oakleaf *n.* дуболистость
oat *n.* овес; cultivated ~ овес посевной
oblate *adj.* сплющенный, плоскоокруглый

oblong *adj.* продолговатый, удлиненный, вытянутый
obtain *v.* получать, доставать, приобретать
occasional *adj.* случающийся время от времени, иногда, редко; редкий, случайный; ~ occurrence of species редкая встречаемость вида
occurrence *n.* встречаемость *(напр. вида);* местонахождение, распространение; наличие *(признака)*
occur *v.* наблюдаться, случаться, встречаться
oedema *Br.E.*, **edema** *Am.E. n.* отек
odour *n.* запах, аромат
offal *n.* отходы помола; отруби; высевки; побочные продукты переработки; отбросы; мусор
offspring *n.* отпрыск, потомок, *syn.* scion; продукт, результат, *syn.* issue, outcome, result
oil *n.* растительное масло; ~ seed масличное семя; sunflower ~ подсолнечное масло
okra *n.* окра, бамия *(Abelmoschus esculentus)*
olive *n.* маслина европейская *(Olea europaea);* Russian ~ лох узколистный *(Elaeagnus angustifolia)*
onion *n. бот.* репчатый лук; луковица; луковичное растение; bulb ~ лук репчатый; white ~ белый лук
oospore *n.* ооспора; ~ formation образование ооспор; resilient ~ упругие, эластичные ооспоры; ~ oospore жизнеспособная ооспора
ooze *n.* ил, тина; болото, топкая местность; просачивание, выделение влаги; истечение
open *adj.* открытый; распустившийся, расцветший; разреженный, редкостойный; ~ drain открытая водосточная труба; открытая дрена; ~ field открытый грунт; ~ field grown tomato томат, выращиваемый в открытом грунте; ~ plant habit открытый характер развития растения; ~ plant type открытый тип растения
open-grown *adj.* выросший на открытом месте; ~ tree дерево, выросшее в редком древостое
open-pollinated *adj.* перекрестноопыляющийся
orchard *n.* фруктовый сад, плодовый питомник
order *n.* отряд; порядок; последовательность; расположение, размещение; ~ of fellings *лес.* последовательность лесосек; ~ of root *с.х.* порядок ветвления корня; soil ~ *почв.* тип почвы *(по американской классификации почв)*
organic *adj.* органический; ~ acid органическая кислота; ~ fertilizer органическое удобрение; ~ matter органическое вещество; натуральный; экологически чистый; полученный без применения химических удобрений, консервантов; ~ produce органическое производство; ~ food натуральные продукты; ~ soil органическая почва; ~ substrate органический субстрат
organically-enriched *adj.* обогащенный органикой
origin *n.* происхождение, источник; род; common ~ общее происхождение
original *adj.* первоначальный; коренной

ornamental *adj.* декоративный, орнаментальный, служащий украшением; ~ hedge декоративная изгородь; ~ planting декоративные, орнаментальные посадки / насаждения
ounce *n.* унция *(единица веса; = 28,3 г)*
outbreak *n.* вспышка болезни, эпифитотия; нашествие *(с.-х. вредителей)*
outdoor *adj.* находящийся под открытым небом
outlet *n. техн.* выпускное, выходное отверстие; выпуск, выход; слив, сток
output *n.* продукт, отдача, выход; выходные данные; результат вычислений
outyield *v.* превосходить по урожайности или продуктивности
ovary *n. бот.* завязь
overdrill *n.* подсев; *v.* подсевать
overgrowth *n.* гипертрофия, разрастание; заросль
overhead *adj.* верхний; ~ lighting верхний свет; ~ /sprinkling / spray irrigation дождевание
overlarge *adj.* огромный, непомерно большой; ~ fruits перезревшие *(переросшие)* плоды
overmature *adj.* перезрелый, переспелый; *syn.* overripe; ~ fruit перезрелый плод; ~ stage стадия переспелости; *лес.* перестойный
overripe *adj.* переспелый, перезрелый; перестойный *(о лесе)*
overrun *n.* избыток
overseed *v.* высевать сверх нормы
overstory *n.* верхний ярус *(лесонасаждения);* высокоствольные спелые деревья
oversow (oversowed, oversown) *v.* пересевать, засевать заново; сеять дополнительно; высевать слишком много семян; сеять вразброс
overtopped *adj. биол.* подчиненный; *лес.* угнетенный *(о дереве)*
overuse *v.* чрезмерно, слишком долго использовать; злоупотреблять
overwinter *v.* перезимовать *(о животных и растениях);* ~ ing plant зимующее растение
ovule *n.* семяпочка, семязачаток
oxidation *n.* окисление; bacterial ~ бактериальное окисление
oxisol *n. почв.* оксисоль *(почва)*
oxygen *n.* кислород; ~-free бескислородный, не содержащий кислорода; ~ -tolerant не чувствительный к кислороду

Pp
packaging *n.* упаковка, способ упаковки
paddy *n.* рис-падди, рис-сырец, необрушенный рис; ~ field рисовое поле, *syn.* rice ~
palatable *adj.* аппетитный, вкусный
palatability *n.* вкусовая привлекательность
palm *n.* пальма
pan *геол.* подпочвенный пласт *(водонепроницаемый);* hard ~ *почв.* твердая прослойка; *экол.* твердый надпочвенный пласт; iron hard ~ *почв.* песчаный слой, сцементированный окислами железа

panning *n.* затвердение почвы; образование почвенной корки; soil ~ уплотнение почвы *(колесами машин)*
parasitic *adj.* паразитический
parasite *n.* паразит; паразитическое чужеродное растение; foliar ~ листовой паразит; plant ~ растительный паразит
parasitize *v.* паразитировать
parasitoid *n.* паразитоид
parent *n.* родитель; ~ line родительская форма; recurrent ~ родительская форма, с которой гибрид скрещивается вновь
park *n.* парк; заповедник; dendrological ~ дендрологический парк, *syn.* arboretum ~; national ~ заповедник; национальный парк; nature ~ природный парк
parsley *n.* петрушка
parsnip *n.* пастернак посевной *(Pastinaca sativa);* морковь дикая *(Daucus carota)*
parthenocarpic *adj.* самоопыляющиеся, партенокарпический; almost ~ факультативный партенокарпик, с преимущественно женским типом цветения
particle *n.* частица; крупица *(почвы)*
partitioning *n.* разделение, расчленение, разбиение, выделение отделов
pasteurization *n.* пастеризация
pasteurize *v.* пастеризовать
pasteurized *adj.* пастеризованный; ~ foods пастеризованные пищевые продукты
pasturage *n.* пастбище; выгон, выпас
pasture *n.* подножный корм; пастбище; выгон; выпас; пастбищные угодья; пастьба; стравливание травостоя; *v.* пасти скот; пастись
pathogen *n.* возбудитель болезни
pathway *n. ланд.* тропинка, тропа; *биол.* путь обмена, путь метаболизма; путь; ход
patch *n.* небольшой участок, просека
patent *adj. биол.* открытый, доступный; явный, очевидный; *n.* патент; ~ application патентная заявка; заявка на выдачу патента
patio *n. ланд.* патио *(открытый внутренний двор)*
pea *n.* горох; cow ~ вигна *(Vigna);* field ~ горох огородный *(Pisum sativum), syn.* garden ~; pigeon ~ кайанус, каянус, голубиный горох *(Cajanus);* snap ~ горох сахарный; snow ~ горошек в стручках
peach *n.* персик
peanut *n.* земляной орех
pear *n.* груша; ~-shaped грушевидный
peat *n.* торф; ~ litter торфянистая подстилка; ~ moor болотный торф; ~ slab / bag торфяной мат / брикет; ~ soil торфяная почва, перегнойная почва; soddy ~ пластовой торф
pebble *n. ланд.* галька, булыжник, гравий; ~ yard двор с гравийным покрытием; aquarium ~ галька для аквариума; landscape ~ галька для ландшафтного дизайна; polished ~ отполированная галька
peeling *n.* шелуха, очистка кожуры

pedicle *n.* цветоножка; плодоножка; стебелек, *syn.* peduncle, fruit stem; ~ attachment место прикрепления плодоножки; jointless ~ плодоножка плода без сочленения *(у томата)*
pedology *n.* почвоведение, *syn.* soil science
pelleted *adj.* дражированный; гранулированный *(о семенах);* таблетированный; брикетированный
pendent *adj.* свисающий, плакучий
penetrate *v.* проникать, заглубляться
pepper *n.* перец; Cayenne ~ перец кайенский *(Capsicum annuum),* перец однолетний *(Capsicum annuum);* перец многолетний *(Capsicum frutescens);* hot ~ горький перец; red ~ сладкий перец
per *prep.* за, на, в, с *(каждого);* указывает на количество, приходящееся на определенную единицу; ~ year за год; ~ capita / head на душу населения
peracid *n. хим.* надкислота; перкислота; *adj.* перкислотный
percentage *n.* процент; процентное отношение; процентное содержание
percolation *n.* просачивание; проникновение; процеживание
perform *v.* исполнять, выполнять; делать, совершать; ~ well расти хорошо, показывать хорошую продуктивность
perennial *adj.* многолетний, сохраняющийся круглый год; *n.* многолетнее растение; ~ river *с.х.* река, имеющая сток в течение всего года; *техн.* река с постоянным стоком
performance *n.* продуктивность; производительность; показатель; КПД; работа; growth ~ показатель роста; high ~ varieties высококачественные сорта
pericarp *n.* околоплодник, перикарпий
perishable *adj.* скоропортящийся *(продукт), ant.* imperishable
perlite *n.* перлит
permafrost *n.* вечная мерзлота
permeable *adj.* проницаемый; ~ shelterbelt *лес.* продуваемая полоса; selectively ~ membrane *биохим.* мембрана с избирательной проницаемостью
peroxide *n. хим.* пероксид, перекись; manganous ~ *агрохим.* перекись марганца; nitrogen ~ *экол.* двуокись азота; pine gum ~ *лес.* перекисное соединение из сосновой живицы
peroxygen *n. хим.* перекисный кислород; пероксидный кислород
perpetuate *v.* сохранять навсегда, увековечивать
perpetuity *n.* бесконечность, вечность; бессрочное владение; пожизненная рента
persistence *n.* выживание, стойкость, выносливость; персистенция *(длительное сохранение вируса в организме);* упорство; устойчивость в растительном покрове; ~ of pesticide длительность действия пестицида
pest *n.* сельскохозяйственный вредитель; вредное насекомое; насекомое-паразит; сорняк; crop ~ насекомое вредитель с.-х. культур; storage ~ амбарный насекомое вредитель; ~ colonization заселенность вредителями
pesticide *n.* пестицид; средство для борьбы с вредителями; химическое средство для борьбы с вредителями; ~ compatibility совместимость пести-

цидов; ~ consumption rate норма расхода пестицида; ~ residue остаточное количество пестицида
petal *n. бот.* лепесток
petiole *n. бот.* черешок листа
pH *n.* показатель степени кислотности среды
phenology *n.* фенология
phenological *adj.* фенологический; ~ stage фенофаза, фенологическая фаза
phenomenon, *pl.* **phenomena** *n.* явление
phenotype *n.* фенотип; abnormally stunted growth ~ *ген.* фенотип с аномальной задержкой роста; immature ~ незрелый фенотип; transformed ~ трансформированный фенотип
phenotypic *adj.* фенотипический; ~ characteristics фенотипические характеристики; ~ traits фенотипические признаки
pheromone *n.* феромон; priming ~ мотивирующий феромон; прайминг-феромон *(феромон, вызывающий долговременный физиологический эффект);* releasing ~ сигнальный феромон, *syn.* signaling ~
Phomopsis *n.* гриб, возбудитель фомопсиоза
phosphate *n.* фосфат
phosphatic *adj.* фосфатный
phosphoric *adj.* фосфорический; содержащий фосфор; ~ acid фосфорная кислота
phosphorus *n. хим.* фосфор
photosynthesis *n. биол.* фотосинтез, фотохимический синтез
phylogenetics *n.* филогенетика *(наука о закономерностях исторического развития разных групп организмов)*
physiognomy *n.* физиономия, внешний вид; рельеф, очертания *(страны, местности, ландшафта)*
physiological *adj.* физиологический; ~ disorders физиологические нарушения
physiology *n. биол.* физиология; crop ~ *с.х.* физиология культурных растений; физиология с.-х. растений; plant ~ физиология растений
phytoene *n. мол. биол.* фитоин; ~ shynthase *биохим.* фитоин синтаза *(основной фермент, участвующий в биосинтезе каротиноидов в растениях)*
phytophthora *n.* фитофтора; ~ rot фитофторозная гниль
pick *v.* собирать *(фрукты, ягоды);* щипать *(траву);* убирать, срывать
picker *n.* уборочная машина, плодосъемник
picking *n.с.х.* сбор *(плодов);* сортировка *(плодов);* ~ problems трудности при сборе урожая; ~ time время уборки урожая; hand ~ ручной сбор *(плодов);* ручная сортировка
pickle *n.* рассол; уксус для маринада; *v.* мариновать, солить
pickling *n.* квашение; ~ cucumbers огурцы для засолки *(корнишоны)*
pinch *v.* пасынковать; отщипывать; прищипывать *(растущие побеги)*
pine *n. лес.* сосна; bishop ~ сосна мягкоигольчатая *(Pinus muricata);* Canary Island ~ сосна канарская *(Pinus canariensis);* loblolly ~ сосна ладанная *(Pinus taeda);* mountain ~ сосна горная *(Pinus mugo);* стланик кедровый *(Pinus*

pumila); pinyon ~ сосна однохвойная *(Pinus monophylla);* ponderosa ~ желтая сосна *(Pinus ponderosa);* red ~ сосна смолистая *(Pinus resinosa);* Scots ~ сосна обыкновенная *(Pinus Sylvestris);* Siberian dwarf ~ кедрач; кедровый стланик *(Pinus pumila);* Turkish ~ сосна калабрийская *(Pinus brutia);* Virginia ~ сосна виргинская *(Pinus virginiana);* white ~ веймутова сосна *(Pinus strobus);* веймутова сосна горная *(Pinus monticola);* white-bark ~ сосна белоствольная *(Pinus albicaulis);* yellow ~ желтая сосна *(общее наименование для ладанной, голой и др. видов сосен Северной Америки)*

pink *adj. бот.* розовый; ~ing – розовая, красная окраска; ~ root розовая гниль корней

pinoideae *n.* подсемейство сосновые

pinyon *n. Am.E.* pinon сосна съедобная *(Pinus edulis)*

Pinus longaeva *лат.* сосна остистая межгорная

pistil *n.* пестик

pit *n. техн.* ямка, углубление; *бот.* пора

pith *n.* мякоть, сердцевина *(растений); v.* извлекать сердцевину *(из растений);* tomato ~ necrosis сердцевинный некроз стеблей томата

pivotal *adj. техн.* центральный; осевой, *syn.* central

placement *n.* внесение *(удобрений);* заделка *(семян)*

plain *n.* равнина, степь; *adj.* простой, обыкновенный, несмешанный, без добавок

plank *n. ланд.* обшивная доска, обшивка досками, *syn.* planking

plant *n.* растение; саженец; урожай; травянистое растение *(в узком смысле); v.* сажать *(растения);* сеять; засаживать; устанавливать; внедрять; засевать; озеленять; adj. растительный; ~ out высаживать в грунт; ~ cultivation растениеводство; high ~ density высокая плотность / густота посадки, загущенная посадка; ~ growth *(темп)* роста / развития растения; ~ habit характер развития растения; ~ load нагрузка на растение; ~ raising выращивание растения от всходов до пересадки; ~ raiser селекционер *(выращивающий новые сорта растений),* производитель посадочного материала; ~ vigor мощность растений; adult ~ взрослое растение; attacked ~ пораженное растение; bedding ~ грунтовая культура; ~ breeding / growing растениеводство; carnivorous ~ хищное растение; climbing ~ вьющееся растение; drug ~ лекарственное растение; evergreen ~ вечнозеленое растение; food ~ пищевое растение; hanging ~ декоративное растение для подвесных кашпо; light demanding ~ светолюбивое растение; long day ~ растение длинного дня; medicinal ~ лекарственное растение; parental ~ исходное *(родительское)* растение; perenial ~ многолетнее растение; potted ~ горшечная рассада; горшечное растение; shade requiring ~ тенелюбивое растение; subsequent ~ последующее растение; transplanted ~ пересаженное растение; wild ~ дикорастущее растение

plantation *n.* плантация, насаждение

plant breeder *n.* растениевод, селекционер

planter *n.* посадочная машина; сеялка; drill ~ рядовая сеялка; tiller ~ сеялка-культиватор

planting *n.* посадка; высадка; посев; сев; культуру; озеленение; ~ distance расстояние между растениями при посадке, густота посадки; ширина междурядий при посадке; ~ schedule сроки / календарный план / схема посадки; ~ stock посадочный материал, саженцы; companion ~ *с.х.* совместная посадка растений-компаньонов *(для отпугивания вредителей и привлечения насекомых-опылителей);* посадка растений-спутников; enrichment ~ *лес.* посадки леса с внесением удобрений в почву; улучшающие посадки *(для увеличения доли участия ценных пород);* moon ~ посадка по лунному календарю; summer ~ летняя посадка

plastic *adj.* пластичный; пластический; пластмассовый; пластиковый, сделанный из пластика; синтетический; ~ film полиэтиленовая пленка; ~ pot пластиковый горшочек

plethora *n.* изобилие, избыток

ploidy *n. ген.* плоидность

plot *n.* делянка; участок *(земли);* experimental ~ опытный участок; land ~ земельный участок; propagation ~ *биол.* участок размножения; sample ~ пробная делянка

plow *Am. E.*, **plough** *Br. E. v.* пахать; вспахать; вспахивать; поддаваться вспашке; прокладывать борозду; бороздовать; разрыхлять; ~ under запахивать; ~ up вспахивать; *n.* соха; орало; сельское хозяйство; упряжка с плугом; пахотная земля; плуг

plowing *n.* вспашка; boardless ~ безотвальная вспашка; contour ~ *агрохим.* вспашка по горизонталям; *экол.* контурная вспашка; deep ~ глубокая вспашка; primary ~ основная вспашка

plum *n.* слива

plume *n.* перо; ~ grass биол. эриантус сахаристый *(Erianthus saccharoides); с.х.* дихелахне редкая *(Dichelachne)*

pod *n.* боб; стручок; кожура; лузга; образовывать бобы, стручки

pointed *adj.* заостренный, остроконечный; ~ fruits плоды с носиком

poison *v.* отравлять; заражать; *n.* яд, отрава; токсин

poisoning *n.* отравление, интоксикация; применение яда; nitrate ~ отравление нитратами; weed ~ отравление ядовитыми травами

polder *n.* польдер *(осушенный участок земли, защищенный дамбой)*

pollen *n.* пыльца; ~ germination прорастание пыльцы; ~ grain пыльцевое зерно; ~ tube пыльцевая трубка; ~ tube nucleus ядро пыльцевой трубки; donor parent ~ *ген.* пыльца донорского родителя

pollinate *v.* опылять; опылить; *с.х.* опыляться

pollinated *adj.* опыленный; open ~ свободно опыленные; poor ~ fruits слабо опыленные плоды

pollination *n. бот.* опыление; close ~ родственное опыление; cross ~ перекрестное опыление; hand ~ *с.х.* опыление ручным способом; ручное опыление; insect ~ опыление насекомыми; spontaneous ~ самоопыление

pollinator *n.* опылитель

pollutant *n.* загрязняющий агент; поллютант

pollute *v.* загрязнять
pollution *n.* загрязнение; air ~ атмосферное загрязнение; environmental ~ загрязнение окружающей среды; man-made ~ антропогенное загрязнение
polyculture *n.с.х.* поликультура; выращивание различных культур
polyhedrosis *n.* полиэдроз; cytoplasmic ~ цитоплазматический полиэдроз *(возбудитель вируса)*
polyploid *n. биол.* полиплоид; ~ species *лес.* полиплоидные виды; polyploid ~ *с.х.* полиплоидная пшеница; primary ~ *ген.* первичный полиплоид
polyploidy *n. ген.* гипердиплоидия; полиплоидия; balanced ~ сбалансированная полиплоидия; rampant ~ буйная полиплоидия *(характеризующаяся изменчивым и неправильным числом хромосом)*
polythene *n.* полиэтилен, *syn.* polyethylene
pond *n. биол.* пруд; водоем; бассейн; запруда; above-ground ~ *ланд.* наземный пруд; dug ~ *ланд.* вырытый водоем; koi fish ~ *ланд.* пруд с золотыми рыбками; искусственный пруд с японскими карпами; plant-filled ~ заросший пруд
pool *n. биол.* группа, совокупность; пул, фонд; водоем; бассейн; водохранилище; заводь; полынья; gene ~ генетический фонд, генофонд
poplar *n.* тополь; lombardy ~ тополь итальянский пирамидальный *(Populus nigra var. italica gracilis);* yellow ~ лириодендрон тюльпанный, тюльпанное дерево *(Liriodendron tulipifera);* липа американская *(Tilia americana)*
population *n.* популяция; густота стояния растений; плотность насаждения; плотность посева; население / численность населения
pore *n.* пора, отверстие
porous *adj.* пористый
postemergence *adj.* период после появления всходов; послевсходовый
potassic *adj.* калийный, калиевый
potassium *n. хим.* калий; ~ nitrate нитрат калия, калиевая селитра
potato *n.* картофель; ~-digger картофелекопатель; ~-digging копка картофеля; ~-planter картофелесажалка; sweet ~ батат, сладкий картофель
potting *n.* посадка или пересадка растений в горшки; ~ compost *Br. E.*/soil *Am. E.* грунт для комнатных растений; ~ soil почва в горшочках для пикировки сеянцев
poultry *n.* домашняя птица
powder *n.* порошок; сухое молоко, измельченное в порошок
powdery *adj.* порошкообразный, порошковидный; ~ mildew настоящая мучнистая роса
power *n.* сила, мощность; способность; производительность; ~ of the rootstock сила роста подвоя; absorbing ~ сила поглощения, абсорбционная способность, поглощающая способность; breeding ~ плодовитость; feeding ~ питательность; fishing ~ уловистость, промысловая мощность; germinating ~ энергия прорастания; growing/growth ~ способность к росту; жизнеспособность; энергия роста; moisture-retaining ~ влагоудерживающая способность; pathogenic ~ патогенность; reproductive ~ способность к размножению

practice *n.* прием; метод; способ; технология; *v.* применять, практиковать; agricultural ~ агроприем; approved ~ испытанный агроприем; proper ~ правильная, подходящая практика; conservation ~ метод мелиорации земель; irrigation ~ методы полива; water control ~ водоохранное мероприятие
precipitate *n.* осадок; *v.* осаждать(ся)
precipitation *n.* осаждение, преципитация; осадки; атмосферные осадки; выпадение осадков, выпадение в осадок; natural ~ природные осадки; up-to-the-second ~ reports *техн.* сводка об осадках с точностью до секунды
predator *n.* хищник; пожиратель
predominantly *adv.* особенно, преимущественно; ~ female преобладающий женский тип цветения
pre-emergence *n.* период перед прорастанием; предвсходовый
preharvest *n.c.x.* предуборочный период; *adj.* предуборочный
premature *adj.* недозрелый; скороспелый; ~ dying off преждевременная гибель
prematurely *adv.* безвременно; преждевременно
prepacked *adj.* расфасованный
preparation *n.* приготовление; подготовка; препарирование; препарат; seedbed ~ предпосевная подготовка почвы, предпосевная обработка
preplant *adj.* предпосевной *(о внесении удобрений и т.п.)*
prescribed *adj.* предписанный, установленный; ~ burning *лес.* выжигание; запланированное выжигание; контролируемое выжигание; профилактическое выжигание
preserve *v.* сохранять, оберегать; консервировать; *n.* заповедник, заказник; wildlife ~ *лес.* заказник; заповедник
preservation *n.* сохранение; консервирование; охрана, защита; предохранение; предупреждение; профилактика
preservative *n.* консервант, консервирующее вещество; фиксатор; антисептик
preserve *v.* хранить, держать *(овощи, продукты);* заготовлять впрок; консервировать; сохранять, оберегать; *n.* заповедник, заказник
press *v.* выжимать, прессовать, сдавливать
pressure *n.* давление; osmotic ~ осмотическое давление *(почвенного раствора, клеточного сока);* osmotic ~ apparatus *агрохим.* осмометр *(прибор для измерения осмотического давления растворов);* pest ~ *биол.* воздействие вредителей
prevent *v.* предотвращать, предупреждать; препятствовать, мешать; to ~ from smth. оберегать от чего-л.; ~ diseases профилактика возникновения заболеваний
prevention *n.* предотвращение, предохранение, предупреждение
preventive *adj.* профилактический, предупредительный; ~ measures профилактические меры
precipitation *n.* выпадение осадков, осадки, осаждение, преципитация
precision *adj.* точный; ~ agriculture точное земледелие; *syn.* ~ farming

previous *adj.* предыдущий; предшествующий; ~ crop предшествующая культура, урожай прошлого года
prick out/off *v.* высаживать рассаду; пикировать сеянцы
primary *adj.* основной, главный; ~ branch *лес.* ветвь первого порядка
prime *adj.* превосходный, лучший *(сорт, категория)*
priming *n.* прайминг, стимуляция *(семян);* seed ~ прайминг семян *(обработка биологически активными веществами и специальными удобрениями семян непосредственно во время протравливания посевного материала)*
principal *adj.* главный, основной, ведущий
privet *n. бот.* бирючина *(Ligustrum)*
process *n.* процесс, прием, способ; технологический процесс; *v.* обрабатывать, перерабатывать
processed *adj.* переработанный
processing *n.* обработка, переработка *(сырья);* ~ as break bean / pod переработка дробленными бобами *(порезанными на дольки стручками)*
procurement *n.* закупки; снабжение; поставка; материально-техническое снабжение; заготовка *(с.-х. продуктов);* лесозаготовка
produce *n.* продукт, продукция; выпуск; объем выпуска; v. производить, вырабатывать; плодоносить
production *n.* производство; продуктивность; урожайность; продукция; урожай; ~ cycle цикл производства; ~ phase фаза плодоношения; constant ~ стабильное / постоянное плодоношение; crop ~ растениеводство; forage ~ кормопроизводство; grass ~ выращивание трав; seedling ~ выгонка рассады
productive *adj.* производительный; продуктивный, эффективный; ~ potential *агрохим.* потенциальная производительность почвы; потенциальное плодородие
productivity *n.* производительность, продуктивность; *syn.* performance
profile *n.* профиль *(почвы);* вертикальный разрез, сечение; ~ form строение профиля *(почвы);* complete ~ полный профиль; complex ~ профиль сложного строения; general ~ обобщенный профиль; immature ~ неразвитый профиль; major ~ основной профиль; modal ~ типичный профиль
profitable *adj.* прибыльный; рентабельный; доходный
prohibit *v.* запрещать; препятствовать, мешать
progeny *n.* потомство; потомок; backcross ~ *ген.* потомство, полученное обратным скрещиванием; clonal ~ *ген.* клональное потомство; клон
projection *n. биол.* проекция; выступ; вырост
proliferate *v.* размножаться *(быстро);* расти; распространяться; пролиферировать
proliferating *adj.* размножающийся; пролиферирующий; процветающий
prolong *v.* пролонгировать, удлинять
promote *v.* повышать, стимулировать
promoter *n. биол.* стимулятор; *мол. биол.* промотор; plant ~ *ген.* растительный промотор
prone *adj.* склонный, предрасположенный *(к чему-либо);* ~ to fire *экол.* легковоспламенимый

propagate *v.* размножать(ся), разводить
propagation *n.* размножение; распространение; разведение; ~ by cuttings размножение черенками; ~ by layerings размножение отводками; ~ phase стадия размножения/разведения; artificial ~ искусственное размножение/разведение; vegetative ~ вегетативное размножение
propagator *n.* производитель потомства *(о животных);* фермер, сеятель *(о человеке, занимающемся высаживанием и выращиванием растений), syn.* planter; теплица; камера выгонки рассады; термостат для проращивания семян; культиватор *(прибор для культивирования микроорганизмов)*
propagule *n.* росток, отпрыск, побег, сеянец, черешок
proper *adj.* надлежащий; правильный, должный; подходящий; отвечающий требованиям
property *n.* свойство, качество; отличительная черта, особенность; признак; inherited ~ унаследованное качество; milling ~ мукомольное свойство *(зерна);* pedological ~ свойство почвы
prosper *v.* благоденствовать, преуспевать, процветать
prostrate *adj.* стелющийся; прижатый к земле; лежащий ничком, распростертый
protectant *n.* защитное средство, протравитель *(семян, зерна, посевного или посадочного материала)*
protected *adj.* закрытый, защищенный; ~ culture закрытый грунт; ~ cultivation выращивание в закрытом грунте
protection *n.* защита, предохранение, охрана; crop ~ защита посевов; environmental ~ защита окружающей среды; wind ~ защита от ветровой эрозии
protein *n.* белок, протеин; crude ~ сырой протеин
protoplast *n.* протопласт; ~ culture *биотех.* культура протопластов
provide *v.* обеспечить, *syn.* to supply; to ~ smth. for smb. обеспечить кого-л. чем-л.
prune *v.* обрезать *(деревья, кусты, ветви);* пасынковать
pruning *n.* обрезка, подрезка *(ветвей деревьев);* artificial ~ *лес.* искусственная очистка от сучьев; fruit tree ~ обрезка плодовых деревьев; ornamental ~ *лес.* формовочная обрезка
pseudowhorl *n.* псевдомутовка, псевдовиток
pubescence *n. биол.* половое созревание; опушение; опушенность; dense cauline ~ *раст.* густая опушенность стебля; rachis margin ~ *раст.* опушение верхушечного сегмента оси колоса *(характеристика сорта пшеницы)*
puddler *n. биол.* обитатель луж; mud- ~ обитатель илистых луж
puddling *n.* уплотнение почвы; осадка почвы; *(при дождевании)* образование луж
puffiness *n.* отечность, одутловатость
pulp *n. биол.* пульпа; мякоть; ~ and paper industry *лес.* целлюлозно-бумажная промышленность; fruit ~ *овощ.* мякоть плода; wood ~ *лес.* древесная масса; пульпа; древесина; древесное волокно
pulverize *v.* распылять, разбрызгивать; разрыхлять *(почву)*

pump *n.* помпа; насос; *v.* качать *(насосом);* ~ station *техн.* водоотливная установка; насосная камера; насосная станция; electric ~ *техн.* электрический насос
pumpkin *n.* тыква
puncture *n. биол.* пункция; прокол; укус; *v.* прокалывать; пробивать отверстие
pungency *n.* едкость, острота *(о вкусе);* ~ of pepper острый вкус перца, жгучесть перца
pungent *n. биол.* острый; жгучий *(о вкусе, запахе)*
pupate *v. зоол.* окукливаться
pure *adj.* чистый, без примесей
purebred *adj. биол.* чистопородный; ~ line чистопородная линия
purification *n.* очищение; очистка
purity *n.* чистота; чистота; беспримесность; правильность; ~ of variety чистота сорта; seed ~ чистота семян
pyrethroid *n. хим.* пиретроид *(синтетический аналог пиретринов – природных инсектицидов, которые содержатся в некоторых растениях семейства сложноцветных)*
pyrethrum *n. биол.* пиретрум *(Pyrethrum);* Caucasian ~ пиретрум красный *(Pyrethrum coccineum);* florists' ~ персидская ромашка, пиретрум розовый *(Pyrethrum roseum)*

Qq
quality *n.* качество; ~ grade стандарт качества; baking ~ хлебопекарное качество *(пшеницы), syn.* bread-making ~; milling ~ мукомольная ценность *(зерна);* superior ~ высочайшее качество; ~ trait *ген.* качественный признак; *Pl.* qualities *n.* качества; primary ~ первичные качества; secondary ~ вторичные качества
quantify *v.* определять количество, измерять, мерить, *syn.* measure
quantitative *adj.* количественный; ~ trait *с.х.* полигенный признак; *ген.* количественный признак; ~ trait locus *ген.* локус количественного признака
quantity *n.* количество; величина, *syn.* amount; seeding ~ норма высева *(семян)*

Rr
radiation *n.* радиация, излучение; эволюционная радиация; heat ~ тепловое излучение; solar ~ солнечная радиация
radicle *n. бот.* первичный корешок; зародышевый корень *(в семени)*
radish *n.* редис; редька
rake *v.* грести, сгребать граблями
rain *n.* дождь; ~-fed agriculture неорошаемое земледелие; ~-fed farming богарное земледелие
rainfall *n.* осадки, ливень
raise *v.* поднимать, выращивать

rancid *adj.* прогорклый, протухший *(о жирах, мясе), syn.* nasty, disagreeable, odious
rancidity *n.* прогорклость; прогорклый запах / вкус, *syn.* rancidness
random *adj.* осуществляемый в произвольной последовательности; случайный; непродуманный; беспорядочный; произвольный; выбранный наугад; бессистемный; разный; смешанный; нерегулярный; рандомизированный; ~ sampling произвольная выборка/взятие образцов
randomized *adj.* рандомизированный; хаотизированный; ~ experiment *агрохим.* рандомизированный опыт *(при случайном расположении делянок); ~* plot *биол.* произвольно взятая площадка
range *n.* ряд; сфера, зона, область; размах; диапазон, интервал; вариационный размах; ареал; область распространения *(растения);* район обитания *(животного);* пастбище; период существования на Земле *(растения, животного); v.* водиться, встречаться; колебаться в известных пределах; ~ of humidity предел колебания влажности; home ~ участок обитания *(особи, семьи, стада, стаи),* индивидуальный участок; tolerance ~ амплитуда устойчивости к определенному фактору
rank *v.* ценить, располагать по рангу; котироваться, занимать какое-л. место
rape *n. биол.* капуста *(Brassica);* ~ seed blackleg черная ножка семян капусты *(возбудитель Leptosphaeria maculans);* summer ~ сурепица *(Brassica campestris)*
rapid *adj.* быстрый, скорый
raspberry *n.* малина
rate *n.* доза, норма; скорость, быстрота *(как физическая характеристика)*
ratio *n.* отношение, пропорция; коэффициент; соотношение
raw *adj.* сырой, необработанный; ~ materials сырье
receptacle *n. бот.* ложе; цветоложе, ложе соцветия; цветоножка
reclaim *v.* поднимать *(целину, заброшенные земли);* проводить мелиорацию, осушать *(болота);* ~ swampland осушать болотистую местность
reclamation *n. рек.* мелиорация; освоение *(напр. целинных земель);* engineering ~ *техн.* водная мелиорация; *экол.* гидротехническая мелиорация; техническая мелиорация; land ~ *с.х.* освоение новых земель; освоение земли; улучшение почвы; восстановление земель; sylvicultural ~ *лес.* агролесомелиорация
recognize *v.* признавать, узнавать
recombination *n. ген.* рекомбинация; genetic ~ генетическая рекомбинация
recuperation *n.* рекуперация; регенерация, восстановление
recycling *n.* переработка отходов; повторное использование; использование для другой цели; nutrient ~ рециклинг *(утилизация, переработка)* биогенных веществ
red *adj.* красный; ~ cabbage краснокочанная капуста; ~ spider mite паутинный клещ
reduce *v.* ослаблять, понижать, сокращать(ся), уменьшать(ся), убывать; ~d yield сниженная урожайность

reduction *n.* снижение, уменьшение, сокращение *(чего-л.)*
re-entry *n.* возвращение, повторное появление
re-establishment *n.* восстановление прежнего положения; ~ of forest восстановление прежнего леса
reforestation *n. лес.* лесовосстановление, насаждение лесов, восстановление лесных массивов; managed ~ управляемое лесовозобновление; natural ~ естественное возобновление леса *(процесс образования нового поколения леса естественным путем);* естественное лесовозобновление; самооблесение
refrigerating *adj.* охлаждающий, холодильный
regeneration *n.* регенерация, восстановление; перерождение, *(полное)* обновление; natural forest ~ естественное лесовозобновление, самосев; to secure natural ~ обеспечивать естественное возобновление
regime *n.* режим; air and water ~ *почв.* водно-воздушный режим; soil water ~ *почв.* водный режим почвы
regrowth *n.* отрастание, вторичный рост; отава; подрост *(напр. леса)*
regular *adj.* регулярный, равномерный, правильный, симметричный
regulator *n. биол.* регулятор; growth ~ регулятор роста, ростовое вещество
rejuvenate *v.* омолаживать; производить омоложение; восстанавливать силы; оживляться; реставрировать; активизировать; обновлять
relationship *n.* взаимоотношение, взаимосвязь; botanical ~ ботаническое родство
relatively *adv.* относительно, сравнительно
relay *n.* смена; ~ cropping сменные уплотненные посевы
release *v.* отпускать, выпускать, освобождать
reliable *adj.* надежный, достоверный, заслуживающий доверие
rely *v.* полагаться, рассчитывать на кого-л. / что-л.
remain *v.* оставаться; находиться; оставаться в каком-л. состоянии
remedy *n.* средство от болезни, лекарство; *v.* исправлять *(положение, вещь);* вылечивать, излечивать, исцелять
remnant *n. биол.* остаток; остатки; *adj.* оставшийся, остающийся
remove *v.* перемещать, убирать; удалять, устранять; ~ a side shoot удалять боковой побег
renewable *adj. экол.* восстановимый, возобновляемый; ~ natural resources возобновляемые, восполнимые природные ресурсы
repellent *n.* репеллент; средство, отпугивающее насекомых; помеха, препона; водоотталкивающая ткань
replace *v.* заменять, замещать *(чем-л. / кем-л.)*
replant *v.* пересаживать *(растение);* снова засаживать *(растениями)*
replenish *v.* пополнять, наполнять вновь; доливать; ~ weight loss *биохим.* восполнить потерю в массе; ~ stock *экон.* пополнять запас; ~ the reserves *экон.* пополнять резервы
replication *n. ген.* репликация, ауторепродукция; *биол.* повторность *(опытных групп или участков);* bidirectional ~ *ген.* двунаправленная репликация; three ~s *лес.* трехкратная повторность

reproduce *v.* размножаться; воспроизводить
reproductive *adj.* репродуктивный, половой; ~ organ орган размножения
require *v.* нуждаться *(в чем-л.);* требовать *(чего-л.)*
requirement *n.* требование; необходимое условие; нужда, потребность; to meet the ~s удовлетворять потребностям; отвечать требованиям
reseeding *n.* пересев, повторный пересев
reserve *n. биол.* запас; заповедник; резерват; *v.* запасать; biosphere ~ биосферный заповедник; forest ~ *лес.* резервный лес; заказной лес; заказник; заповедный лес; *экол.* лесной резерват; genetic ~ *экол.* заповедник по охране генетического фонда; nature ~ заповедник; природная охраняемая территория; state ~ государственный заповедник
reservoir *n.* резервуар, вместилище; водохранилище, водоем; резервуар *(возбудителя инфекции);* annual storage ~ водохранилище годового регулирования; flowing water ~ *экол.* проточный водоем; stagnant ~ стоячий водоем, непроточный водоем; water ~ *агрохим.* водный бассейн; водохранилище; *экол.* водоем
residual *n.* остаток, остаточный продукт; *лес.* ~ tree оставленное дерево; ~ stand остаточный древостой
residue *n. хим.* осадок; *биол.* остаток; остаточный; chemical ~ *техн.* химический остаток; остатки / следы химических веществ; plant ~ уборочные остатки растения
resilience *n.* устойчивость; жизнестойкость
resinous *adj.* смолистый
resistance *n.* устойчивость; ~ to insect attack *лес.* стойкость к повреждению насекомыми; antibiotic ~ устойчивость к антибиотику; antibiotic ~ genes гены устойчивости к антибиотикам; bacterial ~ бактериальная устойчивость; breeding for disease ~ *раст.* селекция на устойчивость к болезням; disease ~ *лес.* устойчивость к заболеванию; genetically modified insect ~ невосприимчивость к воздействию насекомых, созданная генетическим путем; herbicide ~ *раст.* гербицидная устойчивость; резистентность к действию гербицидов; horizontal ~ *ген.* горизонтальная устойчивость растений; insect pest ~ устойчивость к воздействию насекомых-вредителей; insecticide ~ устойчивость к инсектицидам; pest ~ *с.х.* устойчивость к вредителям; polygenic ~ *ген.* полигенная устойчивость; single-gene ~ *ген.* моногенная устойчивость; vertical ~ *ген.* вертикальная устойчивость растений
resistant *adj.* устойчивый, резистентный
resource(s) *n.* ресурс(ы), средства; natural ~s природные ресурсы; forest ~s *лес.* лесные ресурсы; лесной фонд
respectively *adj.* в указанном порядке; соответственно, соответствующим образом
restocking *n. лес., с.х.* лесовозобновление, лесовосстановление, возобновление запасов; ~ of forest лесовозобновление, лесовосстановление
restoration *n.* восстановление *(земель в первоначальном виде);* environmental ~ *экол.* восстановление качества окружающей среды; восстановление окру-

жающей среды; экологическое восстановление; восстановление прежнего состояния окружающей среды; natural ~ естественное восстановление
restorer *n. ген.* восстановитель; fertility ~ *ген.* восстановитель фертильности
restrict *v.* ограничивать *(в пределах чего-л.), syn.* limit
result *v.* следовать, проистекать *(из чего-л.),* происходить в результате *(чего-л.);* ~ in smth. приводить *(к чему-л.),* кончаться *(чем-л.);* иметь результатом; ~ from smth. следовать, происходить в результате; происходить от, обуславливаться
retard *v.* замедлять; задерживать; тормозить *(развитие и т. п.)*
retain *v.* удерживать, задерживать; ~ water *почв.* удерживать воду
retention *n.* удерживание; задержание, задержка; ~ capacity *агрохим.* удерживающая способность; moisture ~ *с.х.* влагозадержание; water ~ влагоудержание
reticulate *adj.* сетчатый; ~ evolution *ген.* сетчатая эволюция; ~ vessel *лес.* сетчатый сосуд
return *n.* доход, прибыль
revetment *n. вод. (защитная)* облицовка; защитное покрытие; крепление
rhizoctonia *n. фтп.* гриб, возбудитель ризоктониоза
rhizome *n. биол.* корневище; bulb with ~ *раст.* луковица с корневищами; storage ~ запасающее корневище
rhododendron *n. бот.* рододендрон *(Rhododendron)*
ribbed *adj.* ребристый; рубчатый; рифленый; с насечкой; полосатый
rice *n.* рис
rich *adj.* изобилующий *(чем-л.),* богатый; тучный, плодородный; сильный *(о запахе);* яркий *(о свете);* сочный *(о фруктах);* ~ soil плодородная почва; to be ~ in smth. иметь высокое содержание, богатый чем-л., *syn.* be high in smth.; *ant.* to be low in smth.
rind *n.* кора *(дерева);* кожица; кожура; *v.* сдирать кору; очищать кожицу; снимать кожуру; melon ~ корка дыни
ripe *adj.* спелый, зрелый
ripen *v.* зреть; созревать
ripening *n.* вызревание, созревание, *syn.* ageing, maturing; early ~ раннеспелый, скороспелый; late ~ позднеспелый; uniform ~ равномерное созревание
rise (rose, risen) *v.* подниматься, возрастать *(в объеме); n.* повышение, увеличение
robust *adj.* крепкий, здоровый; сильный; твердый; ~ plant сильное растение
rogue *n. ген.* уклоняющаяся форма
roll *v.* прикатывать почву; *n.* свиток; рулон; leaf ~ *фтп.* скручивание листьев
romaine *n.* салат ромэн
root *n. бот.* корень; укореняться; ~ activity всасывающая способность корней, поглощение корнями; ~ burning ожог корней; ~ crop корнеплод; ~-cutter корнерезка; ~ damage повреждение *(гниение)* корней; ~ drill сеялка для корнеплодов; ~ hairs корневые волоски; ~stock побег от корня, подвой; ~ system корневая система; ~ tip кончик корня; ~ zone корнеобитаемый слой

(почвы); anchoring ~ якорный корень; feeding ~ питающий корень; fibrous ~ мочковатый корень; fringe ~ бахромчатая корневая система; fungus ~ микориза; lateral ~ боковой корень; main ~ главный корень, стержневой корень; secondary ~ придаточный корень; take ~s пускать корни, приниматься *(о растении),* приживаться; tap ~ стержневой корень

rooting *n.* укоренение

rose *n.* роза *(Rosa);* ~-of-Sharon *биол.* зверобой чашечковидный *(Hypericum calycinum)*

rot *v.* гнить, загнивать; black root ~ черная ножка; charcoal ~ угольная *(углистая)* гниль; phytophthora root rot фитофторозная корневая гниль; root and neck ~ корневая и шейковая гниль; tomato foot ~ фитофтороз томата; ~ting гниение

rotation *n. с.х.* чередование; севооборот, ротация, смена *(культур);* ~ interval интервал севооборота, чередования культур

roughage *n.* грубый корм

row *n.* ряд; гряда; ~ applicator машина для внесения удобрений в междурядья; ~ binder сноповязалка для пропашных культур; ~ crop production возделывание пропашных культур; ~ crop system пропашная система земледелия; ~-crop thinner прореживатель пропашных культур; ~ culture рядковая культура; ~ drill рядовая сеялка; ~ spacing густота посадки; ~ tiller фрезерный культиватор; ~ width adjustment регулировка ширины междурядий

run (ran, run) *v.* тянуться, расти *(о растениях),* направлять движение

runoff *n. биол.* сток; поверхностный сток; agricultural ~ *агроэкол.* поверхностный сток с сельскохозяйственных угодий; сельскохозяйственные сточные воды

rupture *n. биол.* разрыв; трещина; ~ of seed coat *с.х.* разрыв семенной кожуры

rush *n. бот.* ситник *(Juncus);* Japanese ~ *бот.* аир злаковый *(Acorus gramineus), syn.* Japanese sweet flag

russeting *n.* поверхностное побурение плодов

rust *n. биол.* ржавчина; пораженный ржавчиной, страдать от ржавчины *(о растениях); бот.* головня; ржа; cereal ~ ржавчина хлебных злаков; stem ~ стеблевая ржавчина

rye *n.* рожь посевная *(Secale cereale);* Great Basin wild ~ *ланд.* волоснец *(Leymus),* произрастающий в нагорье Большой Бассейн *(США);* Russian wild ~ волоснец ситниковый *(Leymus junceus);* spurred ~ *фтп.* спорынья *(возбудитель – гриб Claviceps purpurea)*

Ss

sac *n. биол.* мешок; мешочек; сумка; embryo ~ зародышевый мешок

sagging *n. почв.* оседание; ~ soils проседающие грунты

save *v.* беречь, экономить; ~ moisture удерживать влагу; ~ energy сберегать энергию

salable *Am. E.,* saleable *Br. E. adj.* пользующийся спросом; ходовой

saline *adj. рек.* солевой; соляной, содержащий соль; ~ soil *почв.* засоленная почва, солонец
salinity *n. рек.* засоленность *(почвы);* ~ level степень засоленности почвы
salt *n.* соль; *adj.* соленый; *почв.* засоленный; ~ level уровень содержания солей; excessive ~s избыточное содержание солей в почве; сильнозасоленные почвы; soluble ~ *рек.* растворимая соль; water-soluble ~ *агрохим.* водорастворимая соль
salt-affected *adj. с.х.* засоленный *(о почве);* минерализованный *(о воде);* ~ soil *рек.* вторично засоленная почва
sample *n.* проба; образец; *v.* брать пробу или образец
sampling *n.* отбор проб / образцов
sandy *adj. почв.* песчаный; опесчаненный; ~ clay суглинок, песчаная глина; ~ loam суглинок, суглинистая почва, легкий суглинок, опесчаненный суглинок; ~ soil песчаная почва
sanitary *adj.* санитарный, гигиенический; ~ state *экол.* санитарное состояние
sanitation *n.* санация; оздоровление; улучшение санитарных условий; санитария; санитарная профилактика; санитарная эксплуатация; *агрохим.* дезинфекция; обеззараживание; *adj.* санитарный; ~ felling *лес.* санитарная рубка, *syn.* ~ cutting, forest ~; watershed ~ санитарная обработка водосбора
sap *n.* сок растения; *v.* впитывать
sapling *n.* побег, отпрыск, отводок; *лес.* молодое деревцо
sappy *adj. биол.* сочный; мясистый
satisfactory *n.* удовлетворительный
satisfy *v.* удовлетворять, соответствовать, отвечать *(каким-л. требованиям)*
saturation *n.* насыщение; насыщенность; поглощение, впитывание; light ~ of photosynthesis световое насыщение фотосинтеза
sauerkraut *n.* кислая, квашеная капуста; ~ processing заквашивание
savoyed *adj.* морщинистый, сморщенный *(о листьях)*
saw *n.* пила; ~ dust *лес.* древесные опилки
sawfly *n. энт.* пилильщик *(Tenthredinidae);* pine ~ *лес.* сосновый пилильщик обыкновенный *(Diprion pini)*
scale *n. овощ.* чешуя *(у лука);* чешуйка; *Pl. энт.* червецы, щитовки *(Coccoidea);* ~ leaf прилистник, почечная чешуйка; bud ~s чешуйки почек
scaly *adj.* чешуйчатый, покрытый чешуей, слоистый; напоминающий чешую по своему внешнему виду; покрытый чешуйками; ~ bark *лес.* чешуйчатая кора
scar *n. фтп.* рубец, шрам; blossom ~ цветочный рубец; bud ~ почечный рубец; leaf ~ листовой рубец; ~ ring рубцевание; stipule ~ *лес.* прилистниковый рубец
scarcity *n.* недостаток, нехватка *(чего-л.)*
scarecrow *n.* пугало
scatter *v.* рассеивать; разбрасывать, рассыпать, раскидывать; расшвыривать
scattered *adj.* редкий, расположенный на расстоянии друг от друга; ~ tree *лес.* одиночное дерево

science *n.* наука
sclerotiniose *n. фит.* склеротиниоз
sclerotitis *n.* склерит
scleroties *n.* склероции
scorch *n. фит.* ожог; angular leaf ~ угловые ожоги листьев; bark ~ ожог коры; leaf ~ ожог листьев *(возбудитель – гриб Leptosphaeria);* root-collar ~ опал шейки корневой шейки
scorched *adj.* выжженный, спаленный, syn. burnt
scraping *n. экол., рек.* удаление солевой корки с поверхности почвы; ~ tool *лес.* инструмент для снятия стружки
scraps *n.* остатки
sculpture *n. ланд.* изваяние, скульптура, скульптурное произведение
scythe *n.* коса; садовая косилка; газонокосилка; выкашивание; косьба; *v.* косить
season *n.* период; growing ~ период роста
secondary *adj.* вторичный; ~ branch *лес.* ветвь второго порядка; ~ phloem вторичная флоэма
sedimentation *n.* осаждение; отложение осадка; седиментация, отстаивание; отложение наносов; заиление
seed *n.* семя; сеять; ~ ball семенной клубочек; шаровидный плод; ~ bed семенное ложе; почва для посева, пашня; ~ coat семенная оболочка; ~ grower семеновод; ~ lot посевная серия микроорганизмов, клеток, маточная серия микроорганизмов, клеток; партия семян; ~ piece посадочный клубень *(или часть его);* ~ planting system схема посева семян; ~ production crops семенные культуры; ~ treatment / sterilization протравливание семян; ~ vigor энергия прорастания семян; form ~s *бот.* семениться
seed-bearing *adj.* семяносный
seeding *n.* обсеменение; посев; ~ stage фаза образования семян
seedless *adj.* бескосточковый; бессемянный; ~ fruits бессемянные плоды
seedling *n.* сеянец, проросток, сеянец, саженец *(Pl. рассада);* ~ rootstock семенной подвой
seedlot *n.* посевной участок *(земли)*
seed-tree *n. лес.* семенное дерево, семенник; маячное дерево; обсеменитель; ~ cutting method способ сплошных рубок с оставлением семенников; ~ system система семенно-лесосечных рубок
seepage *n.* течь, *syn.* leakage; впитывание, инфильтрация; пропитывание; просачивание
segregation *n.* отделение, изоляция; отсоединение
select *v.* отбирать, выбирать
selection *n. ген.* отбор, селекция; artificial ~ искусственный отбор; family ~ семейная селекция; mass ~ массовый отбор, массовая селекция; natural ~ естественный отбор; pedigree ~ *ген.* родословная селекция; *с.х.* отбор по потомству; селекция на базе родословной; positive ~ *ген.* позитивный отбор; positive-negative ~ позитивно-негативная селекция; progeny ~ отбор по потомству

self-binder *n.* жнейка-сноповязалка
self-covering *adj.* самопокрывающий; ~ of the curds самопокрывающая способность головок капусты
self-incompatibility *n. ген.* самонесовместимость *(неспособность двуполых организмов к самооплодотворению);* самостерильность
self-pollinated *adj. овощ.* самоопыляющийся
self-seeding *n.* самосев
self-topping *adj.* самоограничивающий рост растения
semiarid *adj.* полузасушливый
semifrozen *adj.* полузамороженный
seminal *adj.* семенной, зародышевый
semisoft *adj.* полутвердый
senesce *v. мол. ген.* стареть биологически
senescence *n. мол. ген. (биологическое)* старение, дряхление
sensitive *adj.* чувствительный, восприимчивый
sensor *n. биол.* датчик; сенсор; рецептор; advanced ~ *техн.* усовершенствованный датчик; remote ~ *техн.* дистанционный датчик; sight ~ *биол.* зрительный рецептор; soil air ~ *почв.* датчик количества или состава почвенного воздуха; soil moisture ~ *почв.* датчик содержания влаги в почве
sepal *n.* чашелистик
separate *v.* отделять, разделять; *хим.* выделять из раствора *(отстаиванием)*
septoria *n. фтп.* септорий; ~ blight септориоз; белая пятнистость листьев *(возбудители Septoria);* ~ disease септориоз злаков; ~ leaf blotch септориоз листьев; септориозная пятнистость листьев; ~ spot септориоз; септориозная пятнистость
seral *adj.* сукцессионный, серийный; ~ pattern сукцессионная, серийная модель
serum *n.* сыворотка, *pl.* sera
sesamum *n. биол.* кунжут (*Sesamum*), *syn.* sesame
sessile *adj. бот.* сидячий, бесчерешковый; *зоол.* сидячий, прикрепленный; ~-flowered *бот.* сидячецветковый; ~-leaved *бот.* сидячелистный; ~ oak *лес.* скальный дуб; дуб сидячецветный *(Quercus petraea)*
set (set, set) *v.* сажать *(растение; молодой побег растения),* завязывать (ся) *(о плодах или семенах), n.* завязь *(плодов);* отрезок корня для посадки; лук-севок, посадочный материал
setting *n.* сгущение, затвердение; by ~ up the land in ridges при помощи гребневания почвы; concentrated ~ пучковый характер плодоношения; fruit ~ *агрохим.* завязывание плодов; fruit-~ period *овощ.* фаза завязывания плодов
severe *adj.* суровый; ~ losses *экон.* существенный урон
sewer *n. почв.* канализационная система; канализационный водосток; коллектор сточных вод; ~ losses *лес.* потери в сточных водах
sexual *adj. ген.* половой; ~ selection половой; primary ~ character первичный половой признак; secondary ~ character вторичный половой признак
shade *n. овощ.* тень, полумрак; *v.* затенять; защищать *(от света, солнца);* ~ tolerance теневыносливость; устойчивость к затенению

shade-tolerant *adj. биол.* тенеустойчивый; *лес.* теневыносливый *(о древесной породе)*
shaft *n.* ствол; стебель; столб; стержневидная структура; ось; стержень *(пера, волоса)*
shallot *n.* лук-шалот *(Allium ascalonicum)*
shallow *adj.* мелкий; ~-rooted *лес.* с неглубокой корневой системой
shape *n.* форма, вид
shatter *v.* осыпаться *(о зерне, листьях, семенах)*
shed (shed, shed) *v.* ронять *(листья);* осыпаться *(о листьях)*
shelf *n.* полка; ~ life *овощ.* срок хранения *(продукции);* срок годности, *syn.* store life; long ~ длительный срок годности при хранении
shelter *n.* прикрытие; защита; forest ~ belt *лес.* полезащитная полоса; ~ tree защитное дерево; ~-wood system система семенно-лесосечных рубок
shelterbelt *n. агроэкол.* полезащитная полоса; ветрозащитная полоса; древесно-кустарниковые насаждения; ~ establishment *лес.* полезащитное лесоразведение; ~ planting *экол.* полезащитное насаждение; field ~ полезащитная полоса; forest ~ *лес.* лесозащитная полоса; intermediate ~ промежуточная защитная полоса; moderately planted ~ умеренно плотная полезащитная полоса; multirow ~ многорядная защитная полоса; open planted ~ ажурная полезащитная полоса; thickly planted ~ непродувная полезащитная полоса; плотная полезащитная полоса; thinly planted ~ продувная полезащитная полоса; разреженная полезащитная полоса
shiny *adj.* блестящий; яркий; наполненный светом
ship *v.* перевозить(ся), отправлять(ся)
shipment *n.* перевозка, груз; отправка *(груза),* отгрузка; партия отправленного товара; транспортировка
shipping *n.* отгрузка, отправка, поставка; ~ ability транспортабельность; ~ documents товаросопроводительные / отгрузочные документы
shock *n. с.х.* копна *(из снопов);* скирда; ~ gatherer копноподборщик
shoot *n. раст.* росток, побег; ~ bud *биол.* ростовая почка; ~ cutting *биол.* побеговый черенок; ~ root ratio *биол.* соотношение массы надземных и подземных органов растения; annual ~ *лес.* годовой побег; basal ~ *лес.* основной побег; ростовой побег; bud ~ wilt *фтп.* увядание почечных побегов *(при прививке);* coppice ~ *лес.* побег от пня; подрост; порослевина; поросль от пня; creeping ~ *биол.* ползучий побег; dormant ~ побег из спящей почки; спящий побег; elongated fruitless ~ удлиненный вегетативный побег; fertile ~ плодоносный побег; floral ~ цветковый побег; floriferous ~ цветонос; infertile ~ вегетативный побег; неплодоносный побег; spur ~ *лес.* укороченный побег
short *adj.* короткий; ~ trimmed механизированная уборка со скашиванием ботвы
shorten in *v.* укорачивать(ся)
shoulder *n.* плечо; green-~ tomato *овощ.* томат с зеленым пятном у плодоножки
shovel *v.* копать, рыть; вскапывать; *syn.* excavate, dig up

shredded *adj.* измельченный, порезанный, разорванный; ~ leaves *почв.* измельченные листья
shrink (shrank, shrunk) *v.* сокращаться; уменьшаться; усыхать
shrinkage *n.* сжатие; сокращение; уменьшение; усушка
shrub *n. ланд.* куст; кустарник; живая изгородь; low ~ низкий кустарник, *syn.* dwarf ~; flowering ~ цветущий кустарник; green ~ декоративный кустраник *(без цветения);* evergreen ~ вечнозеленый кустраник
shrublike *adj.* кустообразный; кустовидный
shrunken *adj.* сморщенный, съежившийся; ~ leaf сморщившийся лист
sickle *n.* серп; что-л. в форме серпа
side *n.* сторона; heated ~ подогреваемая сторона, *ant.* unheated ~; on one ~ of the plant с одной стороны растения; *adj.* побочный, неглавный; ~ dressing *овощ.* междурядная подкормка; ~ effect *ген.* побочный эффект; ~ shoot *овощ.* боковой побег
silage *n.* силос; *v.* силосовать; ~ crop силосная культура
silt *n.* ил; осадок; илистое отложение; ~ loam *рек.* пылеватый суглинок; ~ up *v.* заиливать
silver *n. хим.* серебро; ~ nitrate *агрохим.* ляпис; нитрат серебра; *хим.* азотнокислое серебро; ~ thiosulphate *хим.* тиосернокислое серебро; тиосульфат серебра
silvering *n. фтп.* (по)серебрение *(физиологическое нарушение, возникающее в результате воздействия низких температур и недостаточной освещенности)*
silvics *n. лес.* лесоведение
silviculture *n.* лесоводство, *syn.* forestry
silvicultural *adj. лес.* лесоводческий, относящийся к лесоводству; ~ practice лесоводческая практика, деятельность
similar *adj.* подобный; похожий, сходный; ~ to smth. подобный чему-л.
similarity *n.* подобие, похожесть, сходство, схожесть
single *adj.* один; единственный; ~ variety grower *овощ.* фермер, специализирующийся на выращивании одного сорта какой-л. культуры
sink *n. биол.* сток; biomass-based carbon ~ *лес.* образуемый биомассой сток углерода; carbon dioxide ~ поглотитель углекислого газа
site *n.* место, участок; местообитание; местонахождение; *ген.* участок, сайт; ~ preparation *лес.* подготовка вырубленных площадей для лесовозобновления; burned ~ *лес.* пожарище; пал; degraded ~ *лес.* вырождающийся *(пришедший в упадок)* участок; relict habitat ~ *лес.* место произрастания реликтовых деревьев
size *n.* размер
skim *v. рек.* снимать верхний слой
skin *n.* кожа, шкура; *v.* сдирать кожу, шкуру
slab-sided *adj. овощ.* имеющий плоские стороны, вытянутый *(о плоде)*
slash *n. лес.* вырубка *(в лесу);* валежник; зарубка; надрез; болотистая местность *(часто поросшая кустарником);* ~ and burn *с.х.* сжигание порубочных остатков *(при подсечно-огневой системе земледелия);* ~ and burn agriculture

с.х. огневое земледелие; ~-and-burn cultivation *с.х.* чередование возделывания культур с лесокустарниковым перелогом; chipping ~ *лес.* отходы дробления древесины; clearing by scattering ~ *лес.* очистка лесосек разбрасыванием порубочных остатков; diversified ~ disposal *лес.* применение нескольких способов очистки *(на одной лесосеке);* heavy ~ *лес.* крупные порубочные остатки *(напр. обломки деревьев);* light ~ *лес.* мелкие порубочные остатки; logging ~ *лес.* порубочные остатки; wind ~ *лес.* бурелом, ветровал

slaughtered *n.* убой; ~ animal *с.х.* забитое животное

slicing *n.* резание, резка; ~ cucumber *овощ.* салатный огурец

slight *adj.* легкий, слабый

slit *n.* длинный узкий разрез; *v.* разрезать в длину; longitudinal ~ *биол.* продольный разрез

slope *n.* уклон; покатость; наклон; склон

slow-growing *adj. биол.* медленно растущий; тугорослый; позднеспелый

slug *n.* слизень

sluice *n. рек.* шлюз; водовод; канал; отводной канал

small *adj.* маленький, небольшой; мелкий; ~ fruits ягоды; ~ grains зерновые культуры *(кроме кукурузы);* ~ plot technique мелкоделяночный опыт

smoke *n.* коптить

smooth *adj. овощ.* однородный; ~ body однородная консистенция; ~ texture ровная текстура; ~ heads гладкие кочаны капусты

smother *v.* заглушать; ~ the flowers сдерживать цветение

smothering *adj.* удушение; ~ crop *с.х.* заглушающая культура

snail *n. биол.* улитка; брюхоногие *(моллюски) (Gastropoda)*

snakefly *n. энт.* верблюдка

snap off *v. биол.* откусывать; отломать; отламывать; отломаться; выламывать

soak *v.* смачивать, впитывать, всасывать

sod *n.* дерн, пласт; ~ formation дернообразование, задернение; ~ soil дерновая почва

sodium *n. хим.* натрий; ~-affected soil *почв.* почва, подверженная накоплению натрия в почвенном поглощающем комплексе

soft *adj.* мягкий; ~ rot *фтп.* мягкая *(мокрая)* гниль

softscape *n. ланд.* ландшафтное озеленение, декоративное растениеводство

soil *n.* почва; *агрохим.* почвенный нанос; почвенный слой; растительная земля; *adj.* почвенный; грунтовой; ~ block почвенно-перегнойные кубик; ~-building почвообразование; ~ capability производительность почвы; ~ conditions почвенные условия; ~ container контейнер для почвенных образцов; ~ conservation охрана почв; охрана и рациональное использование почв; предотвращение эрозии; защита грунта; предотвращение истощения почвы; ~ criterion *(pl. criteria)* показатель почвы; ~-fertility плодородие почвы; ~ fertility survey определение запасов питательных веществ в почве; ~ formation образование, формирование почвы; ~-forming factor фактор почвообразования; ~ heterogeneity неоднородность почвы; ~-inhabiting phytopathogenic fungi почвообитающий фитопатогенный; ~ map почвенная

карта; ~ moisture storage запас почвенной влаги; ~ morphology морфология почвы; ~ particle частица грунта; ~ pH-tester прибор для определения кислотности почвы; ~-plant-fertilizer relation взаимоотношение почвы, растения и удобрения; ~ salinization засоление *(почвы);* ~ structure структура почвы; ~ test почвенный анализ; ~ water почвенная влага, почвенная вода; abnormal ~ незрелая почва; absorptive ~ впитывающая почва; active ~ биологически активная почва; aged ~ старая почва; agrogenic ~ старопахотная почва; antecedent ~ исходная почва; chalky ~ известняковая почва; известняковый грунт; *лес.* меловая почва; *экол.* почва на мелах; hard ~ тяжелая почва; imperfectly drained ~ почва с недостаточным дренажем; impoverished ~ истощенная почва; light ~ легкая почва; loamy ~ суглинистая почва; mixed ~ перемешанная почва; почвенная смесь; muck ~ гумусовая, перегнойная почва; nutrient-poor ~ бедная *(питательными веществами)* почва; peaty ~ торфяной грунт или почва; торфяной грунт; poor ~ неплодородная почва; silty ~ илистая почва; unfavourable ~ неблагоприятная почва

soil-borne *adj. с.х.* передающийся через почву

solanaceous *n.* семейство пасленовых

solarization *n. биол.* облучение солнечными лучами; *лес.* инсоляция; солнечный ожог *(стволиков ели);* соляризация; soil ~ *почв.* соляризация почвы

solid *n.* твердая частица, твердая фаза; *pl.* сухой остаток, сухие вещества; soluble ~s растворимые сухие вещества; total ~s общий плотный остаток, общее содержание сухих веществ; *adj.* твердый *(об агрегатном состоянии вещества);* чистый, без примесей *(о цвете);* прочный, крепкий; солидный *(чаще всего о телосложении)*

solidify *v.* затвердеть, отвердеть, загустевать

solonetzification *n. экол.* осолонцевание

soluble *adj.* растворимый; fat ~ жирорастворимый; water ~ водорастворимый

solution *n.* растворение; раствор; fertilizer ~ питательный раствор; water ~ водный раствор; stock ~ исходный раствор

sorghum *n.* сорго

sorrel *n. бот.* щавель *(Rumex)*

sorting *n.* сортировка, отбраковка

sour *adj.* кислый, кисловатый; прокисший, перекисший *(испорченный в результате брожения, длительного хранения и т.п.)*

source *n.* источник

sow (sowed, sown) *v.* сеять

sowing *n.* посев; ~ date срок посева; ~ in broad drills *с.х.* широкорядный посев; ~ period сроки посева; broad drill ~ *лес.* широкострочный посев; early ~ ранний посев; line ~ *лес.* рядовой посев; two-line ~ *с.х.* двухстрочный посев

sowthistle *n. бот.* осот

soybean *n.* соя, соевый боб; ~ oil соевое масло, *syn.* soya

spacing *n.* расстояние; размещение; расположение; расстояние друг от друга; пространство; междурядье; размещать; площадь питания; шаг посадки; шаг посева; шаг расстановки; ширина междурядья; густота посадки

sparse *adj.* редкий, разбросанный, рассеянный; ~ forest *лес.* редкий лес; редколесье; ~ plot *с.х.* участок с негустой растительностью; участок, имеющий скудную растительность; ~ stand *лес.* редкое насаждение; редкостой; ~ woodland *лес.* несомкнутый древостой; изреженный древостой; редкополнотный древостой; gene ~ region of the genome *ген.* бедный генами участок генома
spare *n.* запас; *adj.* запасной, резервный
species *n. Pl.* species вид, род, разновидность; abundant ~ *экол.* вид с высокой численностью особей; dominant ~ господствующий, главный, основной, преобладающий вид *(порода);* flora and fauna ~ виды флоры и фауны; объекты животного и растительного мира; warmth-loving ~ теплолюбивый вид; wild ~ *ген.* дикие виды
specimen *n.* образец; экземпляр; особь
speck *n. фит.* пятнистость; black ~ черная короста картофеля
spelt *n. бот.* пшеница спельта, полба настоящая *(Triticum spelta)*
sperm *n.* сперма, семя, сперматозоиды; сперматозоид, спермий; антерозоид
spice *n.* специя, пряность; *v.* приправлять специями
spindly *adj.* плохо развивающийся; хилый; идущий только в рост; длинный и тонкий
spine *n.* шип, бугорчатость у огурца; white ~s белошипый, black ~s черношипый
spined *adj.* бугорчатый; light ~ слабобугорчатый; medium ~ среднебугорчатый
split *v.* растрескиваться, лопаться; ~ stem разветвление стебля; ~ting curds образование трещин на головках капусты, лопнувшие головки капусты
spoilage *n.* порча, гниение пищевых и скоропортящихся продуктов; ~ microorganisms микроорганизмы, вызывающие порчу
spore *n.* спора; airborne ~ переносимая по воздуху спора
spot *n.* пятно; angular leaf ~ угловатая бактериальная пятнистость листьев; bacterial ~ бактериальная пятнистость; gray leaf ~ серая пятнистость листьев; septoria leaf ~ септориозная пятнистость листьев; target leaf ~ мишеневидная пятнистость листьев
spotting *n.* пятнистость
spray *n.* веточка; побег; *v.* опрыскивать, распылять, обрызгивать; ~ treatment обработка распылением; ~ rig приспособление, устройство, механизм для опрыскивания
spread (spread, spread) *v.* раскидывать, разбрасывать, устилать; разносить(ся), распространять(ся)
spreadability *n.* растекаемость, консистенция
sprinkle *v.* брызгать, кропить, опрыскивать *(что-л. какой-л. жидкостью);* ~ irrigation орошение дождеванием
spring (sprang, sprung) *v.* произрастать, зарождаться; *n.* молодая поросль
sprout *n.* побег, росток, отросток; *v.* пускать ростки, прорастать; ~ forest *лес.* порослевый древостой; ~ formation *раст.* побегообразование; ~ method

лес. способ ведения порослевого низкоствольного хозяйства; ~ system *лес.* лесосечное низкоствольное хозяйство; even ~s *раст.* дружные всходы, *syn.* good ~s, level ~s; fail to ~ *раст.* не давать отростков; inability to ~ *раст.* невсхожесть; potato ~s *овощ.* ростки картофеля; root ~s *лес.* корневая поросль; stump ~s *лес.* пневая поросль; water ~ *раст.* жировой побег

spruce *n. бот.* ель *(Picea);* Engelmann ~ *бот.* голубая ель *(Picea engelmannii)*

squash *n.* тыква крупноплодная столовая; мезга, мякоть; *v.* раздавливать, расплющивать

squeeze *n.* сжатие, сдавливание; *v.* сжимать, сдавливать

stable *n.* конюшня; конский; *adj.* стабильный; ~ in harvest date стабильность в сроках уборки урожая

stake *n.* подпорка; стойка; столб, опора

stage *n.* стадия, этап

stained *adj.* пятнистый; имеющий какую-либо окраску; ~ zone окислительно-восстановительная зона

stalk *n.* стебель, стебелек; ножка; anther ~ тычиночная нить; cabbage ~ кочерыжка; flower ~ цветонос, цветоножка; стрелка; root ~ корневой отпрыск; seed ~ семяносец

stamen *n.* тычинка

stand (stood, stood) *v.* устоять, выдержать; *n.* густота всходов, стеблестой, травостой; насаждение; древостой; ~ing ability устойчивость к полеганию; ~ of trees *лес.* древостой; лесонасаждение; even-aged ~ одновозрастное насаждение; previous ~ предыдущий, предшествующий древостой; pure ~ чистое насаждение; single aged ~ древостой из деревьев одного возраста; single specied ~ древостой из деревьев одной породы

standard *adj.* обычный, стандартный; норма; ~ variety стандартный гибрид

standardized *adj.* нормализованный

starch *n.* крахмал

starchy *adj.* крахмалистый

start *v.* начинать; расти *(о растениях)*

starter *n. микр.* закваска; bulk ~ производственная закваска

stature *n.* высота *(особенно дерева)*

stay *v.* оставаться; ~ on the truss сохраняться на кисти

steamed *adj.* стерилизованный

steaming/steam sterilization *n.* стерилизация паром

stem *n.* стебель, ствол; ~ canker стеблевой рак; ~ interior сердцевина стебля; ~ thickness толщина, плотность стебля; ~ tissue проводящая ткань стебля; two ~s per plant растение с двумя стеблями

stemphylium *n. бот.* стемфилиум; стемфилий; ~ leaf spot *фтп.* стемфилиоз

steppe *n.* степь, *syn.* plain; ~ soil степная почва

sterilization *n.* стерилизация

sterile *adj.* бесплодный, стерильный, неспособный к деторождению

stew *v.* тушиться, томиться *(на огне)*

sticky *adj.* прилипающий, липкий, клейкий

stiff *adj.* плотный; ~ clay soil тяжелая глинистая почва
stigma *Pl.* stigmas, stigmata *n. бот.* рыльце
stimulate *v.* стимулировать; ~ maturing стимулировать созревание
stir *v.* мешать, помешивать, размешивать; взбалтывать
stock *n.* подвой; порода; поголовье; ствол *(дерева);* запас *(популяции);* native tree ~ фонд местных деревьев
stoma *Pl.* stomata *n. бот.* устьице
stone *n. ланд.* камень; island stepping ~s *с.х.* камни для перехода через ручьи
storable *adj.* непортящийся *(способный сохраняться)*
storability *n.* лежкость, возможность хранения
storage *n.* хранение, хранилище; склад; ~ life срок хранения срок годности; ~ room складское помещение, хранилище; carbon ~ *лес.* накопление углерода; *экол.* подземное хранение углекислого газа
store *v.* запасать, накапливать, сохранять; хранить на складе; ~ up накапливать; запасать
straight *adj.* прямой, вертикальный; обычный, традиционный; ~ fertilizers простые удобрения; ~ plant habit прямостоячий характер развития растения, сильнорослое растение
strain *n.* линия, штамм *(для микроорганизмов)*
stratify *v.* стратифицировать; ~ing media способ, средство стратификации
straw *n.* солома; ~ bale соломенный брикет
streak *n.* штрих; штриховая культура; делать посев штрихом, стрик, полосатость *(вирусное заболевание растений)*
stress *n.* стрессовая ситуация; ~ conditions стрессовые условия
stressor *n.* стрессогенный фактор, стрессор; environmental ~ стресс-фактор окружающей среды; фактор экологического стресса
string *n.* веревка, подвязочный материал
stringless *adj.* безволокнистый
strip *n.* полоса, полоска; wind forest ~ *лес.* лесная полезащитная полоса
stripe *n.* полоса, полоска; *фтп.* полосатость; ~ mosaic of barley ложная штриховатость ячменя *(возбудитель – Virothrix hordei);* dark green radial ~s *овощ.* радиальные полосы темно-зеленого цвета *(у плодов томата);* leaf ~ полосатость листьев *(возбудитель – гриб Helminthosporium gramineum)*
strong *n.* стойкий; ~ growth устойчивый рост; ~ plant сильное, мощное растение
structure *n.* строение, структура; конструкция, устройство; aggregate ~ агрегатная структура; medium tight ~ со средней плотностью
stubble *n. с.х.* стерня, жнивье *(невспаханное поле с остатками соломы на корню)*
stuff *n.* вещество, материал
stump *v.* выдергивать, вырывать с корнем; *n. лес.* пень; пневый осмол; посадка на пень *(для получения поросли);* чурак; ~ sprouts побеги на пне, пневая поросль
stunt *n.* остановка в росте, задержка в росте; карликовость *(вирусное заболевание растений);* малорослое животное; *v.* останавливать рост; останав-

ливаться в росте, чахнуть bushy ~ кустистая карликовость *(томата);* tomato apical ~ апикальная *(верхушечная)* карликовость томата
stunted *adj.* низкорослый; угнетённый; чахлый; корявый; ~ growth задержка в развитии
sturdy *adj.* сильный, обладающий большой физической силой; выносливый; крепкий, здоровый
style *n.* столбик
suberin *n.* суберин
subfamily *n.* подсемейство, субсемья, вторичная семья, семья второго поколения
subject *v. экол.* подвергать *(воздействию, влиянию)*
subsequent *adj.* более поздний, последующий, следующий; ~ crop последующая культура
subsoil *n.* подпахотный слой
substance *n.* вещество
substitute *n.* заменитель; *v.* заменять, использовать вместо чего-л.
subsurface *adj.* находящийся, лежащий под поверхностью; подземный; заглубленный; ~ loosening безотвальное рыхление
succeed *v.* следовать за *(кем-л. / чем-л.);* сменять *(кого-л.);* ~ing crop последующая культура
success *n.* успех
succulent *adj.* сочный, мясистый
succumb *v. биол.* погибать
sucker *n.* корневой побег, корневой отпрыск; *v.* выбрасывать боковые побеги
suffer *v.* страдать, испытывать, претерпевать
sufficient *adj.* достаточный, в достаточном количестве
sugar *n.* сахар; ~-beet сахарная свекла; ~ metabolism сахарный обмен
suitable *adj.* годный, подходящий, пригодный, применимый, соответствующий; ~ season for transplanting the roots подходящий сезон для пересадки корней
sulfur *Am. E.,* **sulphur** *Br. E. n. хим.* сера; ~ dioxide двуокись серы
sulphuric *adj.* серный; ~ acid серная кислота
sun *adj.* солнечный, *syn.* solar; ~ radiation солнечные лучи, солнечная радиация, солнечное излучение; ~light солнечный свет; ~scald *фтп.* солнечный ожог *(листвы, плодов),* солнечный опал
sunflower *n.* подсолнечник, подсолнух; ~ oil подсолнечное масло; ~ seeds семечки; common ~ подсолнечник однолетний; small wood ~ подсолнечник мелкокорзинковый
sunken *adj.* впалый; запавший; затонувший; ниже какого-л. уровня; погруженный; осевший; ~ bed *с.х.* углубленная грядка; ~ wood *лес.* топляк
sunlight *n.* солнечный свет, *syn.* sunshine
sun-loving *adj.* солнцелюбивый; ~ plant *раст.* гелиофит; светолюбивое растение
sunscald *n.* солнечный ожог *(листвы), syn.* sunscorch; *лес.* ожог коры

superficial *adj.* внешний, неглубокий, поверхностный; ~ root system поверхностная корневая система
superior *adj.* лучший, превосходный, высшего качества
superphosphate *n. хим.* суперфосфат
supplement *n.* добавление, дополнение; *pl.* добавки к кормам; nutritive ~ пищевые добавки
supplementary *adj.* добавочный, дополнительный; ~ lighting дополнительное освещение
supply *n.* предложение; запас; снабжение, поставка, обеспечение; *pl.* запасы, общее количество; *v.* снабжать, поставлять, обеспечивать, давать
support *v.* поддерживать; содействовать, способствовать; ~ plant life поддерживать жизнь растений; truss ~ опора для кисти томата
surface *n.* поверхность
surplus *n.* избыток, излишек, остаток; *adj.* излишний, избыточный; добавочный
survive *v.* выжить, пережить; ~ indefinitely in the soil сохраняться в почве неограниченно долгое время
susceptibility *n.* восприимчивость; чувствительность
susceptible *adj.* восприимчивый, чувствительный *(к чему-л.);* ~ to diseases восприимчивый к болезням, подверженный болезням
suspect *n.* подозреваемый; ~ plant *фтп.* растение с подозрением на заболевание
sustain *v.* поддерживать, способствовать
sustainability *n. экол.* устойчивость; устойчивое развитие; environmental ~ устойчивость окружающей среды *(предполагает поддержание экологической целостности и запасов природных ресурсов)*
sustainable *adj.* устойчивый; жизнеспособный; ~ forestry устойчивое лесное хозяйство
swamp *n.* болото; лесное болото; топь, трясина; alder ~ ольховое болото; back ~ пойменное болото; lowland ~ низинное болото; peat ~ торфяное болото, торфяник; salt ~ солончаковое болото; wood ~ лесное болото
sward *n.* газон; травостой; травяной покров; дернина; задерновывать
sweet *adj.* сладкий
sweetened *v.* подслащивать, делать сладким
swell *n.* утолщение, нарост; *v.* набухать; разбухать
symbiosis *n.* симбиоз; contingent ~ случайный симбиоз; disjunctive ~ временный симбиоз; mutual ~ взаимопитательный симбиоз
symphytans *n. энт.* сидячебрюхие *(Chalastogastra, Sessiliventres, Symphyta);* сидячебрюхие перепончатокрылые *(Symphyta);* ~ species pine sawfly *лес.* сосновый пилильщик обыкновенный из отряда сидячебрюхих перепончатокрылых
symptom *n.* симптом; typical ~ типичное проявление
synthetic *adj.* искусственный; синтетический; ~ gene construction *ген.* конструирование синтетических генов; ~ selection *ген.* синтетическая селекция; ~ variety *с.х.* синтетический сорт

synergism *n.* синергия
systemic *adj.* системный; ~ infection *фтп.* системная *(генерализованная)* инфекция

Tt
taiga *n.* тайга; ~ zone *лес.* таежная зона
take (took, taken) *v.* брать; ~ in oxygen поглощать кислород
tally *v.* прикреплять ярлык, этикетку или бирку; маркировать; *лес.* отсчитывать; считать
tap *v.* удалять стержневой корень растения; ~ root главный корень, стержневой корень
tapered *adj.* оттянутый; суженный; со сбегом к кончику, конический *(о корнеплоде),* конусообразный; клиновидный
taproot *n.* стержневой корень, главный корень
taro *n. бот.* таро, колоказия
taste *n.* вкус, вкусовые качества; sour to the ~ кислый на вкус
taxon *pl.* taxa *n.* таксон, таксономическая карта, систематическая категория
taxonomist *n.* специалист по таксономии, систематике
taxonomy *n.* таксономия; soil ~ *агрохим.* определение почвы; таксономия почвы
teak *n.* тик, тиковое дерево; древесина тикового дерева
technique *n.* метод, способ; технический прием, технология техника, технические приемы; метод; методика, способ, *syn.* method, means; ameliorating ~ *рек.* способ улучшения почв; метод мелиорации; molecular breeding ~ метод молекулярной селекции; tissue culture ~ метод *(искусственного)* выращивания живой ткани; *ген.* метод эксплантации
technology *n. биол.* технология; совокупность методов; метод; agricultural ~ *с.х.* агротехника *(система приемов возделывания с.-х. культур, технологии земледелия и растениеводства);* сельскохозяйственная технология; non-waste ~ *с.х.* безотходная технология; recombinant DNA ~ *ген.* метод рекомбинантных ДНК
temporary *adj.* временный
temperate *adj.* умеренный *(о климате)*
temperature *n.* температура; ~ conditions температурные условия; low ~ низкая температура; high ~ высокая температура; day ~ дневная температура; night ~ ночная температура; 24-hour average ~ среднесуточная температура; heating ~ температура отопления
tend *v.* иметь тенденцию *(к чему-л.);* склоняться *(к чему-л.)*
tender *adj.* нежный, мягкий *(плод);* ~ leaves нежные листья
tenderness *n.* нежность, мягкость
tending *n.* охрана, присмотр, надзор, контроль, *syn.* care, keeping, oversight
tensiometer *n. техн.* тензометр, тензодатчик, прибор для измерения деформаций
terrace *n.* терраса; насыпь; *ланд.* газон, клумба посреди улицы; build-up ~ *агрохим.* искусственная терраса *(намывная или насыпная);* level ~ *агрохим.*

горизонтальная терраса; spur ~ *агрохим.* отдельный участок террасы; steep ~ *агрохим.* ступенчатая терраса

terrain *n. биол.* местность; территория, район; ~ condition рельефные условия; ~ estimation оценка местности; contamination of the ~ *экол.* заражение местности; easy ~ *лес.* местность с хорошими грунтовыми условиями; ровная местность; environmentally vulnerable ~ *экол.* экологически уязвимый район; functional ~ classification *лес.* классификация местности с учетом методов и средств лесозаготовок; gentle ~ *лес.* местность с умеренным рельефом; слабохолмистая местность; harsh ~ *лес.* труднопроходимая местность; macrodescription of ~ *экол.* общая характеристика ландшафта местности; sandy ~ erosion *почв.* эрозия песчаной почвы; semiwild ~ *экол.* полудикая местность; полудикая природа; wild ~ *экол.* девственная природа; необитаемая местность; wooded ~ *лес.* покрытая лесом местность

test *n.* проба, испытание, исследование, опыт, анализ; v. пробовать, испытывать; bench ~ лабораторное исследование; germination ~ испытание на всхожесть *(семян);* soil ~ почвенный анализ; usable plant ~ тест на оценку полевой всхожести в искусственно созданных условиях; variety ~ сортоиспытание

testa *n. бот.* теста, семенная кожура

texture *n.* механический состав *(почвы);* текстура, строение ткани; степень плотности ткани; структура

textured *adj.* рельефный; структурированный; текстурированный; шероховатый; clay-~ *почв.* глинистого механического состава; coarse-~ *почв.* легкого механического состава; fine-~ *почв.* тяжелого механического состава *(о почве, об отложении); биол.* тонкотекстурный; open-~ sand *почв.* рыхлый песок; soft-~ wood *лес.* мягкая древесина; древесина хвойных пород

thaw *v.* таять; оттаивать; размораживать(ся)

thermophyte *n.* термофит, теплолюбивое растение

thicken *n.* уплотнение, загущение; *v.* загущать; увеличивать мощность *(почвы)*

thin *v.* прореживать *(посевы);* прорывать, букетировать *(корнеплодные культуры); adj.* топкий, редкий, не густой; ~ leaves тонкие листья

thinner *n.* прореживатель, букетировщик

thinning *n.* букетировка; прореживание; chemical ~ химическая букетировка; conventional ~ methods традиционные способы рубок ухода; corridor ~ коридорные рубки ухода *(в пределах заданной ширины; одного или нескольких рядов в искусственных насаждениях);* crop-tree ~ верховой способ рубок ухода; crown ~ cutting вырубка деревьев господствующего класса, мешающих росту молодняка; early ~ прочистки, ранние рубки ухода; extraction ~ коммерческие рубки ухода; промышленные рубки ухода; free ~ рубки простора *(разновидность проходных рубок);* final ~ сплошные рубки; окончательные рубки ухода; fixed-spacing ~ равномерно-постепенная рубка, *syn.* even gradual cutting; hand ~ ручная букетировка; low ~ низовой способ рубок ухода, проходная низовая рубка; manual ~ немеханизированные рубки ухода; mechanical ~ механизированные рубки ухода; proportional ~ постепенная

рубка, *syn.* gradual felling; selection ~ выборочное прореживание; ~ schedule план рубок ухода
thiol *n.* хим. тиоспирт; меркаптан; тиол
thiram *n.* тирам *(фунгицид)*
thistle *n. бот.* бодяк *(Cirsium);* артишок *(Cynara);* чертополох *(Carduus);* field sow ~ осот полевой *(Sonchus arvensis)*
thorn *n.* шип, колючка; *бот.* голаканта *(Holacantha);* боярышник *(Crataegus); энт.* пяденица
thoroughly *adv.* тщательно, основательно
thresh *n.* обмолот; *v.* молотить; вымолачивать; обмолачивать
thresher *n.* молотилка
threshold *n.* мера чувствительности, порог
thrip *n.* трипс; трипсы; пузыреногие; ~s tolerant устойчивый к поражению трипсами
thrive (throve, thriven) *v.* буйно разрастаться, пышно расти
tie *v.* подвязывать, привязывать *(растения);* связывать *(питательные вещества)*
tier *n.* лента, тесемка, шнурок; ряд; ярус; слой; класс; уровень; bale ~ *с.х.* механизм обвязки тюков; five-~ cages *с.х.* пятиярусные клеточные батареи; plant ~ *с.х.* машина для подвязки побегов
tile *n.* черепица, *syn.* tiling; изразец, кафель, плитка; coloured ~ *ланд.* цветная плитка
till *v.* обрабатывать, возделывать *(землю);* культивировать
tillage *n.* подготовка почвы; обработка почвы; пахота; рыхление; возделанная земля; пашня; запашка; разработка; обработка земли; вспашка; рыхление земли; подготовка почвы *(к посеву);* ~ operations механическая обработка почвы; broadcast ~ сплошная обработка почвы; combined ~ совмещенная обработка почвы; conservation ~ противоэрозионная обработка почвы; in ~ обрабатываемый *(о почве);* inter row ~ междурядная обработка почвы; minimum ~ обработка с минимальным числом рыхлений; nonplow ~ бесплужная обработка, *syn.* plowless ~; oriented ~ обработка почвы с заданной направленностью борозд; primary ~ первичная обработка; rough ~ грубая предварительная обработка; subsoil ~ безотвальная обработка почвы; surface ~ поверхностная обработка почвы; zero ~ гербицидная обработка
tiller *n.* культиватор, мотыга, фреза
tilth *n.* глубина вспашки; обрабатываемая земля; пахотная земля; структура почвы; физическая спелость почвы; качество обработки почвы; пригодность почвы к обработке; ~ process процесс физического созревания *(пахотного слоя);* ~ roll каток для предпосевного прикатывания почвы; ~ stage стадия физической спелости *(почвы);* ~ state состояние физической спелости *(почвы);* ~-top soil пахотный слой
timber *n. лес.* лесоматериал; пиломатериал; лес; брус; бревно; строевой лес; ~ harvesting *лес.* заготовка леса; валка леса; заготовка древесины; лесозаготовка; *экол.* рубка леса; лесоповал; ~ stand лесонасаждение; ~ stand improvement улучшение древостоя *(с помощью рубок ухода, кольцевания*

второстепенных деревьев); prethinning ~ stand насаждение, не пройденное рубками ухода; stand of ~ per acre запас древесины на акр; stand of valuable ~ древостой ценной породы

timing *n.* выбор времени; конвейер сроков *(посева)*

tip *n.* верхушка, верхний конец, конечная точка *(побега),* верхушечная точка *(побега);* ~ burn побурение кончика листа; ~ finish кончик у корнеплода *(моркови);* ~ ped scorch ожог верхушки

tissue *n. биол.* ткань; connective ~ соединительная ткань

tobacco *n.* табак; ~ in leaf листовой табак; chewing ~ жевательный табак; choice ~ отборный табак; snuff ~ нюхательный табак

tolerance *n. биол.* толерантность, устойчивость, выносливость; ~ for winter conditions зимоустойчивость; ~ of forest trees *лес.* устойчивость лесных культур; выживаемость древесных пород; ~ reaction *лес.* реакция устойчивости *(растений);* drought ~ trait *ген.* признак засухоустойчивости; early ~ *раст.* ранняя толерантность, *ant.* late ~ поздняя толерантность; freezing ~ *с.х.* морозостойкость; морозоустойчивость, *syn.* frost ~; heat ~ *овощ.* жароустойчивость; pesticide ~ *с.х.* допустимое содержание пестицидов *(в сельскохозяйственных продуктах);* salt-~ *агрохим.* солеустойчивость; shade ~ *овощ.* устойчивость к затенению; soil loss ~ *почв.* противоэрозионная устойчивость почвы; submersion ~ *бот.* устойчивость к затоплению; understory ~ *лес.* выживаемость нижнего яруса *(насаждения)*

tolerant *adj.* выносливый, устойчивый, толерантный; field ~ толерантный в полевых условиях

tolerate *v.* переносить, выносить, терпеть

tomato *n. овощ.* помидор, томат; ~ paste томатная паста; ~ slicer *техн.* нож для нарезки томатов ломтиками; beef / beefsteak ~ бычье сердце *(сорт томатов);* cherry ~ томаты черри; grape ~ виноградный томат *(разновидность томата черри);* greenhouse ~ томат для выращивания в закрытом грунте; heirloom ~ *раст.* старый негибридный сорт томатов; старый сорт томатов негибридного происхождения; plum ~ сорт томатов с плодами сливовидной формы; saladette ~ салатный сорт томатов; specialty ~ специальный ассортимент томатов; томат высшего качества

tool *n.* инвентарь, инструмент; механизм, способ; advisory ~ справочное пособие; справочное руководство; grafting ~ *раст.* садовый инструмент для прививки; powerful ~ мощное средство; search ~ средство поиска; tillage ~ *почв.* почвообрабатывающее орудие

top *n.* верхушка, ботва *(корнеплодов);* надземная часть *(растения); adj.* верхний; ~ dressing поверхностная подкормка *(внесение удобрений);* ~ rot вершинная гниль; ~ soil поверхностный слой почвы; bunchy ~ кустистость верхушки; bushy ~ верхушка кроны *(дерева);* curly ~ курчавость, скручивание верхушки; make ~ growth образовывать надземную часть *(о растении)*

topdressing *n.* поверхностное внесение удобрений; (некорневая) подкормка

topiary *n. ланд.* фигурная стрижка садовых деревьев; ~ art искусство фигурной стрижки садовых деревьев; ~ garden сад с подстриженными деревьями

topography *n.* топография *(географическое и геометрическое изучение местности);* географические и геометрические особенности местности; changes in ~ of the area *ланд.* перепады рельефа местности; natural ~ *ланд.* естественный рельеф *(земельного участка);* surface ~ *агрохим.* рельеф; устройство поверхности
topping *n.* прищипывание, пинцировка
topsoil *n. почв.* верхний слой почвы, пахотный слой почвы; diminishing of ~ *агрохим.* уменьшение мощности пахотного слоя
total *adj.* весь, целый, полный, общий суммарный; ~ production общий объем произведенной продукции; ~ yield валовой *(общий)* урожай, сбор; выход продукции
tough *adj.* жесткий *(особенно о пище)*
toxic *n.* токсичное вещество, ядовитое вещество; *adj.* токсичный, ядовитый; ~ water pollutant *экол.* токсичное вещество, загрязняющее воду; acutely ~ pesticide *экол.* высокотоксичный пестицид; dumping of ~ waste *экол.* сброс ядовитых отходов; international register of potentially ~ chemicals *экол.* международный регистр потенциально токсичных химических веществ; long-lived ~ substances *экол.* стойкие токсичные вещества
trace *n.* след, незначительное количество; ~ amount ничтожно малое количество; ~ element микроэлемент; следовой элемент *(в культуральных средах);* ~ minerals микроэлементы, *syn.* ~ nutrients
train *v.* формировать *(кроны плодовых деревьев и кустарников);* направлять рост *(растений)*
trait *n. биол.* признак, особенность, черта; agronomically undesirable ~ *ген.* агрономически нежелательный признак; defensive ~ *ген.* защитный признак; dominant ~ доминирующий признак; доминантный признак; polygenic ~ *ген.* количественный признак; recessive ~ *ген.* рецессивный признак
trampling *n. биол.* вытаптывание; *v.* давить; ~ of manure *с.х.* плотная укладка навоза; уплотнение навоза; resistance to ~ *ланд.* устойчивость к вытаптыванию; slash ~ removal *лес.* уборка *(втоптанных)* порубочных остатков; soil ~ *почв.* вытаптывание почвы
transfer *n. биол.* перенос; передача; перевивка; пересадка; трансплантация; *v.* переносить, перемещать; передавать; перевивать; пересаживать; direct ~ *мол. ген.* прямое внедрение *(метод внедрения гена в клетку без использования вектора);* genetic ~ *ген.* перенос генетического материала
transform *v.* превращать, преобразовать; ~ into meadow *с.х.* залужать; ~ed phenotype *биол.* трансформированный фенотип
transformation *n. биол.* трансформация, превращение, преобразование; bacterial ~ *ген.* бактериальная трансформация; competent cell ~ *ген.* трансформация компетентных клеток; plant ~ *ген.* трансформация растения; sex ~ *ген.* переопределение пола; реверсия пола; трансформация пола; species ~ *ген.* трансформация вида; spontaneous ~ *ген.* спонтанная трансформация; stable ~ *ген.* стабильная трансформация; transient ~ method *ген.* способ транзиентной трансформации

transgenic *adj. биол.* трансгенный; *ген.* генно-модифицированный; генетически модифицированный; ~ event *биотех.* трансгенный объект; ~ line *биол.* трансгенная линия; ~ marker *биол.* трансгенный маркер; ~ organism's genetic code *ген.* генетический код трансгенного организма; ~ plants *ген.* трансгенные растения
translocate *v.* передвигать, перемещать
transmit *v.* передавать(ся), отдавать; отправлять, пересылать, посылать; передавать по наследству; fungus-~ted virus *фтп.* вирус, передаваемый грибами
transpiration *n.* транспирация *(испарение воды растениями)*
transplant *n.* саженец; пикированная рассада; пересаженное растение; *v.* пересаживать, пикировать; ~ flat ящик для выгонки рассады; ~ house теплица для выращивания рассады; ~ production выращивание рассады
transplanter *n.* тот, кто пересаживает растения; рассадосажатель; посадочное устройство, приспособление для высадки растений; tree ~ лесопосадочная машина
transplanting *n.* пересадка, *syn.* transplantation
transportability *n.* транспортабельность
trap *n. биол.* ловушка; капкан; *v.* ставить ловушку или капкан; ~ band *агрохим.* ловчий пояс; *лес.* полоса удержания; ~ flower цветок-ловушка *(закрывающийся и удерживающий насекомое для совершения опыления);* ~ log *лес.* ловчее дерево *(для вредителей леса);* ~ trench *агрохим.* ловчая канавка; insect-~ light *с.х.* светоловушка для насекомых-вредителей; moisture ~ *с.х.* водоудалитель; seed ~ *лес.* семеномер; семяноуловитель
treat *v.* обрабатывать; протравлять *(семена);* вносить, применять *(удобрения, ядохимикаты)*
treatment *n.* уход; обработка; протравление *(семян);* внесение *(удобрений, ядохимикатов);* brood tree ~ *лес.* обработка свежезаселенных насекомыми деревьев; intermediate ~ *лес.* рубка ухода; промежуточная рубка; рубка промежуточного пользования; seed ~ *овощ.* протравливание семян; silvicultural ~ *лес.* лесокультурные мероприятия; soil ~ *почв.* обработка почвы; spot ~ *лес.* выборочная рубка; trap tree ~ *лес.* обработка ловчего дерева; water ~ plant *техн.* водоочистка; очистка воды
tree *n.* дерево; crop ~ *лес.* маячное дерево; *техн.* дерево для рубки; дерево, предназначенное к рубке; *экол.* семенное дерево; спелое дерево; дерево, предназначенное к валке; multifunctional ~s *лес.* деревья разного функционального назначения; oldgrowth ~s перестойный лес, перестойные деревья; plane ~ *бот.* платан западный *(Platanus occidentalis);* платан *(Platanus);* scattered ~s отдельно растущие деревья; shallow-rooted ~ *лес.* дерево с неглубокой корневой системой; мелкоукореняющееся дерево; дерево с поверхностной корневой системой; tulip ~, *syn.* lime ~ *бот.* тюльпанное дерево, лириодендрон тюльпанный *(Liriodendron tulipifera);* липа американская *(Tilia americana)*
trench *n.* ров, канава; борозда; *v.* рыть рвы, канавы, траншеи; ~ planting *с.х.* посадка в борозду; *с.х.* ~ the soil перекапывать землю; draining ~ *с.х.* дренажная канава; gutter ~ *лес.* противопожарная канава; insect ~ *с.-х.* ловчая канава; sowing in ~s *с.х.* бороздной посев; листерный посев

trial *n.* проба, испытание, исследование, опыт, проверка; ~ field опытное поле; farm scale ~ производственный опыт; field ~ полевой опыт; variety ~ сортоизучение
trim *v.* подрезать, подстригать; ~ the hedges подстригать живые изгороди
triticale *n.* тритикале *(вид хлебного злака, гибрид пшеницы и ржи)*
trowel *n. бот.* копалка; gardener's trowel садовая лопата
trunk *n.* ствол, syn. bole, stock; clear ~ чистый ствол
truss *n.* связка; пук *(сена, соломы, травы), syn.* bunch, cluster; гроздь, кисть, соцветие; ~ pruning обрезка кистей; ~ clip зажим для кисти
tuber *n.* клубень
tulip *n. бот.* тюльпан *(Tulipa);* common garden ~ тюльпан Геснера *(Tulipa gesneriana);* pine ~ грушанка зонтичная *(Pyrola umbellata);* spotted ~ тюльпан пятнистый *(Tulipa maculata);* two-flower ~ тюльпан двухцветковый *(Tulipa biflora);* water-lily ~ тюльпан Кауфмана *(Tulipa kaufmanniana);* wild ~ тюльпан белый, тюльпан лесной *(Tulipa sylvestris)*
tundra *n.* тундра; barren-grounds ~ арктическая тундра; hilly ~ бугристая тундра; hummocky ~ кочкарная тундра, *syn.* tussock ~; grass ~ травянистая тундра; lichen ~ лишайниковая тундра; sedge cotton-grass ~ осоково-пушицевая тундра; stony ~ каменистая тундра
tunnel *n.* тоннель под укрывным материалом, под пленкой; plastic ~ теплица туннельного типа или туннельное укрытие из полимерной плёнки
turf *n.* дерн, дернина, *syn.* sod; торф; grassy ~ густой травяной войлокообразный покров
turmeric *n. бот.* куркума длинная *(Curcuma longa)*
turn *v.* ворошить *(сено);* перелопачивать *(зерно);* ~ the soil распахивать землю; ~ under запахивать
turnip *n.* репа, турнепс
tweezers *n. биол.* пинцет; ~ mark след пинцета, повреждение от пинцета
twig *n.* веточка, прут, хворостинка; ветвь, ветка, *syn.* shoot, sprig
twine *n.* бечевка, шнурок, шпагат
twist *v.* обвивать; скручивать, сплетать; виться, изгибаться; *n.* закрученность, скручивание; ~ing cover закручивающиеся кроющие листья
two-row *adj.* двухрядный; ~ potato harvester двухрядный картофелеуборочный комбайн

Uu

ultrafiltration *n.* ультрафильтрация *(технология очистки воды путем фильтрации через сверхтонкие мембраны);* ~ concentration концентрирование ультрафильтрацией
unable (to) *adj.* неспособный
under *prep.* под, ниже; ~ the plant под растение *(прикорневой);* ~ favourable conditions в/при благоприятных условиях; ~ wet circumstances в условиях повышенной влажности
undergo (underwent, undergone) *v.* испытывать, подвергаться *(чему-л.)*

underground *adj.* подземный; *n.* подпочва
underseeding *n.* подсев
underside *n.* нижняя часть *(предмета);* дно, низ; оборотная сторона; ~ of the leaf нижняя сторона листа
undeveloped *adj.* необработанный, неосвоенный *(о почве)*
undo (undid, undone) *v.* уничтожать *(сорняки),* губить *(рост растений)*
uneven *adj.* неровный, неравномерный; ~ ripening неравномерное созревание
unhampered *adj.* свободный, нестесненный, беспрепятственный; ненарушенный
uniform *adj.* однородный, равномерный; единообразный, дружный *(о всходах),* выровненный; ~ length ровные посадки *(о растениях)*
uniformity *n.* однородность; improved ~ улучшенная однородность
uniformly *adj.* единообразно, равномерно *(по времени)*
uninfected *adj.* незараженный, неинфицированный; ~ locations незараженная местность
uninodal *adj.* одномутовчатый *(о типе ветвления стволов деревьев хвойных пород)*
uninterrupted *adj.* непрерываемый; непрерывный; ~ growth непрерывный рост
unique *adj.* уникальный; исключительный; необыкновенный
unpretentious *adj.* неприхотливый
unsaturated *adj.* ненасыщенный
upkeep *v. техн.* содержание в рабочем состоянии; уход, обслуживание; ремонт; затраты на *(техническое)* обслуживание и *(текущий)* ремонт; ~ of equipment сбережение оборудования
upper *adj.* верхний
uproot *v.* вырывать с корнем, выкорчевывать, корчевать
upright *adj.* прямостоячий
uptake (uptook, uptaken) *v.* поглощать, усваивать; *n.* поглощение, усвоение, потребление
urea *n.* мочевина
use *n.* употребление, применение, польза; использование; *v.* использовать, пользоваться, применять, употреблять, *syn.* utilize
usefulness *n.* применимость; пригодность
utensils *n.* инструмент; ~ pruning инструмент для подрезки *(ветвей деревьев)*
utilization *n.* утилизация, использование; ~ coefficient *агрохим.* коэффициент использования *(напр. удобрений);* agricultural ~ *с.х.* утилизация сельскохозяйственных отходов; assimilate ~ *с.х.* использование ассимилятов; fertilizer ~ *агрохим.* использование удобрений; потребление удобрений; fodder ~ scheme *с.х.* кормовой план; план использования корма; forest ~ *лес.* использование заготовленного леса; переработка заготовленного леса; grass mixture of medium term ~ *с.х.* травосмесь среднесрочного пользования; herbage ~ *с.х.* использование трав *(на зеленый корм или на силос);* nutritional

~ *агрохим.* использование питательных веществ; потребление питательных веществ; whole-tree ~ *лес.* использование дерева целиком *(включая корневую часть)*

Vv

valuable *adj.* полезный, ценный; высоко ценимый, *syn.* useful

value *n.* важность, ценность, полезность, *syn.* importance; стоимость, цена; breeding ~ племенная ценность; nutritional / nutritive ~ питательная / пищевая ценность

variable *adj.* переменный, изменчивый, непостоянный

variation *n. биол.* вариация, изменчивость; изменение; environmental ~ *экол.* изменение под влиянием внешних условий; genetic ~ наследственная изменчивость; genom ~ *ген.* генная мутация; nonheritable ~ *ген.* ненаследуемая изменчивость; regional ~s *агрохим.* местные изменения; местные отклонения

variegated *adj.* разноцветный; пестрый; неоднородный; смешанный; разнообразный

variety *n.* разновидность; сорт; ~ assortment сортовой состав / ассортимент; ~ check сортовой контроль; ~ certificate сортовое свидетельство; ~ certification аттестация сортности; ~ degeneration вырождение сорта; ~ purity сортовая чистота; ~ test plot сортоиспытательная делянка; ~ testing сортоиспытание; ~ trial on a farm scale производственное сортоиспытание; appreciable / promising ~ перспективный / обещающий сорт; changeable ~ невыровненный сорт; competitive ~ trials without replications конкурсное сортоизучение без повторений; early-season ~ сорт с коротким вегетационным периодом; full-season ~ сорт с длинным вегетационным периодом; high-protein ~ сорт с высоким содержанием белка; hybrid ~ гибридный сорт; leading ~ ведущий / основной сорт; local ~ местный сорт; mid-season ~ сорт со средним вегетационным периодом; среднеспелый сорт; multiline ~ *раст.* сорт многолинейного типа; мультилинейный сорт; многолинейный сорт; quality ~ элитный сорт; salt tolerant ~ солеустойчивый сорт; standard ~ стандартый сорт; сорт-стандарт; *Pl.* varieties; mixed ~ сортосмесь

various *adj.* различный, разный, разнообразный

vary *v.* менять(ся), изменять(ся), варьировать, *syn.* differ

vascular *adj.* васкулярный, сосудистый; ~ bundle волокнистый пучок; *биол.* капиллярный канал; сосудистый пучок; *лес.* сосудисто-волокнистый пучок *(древесины); раст.* проводящий пучок; ~ cylinder сосудистый цилиндр; vascular ~ *бот.* сосудистое растение; vascular ~ species *бот.* виды сосудистых растений; ~ system сосудистая система; ~ tissues сосудистые *(проводящие)* ткани; non-~ plant *бот.* бессосудистое растение

vector *n. биол.* вектор *(фаг, вирус или плазмида со вставкой чужеродной ДНК);* переносчик *(напр. инфекции);* agrobacterium ~ агробактериальный вектор

vegetable *n.* овощ; растительный; ~ garden огород

vegetable-growing *n.* овощеводство

vegetation *n.* произрастание; рост; растительность; растительная жизнь; рост; растительный покров; *adj.* вегетационный; ~ community *биол.* растительное сообщество; ~-inhabiting *биол.* живущий на растениях; ~ mapping *биол.* геоботаническое картирование; colonization by tree and shrubbery ~ *лес.* зарастание древесно-кустарниковой растительностью; ground ~ *лес.* напочвенный покров; halophylic ~ *агрохим.* галофитная растительность; halopsammophilous ~ *биол.* растительность засоленных песков; heavy-duty perennial ~ *агрохим.* многолетники с высокой защитной способностью *(от эрозии);* hydrophilous ~ *биол.* влаголюбивая растительность; indicator ~ *лес.* растения-индикаторы; interception loss evaporation from ~ *лес.* промежуточные потери с поверхности растительности; low ~ *биол.* низкорослая растительность; nitrophilous ~ *агрохим.* нитрофильная растительность; normalised difference ~ index *биол.* нормализованный индекс растительности; retardance class of ~ *агрохим.* класс растительности по сопротивляемости стоку; roadside ~ *биол.* придорожная растительность; seminatural ~ *биол.* полуестественная растительность *(частично измененная человеком);* soil-~ relation *агрохим.* взаимоотношение почвы и растительности; soil and ~ cover *бот.* почвенно-растительный покров; spontaneous ~ *бот.* дикая растительность; structure of ~ layer *лес.* состав травянистой растительности; stunted ~ *бот.* чахлая растительность; tall herbaceous ~ *бот.* большетравье; tangled ~ *лес.* заросль; кустарниковая заросль; сплетенная растительность; taxonomic unit of ~ *бот.* таксономическая единица растительности; transpiration from ~ *лес.* испарение растительностью; транспирация растительностью; understory ~ *лес.* нижний ярус *(насаждения);* порослевое молодое насаждение *(под пологом маячных деревьев);* второй древесный ярус; подлесье; подрост; unit of ~ *биол.* единица растительного покрова; wandering dune ~ *бот.* растительность подвижных песков

vegetative *adj.* вегетативный, вегетационный, растительный; овощной; ~ cover растительный покров; ~ development вытягивание; ~ growth вегетативный рост; ~ plant вегетирующее растение; ~ stage фаза вегетации

vein *n.* жилка *(крыла насекомого или листа растения);* ~ banding *бот.* окаймление жилок; ~-fruited *бот.* жилкоплодный; ~-leaved *бот.* жилколистный; ~ necrosis of tomato *фтп.* некроз жилок томата; branch ~s *бот.* боковые жилки первого порядка *(отходящие от главной жилки листа);* cucumber ~ yellowing virus *фтп.* вирус пожелтения жилок огурца; leaf ~ *бот.* жилка листа; median ~ *бот.* главная жилка листа

veinlet *n. биол.* маленькая вена; маленькая жилка

velvety *adj.* бархатистый; бархатный; густой *(о цвете);* гладкий, ровный, мягкий; нетерпкий, нерезкий *(о вкусе);* ~ growth lawn grass *ланд.* газонная трава, напоминающая изумрудный бархат; ровный, пущистый газон, похожий на зеленый бархат

venation *n. бот., зоол.* жилкование, расположение жилок *(на листе, крыле насекомого);* base to margin ~ расположение жилок от основания к краю листа; base to midrib ~ расположение жилок от основания к средней жилке;

base to tip ~ расположение жилок от основания к вершине; dictyodromous ~ ретикулярное жилкование, сетчатое жилкование, *syn.* netted ~; palmate ~ дланевидное жилкование; pinnate ~ перистое жилкование

veneer *n.* шпон; фанера; наружный слой; защитное покрытие; внешний лоск; *v. ланд.* обклеивать фанерой; придавать внешний лоск *(чему-л.);* маскировать *(что-л.);* ~ grafting *раст.* аблактировка; копулировка; прививка инкрустацией; прививка черенком; ~ rind grafting *лес.* видоизмененная прививка за кору; ~ side grafting *раст.* боковая инкрустация; боковая прививка в приклад

ventilation *n.* вентиляция; аэрация; проветривание; система вентиляции

vermin *n. биол.* с.-х. вредители, паразиты *(насекомые);* хищники *(о животных, птицах);* anti-~ предназначенный для борьбы с с.-х. вредителями

vernalization *n. с.х.* яровизация

vertical *adj.* вертикальный; ~ culture вертикально растущая культура

verticillium *n.* вертициллез; вертициллезное увядание

vertisol *n. почв.* вертисоль *(почва);* вертисоли *(почвы на монтмориллонитовой глине)*

vestigial *adj.* рудиментарный, остаточный

vetch *n. бот.* вика, горошек *(Vicia);* hairy ~ вика мохнатая *(Vicia villosa), syn.* winter ~; summer ~ *с.х.* вика посевная *(Vicla sativa)*

viable *adj.* жизнеспособный; ~ population жизнеспособная популяция

vigour *Br. E.,* vigor *Am. E. n.* мощь, сила; энергия роста; medium ~ среднерослый

vigorous *adj.* сильный, энергичный *(о растениях);* мощный *(о росте)*

vine *n.* лоза; вьющееся растение; виноград; ус; плеть; ~ plant стелющееся растение; ~ ripe бланжевая спелость *(о томате);* ~ tomato кистевой томат; ~ yard виноградник

vine-like *adj. бот.* лозоподобный; ~ flora лозоподобные растения

viral *adj.* вирусный; ~ filtration *биотех.* вирусная фильтрация; ~ inactivation *биотех.* вирусная инактивация; ~-induced insertional mutagenesis *ген.* вирусный инсерционный мутагенез; ~-specific enzyme *ген.* вирус-специфический фермент; ~ strand *ген.* вирулентная цепь; ~ titer *ген.* титр вируса; fungal and ~ disease *биол.* грибное и вирусное заболевание; intact recombinant ~ genome *ген.* интактный рекомбинантный вирусный геном; pre-~ plasmid *ген.* превирусная плазмида

virgin *adj.* девственный; первобытный; целинный; неоплодотворенный; ~ land целина

viroid *n.* вироид; potato spindle tuber ~ вироид веретеновидности клубней картофеля

virus *n.* вирус; ~ free незараженный вирусом; aspermy ~ вирус аспермии; chlorisis ~ вирус хлороза; cucurbit yellow stunting disorder ~ вирус желтой карликовости огурца; curly top ~ курчавость верхушки; etch ~ вирус гравировки; golden mosaic ~ вирус золотистой мозаики; mottle ~ вирус крапча-

тости; yellow leaf curl ~ вирус желтой курчавости листьев; yellow mosaic ~ вирус желтой мозаики
viruslike *adj.* вирусоподобный
viscosity *n.* вязкость; intrinsic ~ внутренняя вязкость
visible *adj.* видимый, очевидный, явный
vital *adj.* жизненный; *(жизненно)* важный, существенный; необходимый
viticulture *n.* виноградарство
volatile *adj. хим.* летучий, быстроиспаряющийся
volatilization *n.* улетучивание; выпаривание; испарение
volunteer *adj.* растущий самопроизвольно, самосевный; ~ plant растение, выросшее самопроизвольно, самосевное растение; ~ weeds самосевные сорняки
V-shaped *adj.* клиновидный; ~ lesions клиновидные поражения

Ww
walk *n.* пастбище, выгон, выпас
walkway *n. ланд.* дорожка; аллея, *syn.* avenue, path; ~ to a building *ланд.* дорожка к зданию
wall *n. биол.* стенка, перегородка; cell ~ оболочка клетки, клеточная оболочка; клеточная стенка; fruit ~ *раст.* перикарпий (околоплодник); embryo sac ~ *бот.* оболочка зародышевого мешка, стенка зародышевого мешка; large ~ brown *энт.* краеглазка печальная *(Pararge maera);* vascular ~ *бот.* стенка сосуда
walnut *n.* орех
warm *adj.* теплый; ~-season crop теплолюбивая культура; ~ soil прогретая почва; ~ up подогревать, прогревать
wash out *v. с.х.* сносить; вымывать(ся); смывать
washing *n.* промывка; отмывка
wasp *n.* оса *(Vespa); Pl.* настоящие осы *(Vespidae),* складчатокрылые осы *(Vespidae);* роющие осы *(Sphecidae);* gold ~s настоящие наездники, ихневмониды *(Ichneumonidae)*
wastage *n. биол.* постепенная потеря, утечка *(напр. генов);* ~ of natural resources *экол.* потери природных ресурсов; ~ of water *экол.* потери воды; сброс части воды *(при оборотном водоснабжении);* wood ~ *лес.* усушка пиломатериалов
waste *n.* пустыня, пустошь; отходы *(производства);* ~ products отходы; отходы производства; *техн.* побочные продукты
wasteland *n.* пустошь; пустырь; заброшенный участок земли; *лес.* бросовые земли; *экол.* пустая земля; *экон.* бесхозная земля; industrial ~ *экол.* земли, нарушенные промышленным производством
water *n.* вода, водоем; v. орошать, поливать; ~ chestnut *бот.* рогульник плавающий, орех водяной *(Trapa natans),* чилим; ~-conducting tissues водопроводящие *(сосудистые)* ткани; ~-holding capacilty водоудерживающая способность; ~ influx обводнение; приток воды; ~ level уровень грунтовых вод; ~ logging сплав древесины; заболачивание; погружение в воду; заболачивание; затопление; подтопление; ~ potential водный потенциал; ~ regime во-

дный режим; ~ requirements оросительная норма; нормы потребления воды; нормы потребности в воде; расход воды; водопотребление; ~ solution водный раствор; ~ stress недостаток воды *(в растении);* дефицит воды; напряженность водного режима; стресс, вызванный недостатком воды; водный стресс; ~ use efficiency коэффициент полезного использования воды; коэффициент водопользования; коэффициент использования водных ресурсов; эффективность использования воды; clean ~ чистая вода, *syn.* pure ~; ground ~s грунтовые воды, *syn.* underground / subterranean ~s; melt ~ талая вода, *syn.* thaw ~; residential ~s бытовые сточные воды; saline ~ *агрохим.* засоленная вода; salt-free ~ *экол.* обессоленная вода; waste ~ сточные воды

watercress *n. бот.* воронья лапа *(Coronopus);* горчица полевая *(Sinapis arvensis);* жеруха лекарственная *(Nasturtium officinale)*

waterfall *n.* водопад; cascading ~ *ланд.* каскадный водопад; miniature ~ *ланд.* водопадик; водопад в миниатюре

watering *n.* водопой; полив, орошение; ~ hose поливочный шланг

waterlogged *adj.* заболоченный

water-melon *n.* арбуз

watershed *n.* водораздел, *syn.* divide; бассейн реки; ~ protection охрана водораздела

wax *n.* воск; ~ bean восковая фасоль; ~ layer восковой налёт

waxing *n.* парафинирование; пропитывание воском; воскование

weak *adj.* слабый, хилый

weed *n. бот.* сорняк; сорная трава; *v.* полоть; пропалывать; выпалывать; выдергивать сорняки; ~-deterring material укрывной материал от сорняков; ~ killing уничтожение сорняков, прополка; ~ out уничтожать сорняки; ~ seeds семена сорняков; carried ~ заносный сорняк; ill ~ злостный сорняк, *syn.* persistent ~; noxious ~ вредный сорняк; troublesome ~ трудноискоренимый сорняк

weeder *n.* полольщик; рыхлитель; корнеудалитель; прополочный культиватор; прополочная борона; агрегат для прополки

weed-free *adj.* свободный от *(семян)* сорняков; без сорняков

weedkiller *n., syn.* weedicide гербицид; selective ~ гербицид избирательного действия; total ~ гербицид общего действия

weedy *adj.* заросший сорняками, засоренный сорняками; изобилующий сорной травой; поросший водорослями

weigh *v.* взвешивать

weight *n.* вес; масса; ~ loss потеря веса; average ~ средняя масса; fruit ~ масса плода; low ~ низкая масса

weighing *n.* взвешивание, определение массы

well-shaped *adj.* сформированный

wet *adj.* мокрый, влажный; сырой; *v.* мочить, смачивать; ~ rot мокрая гниль; гниение древесины, вызываемое переменным действием влажности и сухости

wetland *n.* заболоченное место, сырой участок; болотистая местность; болотный массив; *лес.* заболоченные земли; плохо дренируемый сырой участок; влажный район; заболоченная территория; *техн.* сильно увлажненная земля;

~ *экол.* conservancy охрана заболоченных земель; ~ ecosystem *экол.* экосистема переувлажненных земель; ~ restoration *экол.* восстановление болот
wetness *n.* влажность; сырость; влага
wheat *n.* пшеница; ~ cultivation technology технология возделывания пшеницы; hard ~ твердая пшеница; soft ~ мягкая пшеница; spring ~ яровая пшеница; winter ~ озимая пшеница
wheelbarrow *n.* тачка; ручная тележка; ~ circular saw *лес.* круглая пила на тележке; powered ~ *с.х.* моторная тачка
white *adj.* белый; прозрачный, бесцветный; ~ cabbage белокочанная капуста; ~ flies белокрылки, алейродиды, *syn.* aleurodids; ~ frost иней; изморозь
whitewash *n.* побелка известкой, притенка *(теплиц)*
whole *adj.* цельный; ~ kernel corn цельнозерная кукуруза
whole-leaf *adj.* цельнолистовой; ~-blade *бот.* простой лист *(лист с одной листовой пластиной)*
whorl *n.* мутовка; круг частей цветка или листьев; виток, изгиб; pine ~ мутовка сосны; мутовчатое расположение ветвей сосны
wide-row *adj.* широкорядный *(о посеве)*
widespread *adj.* широко распространенный
wild *adj.* дикий; дикорастущий; ~ fire *лес.* низовой пожар; ~ flooding *агрохим.* нерегулируемый полив напуском; ~ flowers *ланд.* полевые цветы; ~ foods *экол.* продукты питания из диких растений и животных; ~ forest *лес.* девственный лес; лесная чаща; ~ resources ресурсы дикой природы; ресурсы, находящиеся в первобытном состоянии; ресурсы, сохранившие первозданный вид; ~ river заповедная река; ~ stand *лес.* естественное лесонасаждение; ~ type gene *ген.* ген дикого типа; run ~ *рек.* заростать
wilding *n.* дичок, дикое растение; одичавшее растение
willow *n.* ива; pussy willow краснотал, верболоз, ива-шелюга, ива остролистная, верба красная *(Salix acutifolia);* sand-bar willow ива длиннолистная *(Salix interior);* weeping willow ива плакучая, ива вавилонская *(Salix babylonica)*
wilt *v.* вянуть, увядать, поникать; *n.* вилт *(болезнь увядания);* гниль; bacterial ~ of potato бурый бактериоз картофеля; fusarium ~ фузариозное увядание; spotted ~ virus пятнистое увядание томатов; verticilium ~ вертициллиозное увядание
wind *n.* ветер; heavy ~ сильный ветер
windblow *n.* ветровал деревьев с корнями
windblown *adj.* несущийся по ветру; ~ seeds семена, переносимые ветром; перенос семян ветром
wind-break *n.* порывистый ветер; *агрохим.* защитная лесополоса; *лес.* бурелом; *техн.* щит *(для защиты от ветра); ланд.* ветрозащитные посадки; ветролом; *лес.* дерево, поломанное ветром; снегозащитные посадки *(вдоль дорог)*
wind-breaker *n. техн.* ветрогаситель
wind-dispersed *adj.* распространяемый ветром, ветроопыляемый
windmill *n. техн.* ветряная мельница; ветряк, ветродвигатель; ветроэнергетическая установка; a pump operated by ~ *экол.* насос, приводимый в действие ветряком

wind-throw *n.* буревал; ветровал; повал
winged *adj.* крылатый; летающий *(о насекомом);* ~ seed крылатое семя
winter *v.* зимовать, перезимовывать; ~ annual озимый однолетник; ~ hardy зимостойкий; ~ killing вымерзание *(растений)*
wire *n.* проволока; ~ fence проволочная опора; ~-row planting посев по мерной проволоке
wireworm *n.* нематода, проволочник
wisteria *n. бот.* глициния, вистерия
wither *v.* увядать, сохнуть, вянуть, засыхать; чахнуть, слабеть, уменьшаться
withering *n.* вилт, увядание
wolf *n. биол.* волк; ~ tree *лес.* дерево-волк; разросшееся дерево *(занимающее много места и затрудняющее рост соседних деревьев более ценных пород)*
wood *n.* дерево *(срубленное);* древесина; *Pl.* лес; adult wood спелая древесина; early ~ весенняя древесина; fine-grained ~ мелкослойная древесина; hard ~ дерево твердой породы; твердая древесина; knot-free ~ *лес.* бессучковая древесина; late ~ летняя древесина; light-demanding ~s светолюбивые деревья; pithy ~ дерево с рыхлой сердцевиной; stem ~ стволовая древесина; wide-ringed ~ крупнослойная древесина
woodchip *n. техн.* щепа; древесная стружка
woodlot *n.* лесной участок; перелесок; *экол.* группа деревьев; лесоэксплуатационный участок; участок лесонасаждения; farm ~ *лес.* лес сельскохозяйственного пользования; rural ~s *экол.* лесные массивы в сельских районах
worm *n.* червь; червеобразное животное; личинка; гусеница
wormwood *n. бот.* полынь *(Artemisia);* полынь обыкновенная, чернобыльник *(Artemisia vulgaris);* эвкалипт грубый *(Eucalyptus rudis)*
wound *n.* рана, механическое повреждение; root ~ повреждение корня
wrapper *n.* покровное растение
wrinkled *adj.* морщинистый; ~ peas мозговой / морщинистый горох

Xx
xeriscaping *n. раст.* садоводство с использованием засухоустойчивых растений и водосберегающих технологий *(запатентованное название);* садоводство с минимальным поливом или вовсе без полива

Yy
yam *n.* ямс, диоскорея *(Dioscorea);* торица полевая *(Spergula arvensis)*
yard *n.* ярд *(мера длины, равная 3 футам или 91,4 см);* ~ garden *ланд.* лужайка перед домом
yarrow *n. бот.* тысячелистник *(Achillea)*
year *n.* год; fruitful ~ урожайный год, *syn.* high yield ~; lean ~ неурожайный год, *syn.* unfruitful ~
yearling *n.* однолетний саженец, однолетнее растение
yellowing *n.* пожелтение; ~ of the leaves at the edges краевой хлороз листьев; ~ of the lower leaves пожелтение нижних листьев; cucumber vein ~ virus ви-

рус пожелтения жилок огурца; marginal ~ краевой хлороз листьев *(болезнь калийной недостаточности);* uniform ~ диффузный хлороз *(болезнь сульфатной недостаточности свеклы)*

yew *n. бот.* тис *(Taxus);* Pacific ~ тис коротколистный, тис тихоокеанский *(Taxus brevifolia), syn.* American ~

yield *n.* урожай; урожайность; размер выработки; выход готовой продукции; количество добытого или произведенного продукта; выход *(продукции); v.* производить; приносить; давать; приносить плоды; ~ gain повышение урожая; ~ per unit урожай на единицу площади; ~ per acre harvested урожай в расчете на акр убранной площади; ~ potential потенциально возможный урожай; ~ stability стабильность урожайности; bulk ~ валовой сбор; bumper ~ небывало большой урожай; check ~ урожай контрольной делянки; conventional ~ плановая урожайность; crop ~ урожайность культур; dry matter ~ урожай сухой массы; fresh ~ выход зеленой массы; further ~ виды на урожай; gross ~ валовой урожай; gross ~ общий выход продукции; heavy ~ обильный урожай; high ~ year высокоурожайный год; milk ~ надой молока; meat ~ выход мяса; marketable ~ товарный урожай; negative ~ response отрицательный эффект; relative ~ относительный урожай *(по сравнению с контролем или фоном)*

young *adj.* молодой; ~ fruit завязь *(плода);* зеленец *(огурца);* ~ plant молодое растение; сеянец; саженец

Zz

zinc *n.* цинк

zone *n.* зона; ~ of alternation зона выветривания; ~ tillage полосная обработка почвы; barren ~ зона выноса; bleached ~ слой выщелачивания; compression ~ зона уплотнения; evaporation ~ зона испарения *(в почве);* hardiness ~ *раст.* зона морозостойкости; hybrid ~ *ген.* гибридная зона; rainfed ~ зона с осадками; root ~ *бот.* корневая зона; корнеобитаемая зона; прикорневая зона; ризосфера; sampling ~ участок взятия образцов; saturated ~ гумидная зона; насыщенная влагой зона; увлажненная зона; seedling environment ~ площадь питания рассады; площадь питания саженцев; seepage ~ зона подпитывания; полоса впитывания; temperate ~ зона умеренного климата; unsaturated ~ аридная зона; засушливая зона; vegetation ~ растительная зона

zoning *n.* районирование; ~ unit *экол.* единица районирования; agricultural ~ *агрохим.* с.-х. зонирование; agroclimatological ~ *экол.* агроклиматическое зонирование; агроклиматическое районирование; emission density ~ *экол.* районирование территории по объему выбросов; natural ~ *экол.* природное районирование; reclamative ~ *экол.* мелиоративное районирование; rural ~ *агрохим.* районирование по типу использования земель; soil ~ *экол.* почвенное районирование; water criteria ~ *экол.* районирование критериев качества воды

zyme *n.* фермент; ~ system *биотех.* система ферментов

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