МИНИСТЕРСТВО СЕЛЬСКОГО ХОЗЯЙСТВА
РОССИЙСКОЙ ФЕДЕРАЦИИ

Федеральное государственное бюджетное образовательное учреждение
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«Казанский государственный аграрный университет»

Кафедра иностранных языков

ПРАКТИКУМ ПО ДИСЦИПЛИНЕ «ИНОСТРАННЫЙ ЯЗЫК»

для обучающихся по программам бакалавриата
агрономического факультета

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Данный практикум по английскому языку предназначено для студентов агрономических специальностей по направлениям подготовки 35.03.04 – Агрономия, 35.03.05 – Садоводство, 35.03.07 – Технология производства и переработки сельскохозяйственной продукции.

Цель данного практикума – формирование умения читать и переводить оригинальную литературу и развитие навыков устной речи на английском языке в пределах пройденной тематики.

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Оглавление

Предисловие

Данный практикум по английскому языку предназначен для бакалавров агрономических специальностей по следующим направлениям подготовки:

35.03.04 – Агрономия. Профиль «Агробизнес»

35.03.04 – Агрономия. Профиль «Защита растений и биотехнологии»

35.03.05 – Садоводство. Профиль «Декоративное садоводство и ландшафтный дизайн»

35.03.07 – Технология производства и переработки сельскохозяйственной продукции Профиль «Технология производства и переработки с/х продукции»

Цель данного практикума – формирование умения читать и переводить оригинальную литературу и развитие навыков устной речи на английском языке по сельскохозяйственной тематике. Практикум состоит из 4 модулей. Каждый модуль состоит из основного текста и текстов для дополнительного чтения (Supplementary Reading). Каждый текст сопровождается упражнениями и текстами по специальности. Тексты предназначены для чтения и перевода с английского языка со словарем и без словаря. Упражнения содержат вопросы по содержанию текста, лексические и грамматические задания. Грамматические упражнения чередуются с лексическими, что позволяет избежать монотонности на занятии.

Задания блока грамматики соотносятся с тематикой раздела и способствуют активизации его лексической составляющей. Поскольку основой занятия является текст, первоочередная задача – его прочтение, перевод с доскональным (полным) пониманием. Отбор грамматического материала обусловлен необходимостью изучения и активизации грамматических конструкций, характерных для научной литературы (Present/Past/Future Tenses, Passive Voice, Modal Verbs).

Перед каждым текстом даны лексические упражнения для облегчения работы с текстом. Поурочный словарь лексики содержит лексические единицы, подлежащие активному усвоению, которые затем неоднократно повторяются в упражнениях в последующих занятиях с целью закрепления материала.

Упражнения на вопросы, обращённые к студенту, преследуют основные цели: проверки знания содержания текста, активизации словарного запаса, усвоения отдельных деталей текста; проведение беседы по проблемам, затрагиваемым в тексте.

Дополнительные тексты помогут студентам расширить и закрепить полученные знания.

MODULE 1. An Introduction to Agriculture and Agronomy

AGRICULTURE

STARTING UP

Discuss this question.

• Что Вы знаете о сельском хозяйстве?

VOCABULARY

Read and translate these words and word combinations into Russian.

Economic, natural resources, protect, management, production, agronomy, entomology, pathology, microbiology, control, ornamental, narcotic, agricultural engineering, component, machinery, materials for industries, utilization, integration, production group.

READING

Essential vocabulary

allied – родственный, смежный.
condiments – приправы, добавки.
deterioration – ухудшение, износ.
disease – болезнь.
enhanced – увеличенный, повышенный.
facilitate – способствовать.
fibre – волокно, клетчатка.
fodder – корм, кормовое растение.
horticulture – садоводство.
husbandry – хозяйство.
livestock –скот.
misuse – неправильно использовать.
perennial – многолетний.
prawn – креветка.
raw – сырой.
shrimp – мелкая креветка.
timber – лесоматериал, древесный.
tool – орудие, инструмент.
yield – урожай.

Agriculture means cultivation of land, producing crops and livestock for economic purposes. It studies field crops and their management, including soil

management. The primary aim of agriculture is to protect land from deterioration and misuse to achieve high productivity.

Crop production − it deals with the production of various crops such as food crops, fodder crops, fibre crops, sugar, oil seeds, etc. It includes agronomy, soil science, entomology, pathology, microbiology, etc. The aim is to have better food production and how to control the diseases.

Horticulture − branch of agriculture which deals with the production of flowers, fruits, vegetables, ornamental plants, spices, condiments (includes narcotic crops − opium, etc., which has medicinal value) and drinks.

Agricultural Engineering – it aims to produce modified tools to facilitate proper animal husbandry and crop production tools, implements and machinery in animal production.

Forestry − it deals with production of perennial trees for supplying wood, timber, rubber, etc. and also raw materials for industries.

Animal Husbandry − it is common for both crops and animals.

Fishery Science − it is for marine fish and inland fish including shrimps and prawns and other types of seafood.

Home Science − it deals with application and utilization of agricultural produces in a better manner. When utilization is enhanced production is also enhanced.

On integration of all the seven branches, first three are grouped as for crop production group and next two for animal management and last two as allied agriculture branches.

COMPREHENSION

1. Are the following statements TRUE or FALSE?

a) The only aim of agriculture is to protect land from deterioration and misuse. **(TRUE / FALSE)**

b) The aim of crop production is to have better food production and to control the diseases. **(TRUE / FALSE)**

c) Agricultural Engineering doesn't plan to modify tools. **(TRUE / FALSE)**

d) Animal Husbandry is both for crops and animals. **(TRUE / FALSE)**

e) There are seven branches of agriculture. **(TRUE / FALSE)**

Answer the questions.

a) What is agriculture?

b) Why does agriculture protect land?

c) What branch of agriculture deals with production of flowers, fruits, vegetables?

d) What does forestry deal with?

e) When production is enhanced?

VOCABULARY

1. Match the words.

a) protection	1) болезнь
b) crop	2) дерево
c) disease	3) защита
d) implement	4) культура
e) animals	5) орудие
f) tree	6) животные

2. Put the letters in the correct order to make nouns. The first letter is underlined.

Cugairlreut agriculture

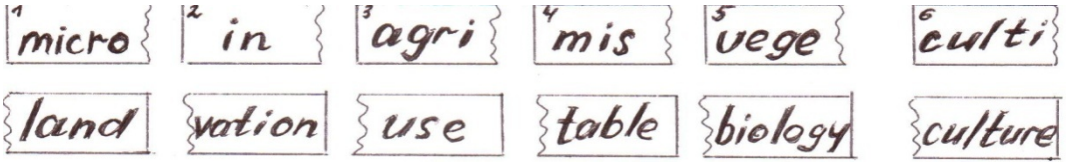
a) deyli _____
b) leifd _____
c) lbegevetas _____
d) narcbh_____
e) nilama _____

WRITING

1. Find the following word combinations in the text and copy their English variants to your notebooks.

В то же время, производить обильно, различные культуры, кормовые культуры, важный компонент, многолетние деревья, сырой материал, семь отраслей, сельскохозяйственные отрасли.

1. Match the two halves to make words.



2. Complete the sentence with a word from Exercise I.

a) _____ means growing of crops.
b) Fishery deals with marine and _____ fish.
c) _____ is a part of Crop production branch.
d) _____ is the process of cultivating.
e) Agriculture tries to protect land from _____.

f) _____ a plant or part of a plant used as food.

GRAMMAR

1. Write down questions to the underlined words.

a) Agriculture studies field crops and their management.

b) Agricultural Engineering is an important component for crop production and horticulture.

c) Forestry deals with production of perennial trees.

d) Home Science deals with application and utilization of agricultural produces in a better manner.

e) Agriculture has seven main branches.

2. Find all sentences in Present Simple with the -s ending. Put down questions to these sentences. Make these sentences negative.

3. ***Look through the text again and find 5 nouns with the suffix "tion". Write these nouns into the chart, make verbs from them.***

noun	**verb**

4. Complete the text with the verbs and prepositions from the brackets.

Agriculture _____ crops and livestock ____ economic purposes. It _____ field crops and their management. Agriculture _____ seven main branches. Every branch ____ important for land protection and high productivity. Crop production branch _____ better food production and disease control. Horticulture _____ the production ___ flowers, fruit, vegetables, etc. Agricultural engineering _____ modified tools. Forestry _____ industries _____ wood, timber and raw materials. (deals with, supplies, studies, is, produces, for, produces, of, has, aims at, with).

SPEAKING

1. Make questions about the Agriculture using the chart below. Answer these questions.

		agriculture produce modified tools?

What		agriculture mean?
Where	*do*	farmers control diseases?
Why	*does*	horticulture deal with?
How		farmers use machinery?
		timber, wood and raw materials come from?

2. Choose one or two branches of agriculture which you think are the most important. Explain your ideas. Check your ideas with your group.

Supplementary reading

Text I. AGRONOMY

STARTING UP

Discuss these questions.

• Чем занимается агрономия? Какие, на Ваш взгляд, основные принципы агрономии?

VOCABULARY

Read and translate these words and word combinations into Russian.

Agronomy, agricultural, principles and practices, production and management, productivity, physiology and biochemistry, meteorology, ecology, basic principles, planning, programming, maximum utilization, factors of production, adapt, irrigation, drainage, erosion, mix, balance, correction, reactions, organic, farm, bio, material, irrigation, adequate, critical, pathogen, technologies.

READING

<u>Essential vocabulary</u>

application – применение, внесение.
adverse – неблагоприятный, вредный.
adaptable – адаптирующийся, легко приспосабливаемый.
branch –отрасль.
breeding – выведение, селекция.
condition –условие, состояние.
density – густота, плотность.
environment – окружающая среда.
fertility – плодородие, продуктивность.
fertilizer – удобрение.
manure – навоз, органическое удобрение.

particular – отдельный, индивидуальный.
scheduling – планирование сроков.
tillage – подготовка почвы.

The word agronomy has been derived from the two Greek words, ***agros*** and ***nomos*** which have the meaning of ***field*** and ***to manage***. Agronomy is "a branch of agricultural science which deals with principles and practices of field crop production and management of soil for higher productivity". Agronomy has three main branches: Crop Science (plant breeding, crop physiology and biochemistry etc.), Soil Science (soil fertilizers, manures etc.), and Environmental Science (meteorology and crop ecology).

Basic Principles of agronomy are:

• Planning and programming for maximum utilization of land, labourer, capital and other factors of production;

• Choice of crop varieties adaptable to the particular agro-climate, land situation, soil fertility and season;

• Proper field management by tillage, preparing field channels for irrigation and drainage, checking soil erosion, levelling and adopting other suitable land improvement practices;

• Adoption of multiple cropping and also mixed or intercropping to ensure harvest even under adverse environmental conditions;

• Timely application of proper and balanced nutrients to the crop and improvement of soil fertility and productivity. Correction of ill-effects of soil reactions and conditions and increasing soil organic matter through the application of green manure, farm yard manure, organic wastes, bio fertilizers and profitable recycling of organic wastes;

• Choice of quality seed or seed material and maintenance of requisite plant density per unit area with healthy and uniform seedlings;

• Proper water management with respect to crop, soil and scheduling irrigation at critical stages of crop growth.

• Adoption of adequate and timely plant protection measures against weeds, insect-pests, pathogens;

• Adoption of suitable method and time of harvesting;

• Adoption of suitable post-harvest technologies.

COMPREHENSION

1. Are the following statements TRUE or FALSE?

a) Agronomy has three main branches. **(TRUE / FALSE)**

b) Agronomy deals with principles and practices of field crop production. **(TRUE / FALSE)**

c) You can use nutrients at any time you want. **(TRUE / FALSE)**

d) You don't need any post-harvest work. **(TRUE / FALSE)**

e) Irrigation is very important for plant growth. **(TRUE / FALSE)**

2. ***Answer the questions.***

a) What is agronomy?

b) What are the main branches of agronomy?

c) What is important in choice of crop varieties?

d) What is the difference between winter and spring cereals?

e) What do people get from cereal grains?

3. Translate the following phrases into English (find them in the text).

Отрасль сельского хозяйства, высокая продуктивность, плодородие почвы,

качественные семена, своевременное внесение, меры по защите растений.

VOCABULARY

1. Complete the table with the underlined words from the text (write them in the correct column).

noun	**verb**	**adjective**

2. Match the words.

a) seed	1) урожай
b) field	2) окружающая среда
c) environment	3) семя, зерно
d) irrigation	4) навоз
e) manure	5) поле
f) harvest	6) полив

WRITING

1. ***Write down questions to the underlined words.***

a) Agronomy deals with <u>field crop production and management of soil</u>.

b) Agronomy has <u>three</u> main branches.

c) <u>Intercropping</u> is necessary to get harvest even under bad environmental conditions.

d) Soil fertility and productivity depend on timely application of proper and balanced nutrients.
e) Crops must be adaptable to the particular agro-climate.

GRAMMAR

1. Translate the words from the text using Gerund.

Планирование, программирование, приготовление, проверка, выравнивание, применение, увеличение, переработка, разработка графика.

2. Find sentences with these words in the text. Translate into Russian.

SPEAKING

Tell your friend what is interesting in agronomy. Tell about basic principles of agronomy, using Gerund.

Text II. AGRONOMIST

STARTING UP

Discuss this question.

• Что входит в обязанности агронома?

VOCABULARY

Read and translate these words and word combinations into Russian.

Agronomist, production, management, maximum production, minimum, economic methods, methods of minimizing energy, type, season, effective functioning, farm, effect of factors, climate, production technique, situation, cooperate and co-ordinate, disciplines of agriculture, cultivation, irrigate, stop, marketing, plan.

READING

Essential vocabulary

adjust – регулировать**,** приводить в порядок.
apply – применять, вносить.
appropriate – подходящий, соответствующий.
content – содержание.
cost – затраты, расходы.
fibre – волокно, клетчатка.
nutrient – питательное вещество.
obtain – получать.

select – отбирать, выбирать.
take into account – учитывать, принимать во внимание.
weed – сорняк.

Agronomist is a scientist who studies the principles and practices of crop production and soil management for production of food for people and feed for their animals. Agronomist studies the problems of crop production and develops better ways of producing food, feed and fibre. Agronomist aims at obtaining maximum production at minimum cost. He thinks of developing efficient and economic field preparation methods, methods of minimizing energy, thinks of what type of crop in what season to choose and use, etc. Agronomist takes the responsibilities for the effective functioning of the farm in general.

Agronomist should take into account the effect of factors like soil, climate, and crop varieties and adjust production techniques suitably depending on the situation. Thus, the agronomist co-operates and co-ordinates with all the disciplines of agriculture. Developing efficient methods of cultivation he also has to identify various types of nutrients required by crops. If the method of cultivation varies the nutrient content also varies. The time and method of applying nutrients must also be taken into account. Agronomist must select a better weed management practice. Whether to irrigate continuously or stop in between and how much water should be irrigated also depends on agronomist. Agronomists are also developing the methods of harvesting, time for harvesting, etc. The harvest should be done in the appropriate time.

Decision-making in the farm management is also the duty of the agronomists. What type of crop to be produced, how much crop, including marketing should be planned? Decisions should be taken at appropriate time.

COMPREHENSION

1. Are the following statements TRUE or FALSE?

a) Agronomist is a scientist who studies the principles of crop production.
(TRUE / FALSE)
b) Agronomist aims at obtaining minimum production at maximum cost.
(TRUE / FALSE)
c) The agronomist doesn’t co-operate and co-ordinate with the disciplines of agriculture. **(TRUE / FALSE)**
d) The time of harvest is not important. **(TRUE / FALSE)**
e) Irrigation should be controlled by agronomist. **(TRUE / FALSE)**

2. *Answer the questions.*

a) What does an agronomist study?
b) What is the most important aim of agronomists?
c) What factors should be taken into account?
d) What should be controlled during irrigation?
e) When is it important to harvest?

VOCABULARY

1. Match the words.

a) crop	1) урожай
b) fibre	2) почва
c) soil	3) сельхоз. культура
d) weed	4) клетчатка
e) harvest	5) сорняк

2. ***Translate these words and word combinations with the word "produce". Make up your own sentences with each of them.***

Produce, production, producing, food producing, crop production, production of food, production t techniques.

WRITING

1. *Write down questions to the underlined words.*

a) Agronomist studies the problems of crops.
b) He thinks of developing efficient and economic field preparation methods.
c) Agronomist co-operates and co-ordinates with all the disciplines of agriculture.
d) Agronomist thinks of the time and method of applying nutrients.
e) Decision-making in the farm management is also the duty of the agronomists.

2. *Find English equivalents from the text and copy them in your notebooks.*

a) Цель агрономов – получить максимальную продуктивность при минимальных затратах.
b) Агроном отвечает за эффективную работу хозяйства в целом.
c) Время и методы внесения удобрений должны также учитываться.
d) Уборка урожая должна проводиться во время.
e) Агроном выбирает лучшие способы борьбы с сорняками.

GRAMMAR

1. Find all sentences with Modal Verbs. Translate them.

2. Change these sentences with Modal Verbs from Passive Voice into Active Voice. Translate into Russian.

a) The time and method of applying nutrients must be taken into account.
b) Decisions should be taken at appropriate time.
c) A better weed management practice must be selected.
d) The harvest should be done in the appropriate time.
e) Many important measures must be taken by agronomists.

SPEAKING

Tell about duties and responsibilities of an agronomist using the key words given below and Modal Verbs where it is necessary:

Scientist, responsibilities, take into account, aim at, nutrients, weed management, harvesting.

Text III.
AGRICALTURE IN GREAT BRITAIN

STARTING UP

Discuss this question.

• Что Вы знаете о сельском хозяйстве в Великобритании?

VOCABULARY

Read and translate these words and word combinations into Russian.

Natural resource, proportion, climate, farm, mechanize, area, principal, production, import, distance.

READING

Essential vocabulary

acreage – площадь земли в акрах.
because of – из-за.
cane sugar – тростниковый сахар.
conducive – благоприятный.
county – графство.
fertile – плодородный.
grain crop – зерновая культура.
holding – участок земли.

livestock **–** домашний скот.
majority **–** большинство.
widespread **–** широкораспространенный.
yield **–** урожайность.

The physical environment and natural resources of England are more favorable to agricultural development. A greater proportion of the land consists of lowlands with good soils where the climate is conducive to crop growing. The majority of English farms are small, most holdings are less than 250 acres (100 hectares); nonetheless, they are highly mechanized.

Wheat, the chief grain crop, is grown in the drier, sunnier counties of eastern and southern England, where new, stronger varieties have become increasingly widespread and its average yields have risen significantly.

Barley is grown mainly for livestock feeding. The acreage under oats is gradually declining. Corn (maize) and rye are also grown. Principal potato-growing areas are the fenlands of Norfolk, Cambridgeshire and Lincolnshire.

Sugar-beet production depends on government subsidy because of competition from imported cane sugar. In recent years acreage and yield of rape have increased.

The growing of vegetables, fruit and flowers is often done in greenhouses and is found within easy trucking distance.

The fertile soil of Kent has always been conducive to fruit growing. The county Kent is a major supplier of fruits and vegetables (apples, pears, cabbage, cauliflower, etc.). Hereford and Worcester are noted for their plums while Somerset and Devon specialize in apples.

The agriculture of England is primarily concerned with livestock husbandry and with milk production.

COMPREHENSION

1. Are the following statements TRUE or FALSE?

a) The majority of English farms are large. **(TRUE / FALSE)**
b) In recent years acreage and yield of rape have decreased. **(TRUE / FALSE)**
c) The county of Kent is a major supplier of crops (wheat, corn, barley). **(TRUE / FALSE)**
d) Main potato-growing areas are the fenlands of Norfolk, Cambridgeshire and Lincolnshire. **(TRUE / FALSE)**

2. *Answer the questions.*

a) Where is wheat grown?
b) What is barley grown mainly for?

c) Where is the growing of vegetables, fruit and flowers done?
d) When cultivation was first established?
e) What kind of soil has always been conducive in Kent?

WRITING

1. *Write down questions to the underlined words.*

a) In recent years acreage and yield of sugar-beet have increased
b) Sugar-beet production depends on government subsidy.
c) The county Kent a major supplier of fruits and vegetables.
d) Hereford and Worcester are noted for their plums.
e) Corn and rye are also grown.

2. *Find the following word combinations in the text and copy their English variants to your notebooks:*

a) На большей части территории преобладают низменности с хорошими почвами, а климат благоприятен для выращивания сельскохозяйственных культур.
b) Ячмень выращивается главным образом для корма крупного рогатого скота.
c) Также выращивается кукуруза и рожь.
d) В последние годы выросли посевы и урожай рапса.
e) Графство Кент основной поставщик фруктов и овощей.

SPEAKING

Tell your friend about Agriculture in Great Britain.

MODULE 2. Soil Studies

THE SOIL

STARTING UP

Discuss this question.

- Что вы знаете о почве?

VOCABULARY

1. Read and translate these words and word combinations into Russian.

Substance, process, physical, chemical, farming system, erosion, organism, character, nature, cycle, microorganism.

2. Complete the chart below. Translate.

Noun	Verb	Adjective
protection		protective
	convert	
		convertible
import, importance		important
character, characteristics	characterize	
	produce	productive, productional
foundation		foundational
	improve	improvable
recognition	recognize	

READING

<u>Essential vocabulary</u>

coarse-grained sandstone **–** крупнозернистый песчаник.
environment **–** окружающая среда.
legumes **–** бобовые.
parent material **–** материнская порода.
stratum of shale **–** пласт глинистого сланца.
substance **–** вещество.
thrive **–** процветать.
weathering **–** выветривание.

Soil is an incredibly complex substance. It is produced from rock by the process of weathering and by activities of plants, animals and man. Soil has physical and chemical properties that allow it to sustain living organisms − not just plant roots and earthworms but hundreds of different insects, wormlike creatures and microorganisms. When these organisms are in balance, soil cycles nutrients efficiently, stores water, drains the excess and maintains an environment in which plants can thrive.

To recognize that a soil can be healthy, one has only to think of the soil as a living entity. Soil can breathe, transport nutrients. It can interact with its environment and even purify itself and grow over time.

Cover crops play a vital role in ensuring that soil provides a strong foundation for a farming system. Cover crops improve soil in a number of ways. Protection against soil loss from erosion is the most obvious benefit of cover crops. Cover crops contribute to overall soil health by catching nutrients before they can leach out of the soil profile or in the case of legumes, by adding nitrogen to the soil. Their roots can even unlock some nutrients, converting them to more available forms. Cover crops

provide habitat or a food source for some important organisms, break up compacted layers in the soil and help to dry out wet soils.

The general character of a soil depends on the nature of parent material. Thus coarse-grained sandstone will generally produce a sandy soil, and a stratum of shale a “heavy soil”.

COMPREHENSION

1. Are the following statements TRUE or FALSE?

a) Soil has only chemical properties. **TRUE / FALSE**

b) Soil can't breathe, transport and transform nutrients. **TRUE / FALSE**

c) Cover crops play a very important role in ensuring that soil provides strong foundation for a farming system. **TRUE / FALSE**

d) Cover crops worsen soil in a number of ways. **TRUE / FALSE**

e) Protection against soil loss from erosion is the least obvious benefit of cover crops. **TRUE / FALSE**

2. *Answer the questions.*

a) What is soil produced from?

b) What kind of properties does soil have?

c) When does soil cycle nutrients efficiently?

d) What can soil do?

e) Do cover crops improve soil in a number of ways?

VOCABULARY

1. Put the letters in the correct order to make nouns. The first letter is underlined.

a) ntasubesc _____ 5. liso_____

b) rivmontnenn_____ 6. tabahit_____

c) ruterace_____ 7. toro_____

d) minsgaor_____ 8. ecylc_____

WRITING

1. *Fill in the blanks with the right words.*

Obvious, grow, source, transform, properties.

a) Soil has physical and chemical … .

b) Soil can breathe, transport and … nutrients.

c) Protection is the most … benefit of cover crop.

d) Soil can purify itself and … over time.

e) Cover crops provide a food … for some important organisms.

2. Write down questions to the underlined words:

a) Soil is an incredibly complex substance.

b) Cover crops play a vital role in ensuring that soil provides a strong foundation for a farming system.

c) Crops provide habitat or a food source for some important organisms.

d) The general character of a soil depends on the nature of parent material.

e) A coarse-grained sandstone will generally produce a sandy soil, and a stratum of shale soil.

3. Find the following word combinations in the text and copy their English variants to your notebooks:

a) Почва имеет физические и химические свойства.

b) Почва может дышать, переносить и транспортировать питательные вещества.

c) Она может взаимодействовать с окружающей средой.

d) Характер почвы зависит от природы материнской породы.

e) Крупнозернистый песчаник будет вырабатывать песчаную почву.

GRAMMAR

1. Form the nouns from the following verbs.

Transport, transform, interact, produce, purify, contribute, add, provide.

2. Translate the phrases using Participle I or Participle II from the text.

Добавляя азот, превращая их в формы, система земледелия, живые организмы, плотно уложенные слои, зернистый песчаник.

3. *Make up sentences paying attention to the word order.*

a) help, soils, crops, dry out, Cover, wet.

b) its, can, environment, interact, Soil, with.

c) plants, in, Soil, an environment, can, maintains, thrive, which.

d) rock, by, produced, weathering, Soil, from, is, the process, of.

e) are, nutrients, When, cycles, these, in, efficiently, balance, organisms, soil.

4. *Put the following sentences in the Passive Voice.*

a) Cover crops play a vital role in a farming system.

b) Cover crops improve soil in a number of ways.

c) Soil cycles nutrients efficiently for some important organisms.

5. ***Fill in the gaps with the correct forms of the adjectives.***

a) ___ − _____ − the greatest.
b) ____ − smaller − _____.
c) wet − ____ −___.
d) ____ − newer − ____.
e) ____− ____ − the best.
f) ____ − more attractive − ____.

6. Select a word that will correctly complete the sentences.

a) Crops growing on this soil will have _____ difficulty penetrating the subsoil with their roots.
• great
• greater
• the greatest
b) _____ substances may be formed when bonds between atoms and ions are formed.
• new
• newer
• the newest
c) For similar minerals, _____ participles will dissolve fast.
• smaller
• more small
• more smaller
d) How minerals nutrients are transformed and bound in soil leads to _____ fertilization.
• gooder
• better

7. Look through the text and find sentences with Participle I. Define its functions.

8. ***Find all sentences in Present Simple with the -s ending. Put down questions to these sentences. Make the sentences negative.***

SPEAKING

Your friend knows nothing about the soil. Give her/him general information. Information below may help you.

Почва - это смесь минерального вещества, органического вещества и живых организмов. Почва – это продукт окружающей среды. Почва иногда

развивается очень медленно в сухих районах пустыни и более быстро – во влажных тропических районах. Многочисленные бактерии, грибки, черви, насекомые, маленькие грызуны и млекопитающие населяют почву. Многие из этих организмов помогают поддерживать плодородие почвы.

Supplementary reading
Text IV.
SOIL FLORA

STARTING UP

Discuss these questions.

• Что такое «флора»? Что Вы знаете о почвенной флоре?

VOCABULARY

Read and translate these words and word combinations into Russian.

Group, organism, portion, mass, material, organic, microorganism, mineral, proportion of organisms, bacteria, proportion, aeration, chemical products, microbial reaction, aggregates, erosion, microbes, tuberculosis.

READING

Essential vocabulary

actinomycetes – актиномицеты (микроорганизмы, грамположительные бактерии).
algae – водоросли.
anthrax – сибирская язва.
beneficial – благоприятный.
bind – соединять, связывать.
decompose – расщеплять, разлагать.
dissolve – растворять.
enhance – увеличивать, повышать.
environment – окружающая среда.
feet (foot) – фут (0, 305 м).
fungi – грибки.
leprosy – проказа (болезнь).
particle – частица.
residues – остатки.
resist – сопротивляться, противостоять.
root – корень.
vegetation – растительность.

This group is broken down into *Macro-*, *Meso-* and *Micro-* divisions, based on the size of the organism. The most important members of soil *macro flora* group are the living plants or more importantly below-ground portion or the roots. We often forget about plants' underground root mass, but they are equal or exceed the amount of material that we see above ground. The roots of certain grasses can grow to depth of ten feet or more and trees can extend their roots to several hundred feet.

Roots create a rich environment for the growth of microorganisms. The activity of the microorganisms fixes nitrogen from the soil air, dissolves soil minerals and decomposes organic matter to enhance the ability of roots to pick up essential nutrients.

There are few organisms that can be put into the *meso flora* group so majority represents the *micro flora* including the microorganisms − fungi, bacteria, actinomycetes and algae. The exact proportion of these organisms depends on soil conditions (available moisture, chemical conditions, aeration, organic matter, etc.) and type of plant present.

Microorganisms are very important for the soil. They decompose plant and animal residues; synthesize humus, cycle nutrients such as carbon and nitrogen. The chemical by-products of microbial reactions bind together soil particles into stable aggregates that resist erosion.

Not all microorganisms are beneficial. Some organisms are harmful to plants and humans. Did you know that some of the most deadly bacteria such as microbes responsible for tuberculosis, anthrax, leprosy come from soil?

COMPREHENSION

1. Are the following statements TRUE or FALSE?

a) Underground root mass is not important for plant growth. **(TRUE / FALSE)**
b) Mesoflora is a small group of organisms. **(TRUE / FALSE)**
c) The microflora consists of microorganisms. (**TRUE / FALSE)**
d) Microorganisms supply plants with oxygen and carbon. **(TRUE / FALSE)**
e) All microorganisms are beneficial. **(TRUE / FALSE)**

2. *Answer the questions.*

a) What groups does soil flora have?
b) How long can some roots be?
c) Where do microorganisms live?
d) What is the importance of microorganisms?
e) What harmful organisms can come from the soil?

3. Translate the following phrases into English (find them in the text).

Размер организма, подземная часть, над землей, определенные злаки, богатая среда, необходимые питательные вещества, состояние почвы, связывать вместе, смертельная бактерия.

VOCABULARY

1. Fill in the gaps using the words given in brackets:

a) Soil flora is broken down into 3 divisions, based on the _____of the organism.
b) _____create a rich environment for the growth of microorganisms.
c) _____includes fungi, bacteria, actinomycetes and algae.
d) Microorganisms decompose plant and animal_____.
e) Some microorganisms are _____ to plants and humans.
(residues, harmful, size, roots, micro flora)

2. Match the words.

a) root	1) дерево
b) nitrogen	2) богатый
c) tree	3) азот
d) rich	4) среда
e) animal	5) корень
f) environment	6) животное

WRITING

Match the adjectives with the nouns (according to the text). Then use these word combinations to make your own sentences. Write these sentences in your copybooks.

important	mass
rich	condition
soil	member
root	matter
organic	environment

GRAMMAR

1. Find the nouns with the articles *a/ an,* ***and*** *the* ***in the text. Circle the nouns with no articles.***

2. Complete these sentences with *a/ an,* ***and*** *the* ***or no article (X).***

a) ___ roots of certain grasses can grow very deep.
b) _____ chemical fertilizer is produced synthetically from inorganic materials.

c) ____ nitrogen is an essential component for plants to manufacture new cells.
d) ____ vegetables are generally grown on mineral or organic soils.
e) ___ soil is a three phase system.

SPEAKING

Tell about Soil Flora using the key words given below.

Three main divisions, macro flora group, underground root mass, roots, micro flora group, microorganisms, harmful microorganisms.

Text V.
SOIL FAUNA

STARTING UP

Discuss these questions.

• Что такое «фауна»? Что Вы знаете о почвенной фауне?

VOCABULARY

Read and translate these words and word combinations into Russian.

Component, system of classification, bacteria, evolution, organism, group, *Macro* organism, diameter, *Meso* organism, *Micro* organism, normally, microscope, physical and chemical reactions, structure, organic, farmer, production, parasitic, effect.

READING

Essential vocabulary

algae – водоросли.
annelida – кольчатые черви.
arthropods – членистоногие.
beneficial – благоприятный.
collembolan- ногохвостка.
devastate – опустошать, истреблять.
mite – клещ.
nematoda – круглые черви.
protozoa – простейшие.
rotifer – коловратка.
slug – моллюск.
snail – улитка.
vertebrate – позвоночное.
worm – червь.

The study of living components of soils is called *Soil Biology*. The five kingdom system of classification is in wide use: Animalia (animals), Fungi (mushrooms), Plantae (plants), Protista (simple algae, protozoa) and Monera (bacteria and blue-green algae). Many scientists, however, feel that this system of classification does not fully represent evolutionary patterns. We will take a simple approach to study soil organisms, dividing them into two groups: Animals (*fauna*) and Plants (*flora*).

These groups are broken down into *Macro*-, *Meso*- and *Micro*- divisions, based on the size of the organism. *Macro* organisms are considered to be larger than 2 mm in diameter. *Meso* organisms are between 2 mm and 0.2 mm in diameter. *Micro* organisms are less than 0.2 mm in diameter and we normally need microscope to observe them.

Many soil organisms are beneficial and take part in many physical and chemical reactions (improving soil structure, breaking down organic matter, etc.). Others, such as the tiny nematode, a worm, less than 0.1 mm long, can cause farmers billions of dollars every year in lost production.

Important soil *macro fauna* include:

1. Vertebrates – gophers, mice, ground squirrels.
2. Arthropods – insects.
3. Annelida – worms.
4. Mollusca – slugs and snails.

Important soil *meso fauna* include:

1. Arthropods – mites, collembolan.
2. Annelida – earthworms.

Soil *micro fauna* include:

1. Nematoda – mites, collembolan (spring tais).
2. Rotifera – rotifers.
3. Protozoa – amoeba.

Unfortunately a large number of these micro fauna are parasitic and can cause devastating effect on crop yields.

COMPREHENSION

1. *Are the following statements TRUE or FALSE?*

a) All scientists like the five kingdom system of classification. **(TRUE / FALSE)**

b) Living components are broken into 3 divisions based on the size of the organism. **(TRUE / FALSE)**

c) We normally need microscope to observe *meso* organisms. (**TRUE / FALSE)**

d) All soil organisms are beneficial and take part in many physical and chemical reactions. **(TRUE / FALSE)**

e) A large number of microfauna is parasitic and can cause devastating effect on crop yields. **(TRUE / FALSE)**

2. Answer the questions.

a) How many kingdoms of living components are there?
b) Why don't many scientists like this classification?
c) What diameter are organisms of this or that division?
d) What do beneficial soil organisms do?
e) What harmful micro fauna can you name?

3. *Find English equivalents from the text.*

a) Способность почвы пополнять и поддерживать определенное количество питательных веществ, необходимых для роста растений, называется плодородием почвы.

b) Дефицит питательных веществ может быть скорректирован добавлением химических или органических удобрений.

c) Макроэлементы требуются растениям в больших количествах.

d) В некоторых почвах с дефицитом азота и фосфора требуется ежегодное внесение этих удобрений.

e) Потери бывают в грунтовые воды через вымывание, и в атмосферу через испарение.

VOCABULARY

1. Fill in the gaps using the words given in brackets.

a) A _____needs at least 17 elements to grow and reproduce.
b) Macronutrients are _____required by plant in large amounts.
c) _____under intensive crop or animal production lose nutrients.
d) Nitrogen and phosphorus should be added every_____.
e) Chemical or organic _____must be applied in a careful and timely manner.
(*year, plant, fertilizers, nutrients ,soils)*

2. Match the words.

a) amount	1) урожай
b) yield	2) плодородие
c) annual	3) удобрение
d) fertilizer	4) ежегодный
e) addition	5) количество

f) fertility 6) добавление

WRITING

Look through the text again and find all sentences with the singular form of the verb** TO BE**. Copy them to your notebook.

GRAMMAR

1. Look at the sentences you have written in your copybook. Which of them are in the Active Voice? Which of them are in the Passive Voice?

2. Order the words to make sentences. Write them out in your copybook. The first word of the sentence is underlined.

a) Is / every / group / broken / three/ into / divisions.
b) Macro / diameter/ than / larger/ are/ in / organisms / 2 mm.
c) To observe / organisms / microscope / is / micro / needed.
d) A / micro / number / of / parasitic / these / large / fauna / are.

SPEAKING

Tell about "Soil Fauna" using the key words in the given order.

Soil Biology …
Macro / Meso / Micro organisms …
Beneficial organisms …
Parasitic organisms …

MODULE 3. Cereals

CEREALS

STARTING UP

Discuss these questions.

- Что Вы знаете о злаках? Какие злаки выращивают в Вашем регионе?

VOCABULARY

Read and translate these words and word combinations into Russian.

Cultivate, type, climate, cultivation system, season, climate, system, irrigation, calorie, protein, diet.

READING

Essential vocabulary

annual – однолетний, годовой.
cereal – хлебный злак, зерновой.
edible – съедобный.
fiber – волокно, клетчатка.
harvest – убирать урожай.
mature – зрелый, зреть.
optional – выборочный, необязательный.
protein – белок.
quantity – количество, размер.
similar – похожий, подобный.
starch – крахмал.
temperate – умеренный.
variety – разнообразие, вид.
vernalization – яровизация.
yield – урожай, давать урожай.

The cereals are crop plants which belong to the grass family (Graminea). Cereals are mostly cultivated for their edible seeds. Cereals are grown in greater quantities than any other type of crop because they are the most important source of food for a man and domestic animals. Wheat, rice, maize, millet, sorghum, rye, oat and barley are more important than any other crop.

The cultivation of all cereal crops is similar. All cereals are annual plants: one planting yields one harvest. Wheat, rye, oat and barley are cool-season cereals. They are generally grown in the temperate climates.

There are winter and spring varieties of cereal crops. Winter varieties are sown in autumn and they mature in late spring or early summer. This cultivation system makes optional use of water and frees the land for another crop. Spring cereals are planted in early springtime and mature late the same summer without vernalization. Spring cereals need more irrigation and give less harvest than winter cereals.

Cereal grains supply most of their calories as starch. They are also a source of protein. Whole grains are good source of dietary fiber.

COMPREHENSION

1. Are the following statements TRUE or FALSE?

a) There is no protein in cereal grains. **(TRUE / FALSE)**
b) All cereal crops give one harvest. **(TRUE / FALSE)**
c) There are only winter varieties of cereal crops. **(TRUE / FALSE)**

d) There are only two important cereal crops. **(TRUE / FALSE)**
e) Winter cereals need more irrigation. **(TRUE / FALSE)**

2. ***Answer the questions.***

a) Why are cereal grains grown in great quantities?
b) What are the most important cereal crops?
c) What crops are cool-season cereals?
d) What is the difference between winter and spring cereals?
e) What do people get from cereal grains?

VOCABULARY

1. Match the words.

a) seed	1) урожай
b) animal	2) умеренный
c) annual	3) семя, зерно
d) spring	4) однолетний
e) temperate	5) весна
f) harvest	6) животное

2. Put the letters in the correct order to make nouns. The first letter is underlined.

relace cereal

a) rcueos _____
b) milaan _____
c) vsehtar _____
d) rewta_____
e) mserum _____

WRITING

1. Find English equivalents from the text and copy them to your notebook.

a) Зерновые культуры выращивают в больших количествах, чем любые другие культуры.
b) Один посев дает один урожай.
c) Существуют озимые и яровые виды культур.
d) Яровые культуры нуждаются в большем поливе и дают меньше урожая, чем озимые.

2. Make questions to the underlined words using the question word given below. Write down questions in your notebooks.

a) Cereals are grown in great quantities <u>because they are the most important source of food</u>. **How much?**
b) One planting of cereals yields <u>one harvest</u>. **When**?
c) Cereal crops are grown <u>in the temperate climates</u>. **Why**?
d) There are <u>winter or spring</u> varieties of cereal crops. **Where**?
e) Spring cereals are planted <u>in early springtime</u>. **What**?

GRAMMAR

1. Look through the text again and find five sentences in the Passive Voice. Make negative forms of these sentences and copy them to your notebook. Change these sentences from Passive Voice into Active Voice.

2. Complete the chart below using the comparative and superlative forms of the adjectives.

many		
		the best
	more expensive	
		the coldest
	less	

3. Look through the text again and find the (4) comparative and (2) superlative forms of the adjectives in the text.

4. Make the underlined adjectives from the text comparative and superlative.

SPEAKING

Put the sentences below in correct order according to their place in the text. Use this plan to retell the text.

a) The most important cereals
b) Spring and winter cereals
c) Grass family
d) The use of cereal grains

Supplementary reading

Text I.
WHEAT

STARTING UP

Discuss these questions.

• Что Вы знаете о пшенице? Для чего выращивают пшеницу в Вашем регионе?

VOCABULARY

Read and translate these words and word combinations into Russian.

Cultivation, production, industry, million tons, embryo, contact, cultivate, material, forage, construction, vitamins, minerals, protein, vegetation.

READING

Essential vocabulary

ample store – обильный запас.
ability – способность.
cereals – злаковые.
facilitate – облегчать.
protein – белок.
starchy – крахмалистый.
variety – разновидность.
vegetation – растительность.
yield – урожай.

Wheat (Triticum spp.) is a cereal grain, originated in the Middle East and Ethiopian Highlands. It is one of the first cereals which were domesticated and the ability of wheat to self-pollinate greatly facilitated the selection of many domesticated varieties. The archeological record suggests that this first occurred in the region known as the Nile Delta.

Cultivation of wheat began to spread after 8000 B.C. The early Egyptians were developers of bread and the use of the oven. They developed baking into one of the first large-scale food production industries.

Now wheat is cultivated all over the world. In 2007 world production of wheat was 607 million tons, making it the third most produced cereal after maize (784 million tons) and rice (651 million tons). In 2009 world production of wheat was 682 million tons.

Each grain of wheat consists of an embryo plant in close contact with an ample store of starchy and nitrogenous food material.

Wheat was one of the first crops that could be easily cultivated on a large scale.

Wheat is planted to a limited extent as a forage crop for livestock and its straw can be used as a construction for roofing thatch. The whole grain is a concentrated source of vitamins, minerals and protein, while the refined grain is mostly starch. Perfect crops of wheat can be grown on heavy loams and clays. When wheat is grown on peaty soils the quality is usually poor while the vegetation is luxuriant and the yield of straw is large.

COMPREHENSION

1. Are the following statements TRUE or FALSE?

a) Wheat was originated in the Middle East. **(TRUE / FALSE)**
b) Cultivation of wheat began to spread before 8000 B.C. **(TRUE / FALSE)**
c) In 2009 world production of wheat was 607 million tons. **(TRUE / FALSE)**
d) Wheat was one of the first crops that could be cultivated on small scale. **(TRUE / FALSE)**
e) Wheat contains a concentrated source of vitamins. **(TRUE / FALSE)**

2. Answer the questions.

a) When did cultivation of wheat begin?
b) Where is wheat cultivated now?
c) How much wheat was produced in 2007?
d) Who were the first developers of bread?
e) Where was wheat originated?

GRAMMAR

Find 5 sentences in the Passive Voice. Make negative forms of these sentences. Rewrite them as questions.

VOCABULARY

1. ***Match the words with their definitions.***

wheat	any of a class of nitrogenous organic compounds that consist of large molecules composed of one or more long chains of amino acids and are an essential part of all living organisms, esp. as structural components of body tissues such as muscle, hair, collagen, etc., and as enzymes and antibodies

rice	any of a group of organic compounds that are essential for normal growth and nutrition and are required in small quantities in the diet because they cannot be synthesized by the body
vitamin	an odorless tasteless white substance occurring widely in plant tissue and obtained chiefly from cereals and potatoes. It is a polysaccharide that functions as a carbohydrate store and is an important constituent of the human diet
minerals	a cereal plant that is the most important kind grown in temperate countries, the grain of which is ground to make flour for bread, pasta, pastry, etc.
protein	the action or fact of carefully choosing someone or something as being the best or most suitable
starch	a solid inorganic substance of natural occurrence
selection	the action of making or manufacturing from components or raw materials, or the process of being so manufactured
production	a swamp grass that is widely cultivated as a source of food, esp. in Asia

2. Match the words.

a) grain	1) отбор
b) variety	2) производство
c) production	3) развитый
d) selection	4) зерно
e) starch	5) разновидность
f) developed	6) крахмал

WRITING

1. *Write down questions to the underlined words.*

a) The archeological record suggests that this first occurred in the region known as the Nile Delta.

b) In 2009 world production of wheat was 682 million tons.

c) Wheat was one of the first crops.

d) Wheat is planted as a forage crop for livestock.

e) The ability of wheat to self-pollinate greatly facilitated the selection of many domesticated varieties.

Text II. **RYE**

STARTING UP

Discuss these questions.

• Что Вы знаете о ржи? Для чего выращивают рожь в Вашем регионе?

VOCABULARY

Read and translate these words into Russian.

Condition, cultivation, forage, August, special.

READING

Essential vocabulary

drought – засуха.
dry – сушить.
high-quality – высококачественный.
resistant – устойчивый.
take place – происходить.
therefore – поэтому.
thrive – процветать.

Rye is a drought resistant plant which thrives under a great variety of conditions; it is very resistant to acid conditions. When rye is grown for grain on good soil it is usually less profitable than other cereals, and its cultivation is therefore confined to districts of poor, light land that produce inferior wheat and oats. It also succeeds on peaty soil and on the pooper sorts of black fen. Rye does best on good loams, which however, yields more profit under other crops. Rye is considerably more winter-hardy than wheat. When rye is grown on good land it is mostly cultivated for forage purposes.

The seedbed is prepared for wheat, and the grain may either be broadcast or drilled in the usual way. Seeding should take place from two to three weeks before wheat sowing begins.

Cutting takes place at the beginning of August. When high-quality rye straw is required for special purposes it may be cut before the ear has filled then dried and used.

In Britain rye is cultivated as a forage crop, but more largely for its grain and straw.

COMPREHENSION

1. Are the following statements TRUE or FALSE?

a) Rye isn't a drought resistant crop. **(TRUE / FALSE)**

b) When rye is grown for grain on bad soil it is less profitable than other cereals. **(TRUE / FALSE)**

c) Rye is less winter hardy than wheat. **(TRUE / FALSE)**

d) Cutting takes place at the end of August. **(TRUE / FALSE)**

e) In Britain rye is cultivated for its grain and straw. **(TRUE / FALSE)**

2. Answer the questions.

a) What kind of plant is rye?

b) What is rye cultivated for?

c) How may the grain be drilled?

d) When should seeding take place?

e) When may high quality rye straw be cut?

WRITING

1. ***Write down questions to the underlined words.***

a) Rye thrives under a great variety of conditions.

b) When rye is grown for grain on good soil it is usually less profitable than other cereals.

c) It also succeeds on peaty soils.

d) Cutting takes place at the beginning of August.

e) In Britain rye is cultivated as a forage crop.

VOCABULARY

1. Match the words with the definitions.

soil	a fertile soil of clay and sand containing humus
cultivation	a cereal plant that is the most important kind grown in temperate countries, the grain of which is ground to make flour for bread, pasta, pastry, etc.
oats	the upper layer of earth in which plants grow, a black or dark brown material typically consisting of a mixture of organic remains, clay, and rock particles
loam	harvest (plants or their produce) from a particular area
fen	a wheat- like cereal plant that tolerates poor soils and low temperatures
crop	a cereal plant cultivated chiefly in cool climates and widely used for

	animal feed as well as human consumption
rye	produce (a hole) in something by or as if by boring with a drill
wheat	the action of cultivating land, or the state of being cultivated
drill	a low and marshy or frequently flooded area of land

2. Put the letter in the correct order to make nouns. The first letter is underlined.

1. tovintulica _____ 5. grafoe _____
2. risditct _____ 6. cardobtas _____
3. kaclb _____ 7. wrtas _____
4 .frotip _____ 8. persupo _____

GRAMMAR

1. Change Active Voice into Passive Voice.

to thrive
to produce
to cut
to succeed
to do

2. Change Passive Voice into Active Voice.

is grown
is confined
is cultivated
is required
is prepared

3. Change these sentences from Passive Voice into Active Voice.

a) Rye is grown for grain on good soil.
b) Rye is cultivated for forage purposes.
c) The seedbed is prepared for wheat.
d) The grain is drilled in the usual way.

Text III. OATS

STARTING UP

Discuss this question.

• Выращивают ли овес в Вашем регионе?

VOCABULARY

Read and translate these words and word combinations into Russian.

Condition, climate, temperature, minimum, October, July, February, April, August, September, normally, extreme, start.

READING

Essential vocabulary

ample – обильный, достаточный.
district – район, участок.
dormant – находиться в состоянии покоя.
dull – пасмурный, неясный.
encourage – способствовать.
grain – зерно, хлебный злак.
legume – бобовое растение.
manure – удобрение, навоз; удобрять.
nitrogen – азот.
oat – овёс.
poor – бедный, слабый.
reduce – понижать, уменьшать.
ripen- зреть, созревать.
soil – почва.
straw – солома.
substantial – существенный, значительный.

The oat is grown in every country and under different conditions of soil and climate. It is the **best** of the cereals for growing on poor soil, in dull rainy districts, and where the summer temperature is rather low. Oats need a minimum of sunshine to ripen. Very high rainfall encourages the development of straw rather than grain. **Lower** rainfall and **better** soil give more and **better** grain but **less** straw.

The oat is an annual plant. Winter varieties are normally sown in October and are usually ripe for harvest before the end of July. The spring varieties are sown from late February to the middle of April and ripen from early August to late September, or in late October in the extreme north. Oats are sown in the spring as soon as the soil can be worked. **Earlier** start gives **better** yield because oats will go dormant during the summer heat.

Oats get substantial amounts of nitrogen from the soil. Nitrogen is **the most important** nutrient for plant height, straw quality and yield. When the prior year crop was a legume, or where ample manure is applied, nitrogen rates can be reduced. On

good soils that are in high conditions, oats can be grown without the application of any manure.

Oats are used for food for people, and also as fodder for animals, especially horses and poultry. Oat straw is used as animal bedding and also sometimes used as animal feed.

COMPREHENSION

1. Are the following statements TRUE or FALSE?

a) Very high rainfall encourages the development of straw rather than grain. **(TRUE / FALSE)**
b) Oats need much sunshine to ripen. **(TRUE / FALSE)**
c) Oats don't need any manure. **(TRUE / FALSE)**
d) Oats need good conditions to grow. **(TRUE / FALSE)**
e) Oats are sown only in the spring. **(TRUE / FALSE)**

2. Answer the questions.

a) What conditions are necessary for the growth of oats?
b) When is there less straw but much grain?
c) When can oats be planted?
d) Why is early start important to good yield?
e) When can nitrogen rates be reduced?

3. Find English equivalents from the text.

a) Чтобы созреть, овёс нуждается в малом количестве солнечного света.
b) Ранний посев очень важен для хорошего урожая.
c) Овёс получает значительное количество азота из почвы.
d) Достаточное количество азота необходимо для роста культуры, качества соломы и урожая.
e) Если почва в хорошем состоянии, овёс можно выращивать без внесения удобрений.

VOCABULARY

1. Fill in the gaps using the words given in brackets.

a) Oats _____a minimum of sunshine to ripen.
b) Very high _____encourages the development of straw.
c) Oats get substantial amounts of _____from the soil.
d) Oats will go dormant during the summer_____.
e) The oat is an _____plant.
f) Oats need a minimum of _____to ripen.

g) _____varieties are normally sown in October.
(annual , sunshine , winter, need, heat , nitrogen , rainfall)

WRITING

1. *Write down questions to the underlined words.*

a) High rainfall encourages the development of straw rather than grain.
b) Oats can be planted either in the fall or in the spring**.**
c) Oats get nitrogen from the soil.
d) Oats can be grown on poor soil**.**
e) On good soils oats can be grown without the application of any manure.

GRAMMAR

1. There are 4 sentences in the text with comparative and superlative adjectives. Find them.

2. Give all 3 forms of these adjectives in English and in Russian.

SPEAKING

Retell the text choosing 6-7 sentences that give the main ideas of the text.

Text IV. MAIZE

STARTING UP

Discuss these questions.

• Что Вы знаете о кукурузе? Для чего ее выращивают в Вашем регионе?

VOCABULARY

Read and translate these words and word combinations into Russian.

Cultivate, system, produce, irrigation, syrup, million tons, ethanol, production, alcohol, octane, supermarket, popcorn, corn.

READING

Essential vocabulary

additive – добавка.
advantage – преимущество, выгода.
approximately – около, примерно.
corn flakes – кукурузные хлопья.
fertile – плодородный.
increase – увеличить.
kernels – зерно, семечко.

light soil – легкая почва.
livestock – скот.
loams – суглинок.
maize – кукуруза.
octane rating – октановое число.
root – корень.
rot – гнить.
shallow – поверхностный, неглубокий.
staple –главный продукт (производимый в данном районе).
thoroughly – полностью, как следует.
throughout – везде, повсюду.

Maize, also called *corn* in North America and Australia, is a staple food grain from Mesopotamia. It is widely cultivated throughout the world. The United States produces almost half of the world's harvest. There are other top producing countries as China, India, Brazil, France, Indonesia and South Africa.

Maize grows best on warm, fertile loams. If there is enough manure in the soil, it produces good crops on light soils, too. Maize grows to a height of 2.5 m. Sweet corn is usually shorter than field corn.

Maize is planted in the spring (in the middle of May) to take advantage of spring rains. Its root system is shallow and the plant depends on rain or irrigation. If the soil is cold, the seeds rot.

If you use maize as silage, you harvest it while the plant is green and the fruit is not matured. If you want to dry it thoroughly, you leave it in the field very late in the autumn.

The primary uses for corn seed in North America are the production of corn sweeteners like corn syrup, as a feed for livestock. Approximately 40% of the crop — 130 million tons — is used for production of ethanol. Ethanol, a type of alcohol, is used as an additive in gasoline to increase the octane rating.

The sweet varieties are grown on a small scale for table purposes. This is the variety found in supermarkets. Common food made from maize is corn flakes, corn flour and it can also be popped as popcorn. Maize kernels are used in cooking as a starch.

COMPREHENSION

1. Are the following statements TRUE or FALSE?

a) Maize is widely cultivated throughout the world. **(TRUE / FALSE)**
b) Maize grows only on warm, fertile loams. **(TRUE / FALSE)**
c) Ethanol is used as food for livestock. **(TRUE / FALSE)**

d) Maize is planted in the spring and autumn. **(TRUE / FALSE)**
e) Maize can be popped as popcorn. **(TRUE / FALSE)**

2. Answer the questions.

a) What country is the biggest maize producer in the world?
b) What is the height of maize?
c) Why is maize planted in the spring?
d) How is maize used in agriculture?
e) What is ethanol used for?

3. Translate the following phrases into English (find them in the text).

Ведущие производители, мировой урожай, Северная Америка, корневая система, весенние дожди, кукурузные хлопья, этиловый спирт, октановое число, карамельная патока, плодородный суглинок.

VOCABULARY

1. Put the letters in the correct order to make nouns. The first letter is underlined.

zaime – maize

a) ernuma _____
b) ilfed_____
c) onitrirgai_____
d) legasi_____
e) toahlen_____

WRITING

1. *Write down questions to the underlined words.*

a) Maize is widely cultivated throughout the world.
b) Maize is cultivated in such countries as China, India, Brazil, France.
c) Sweet corn is usually shorter than field corn.
d) Approximately 40% of maize is used for production of ethanol.
e) Maize is planted in the spring.

2. Find English equivalents from the text. Write them in your notebook (be careful translating the word "он").

a) Он широко выращивается по всему миру.
b) Если хорошо удобрять, он производит хороший урожай и на легких почвах.
c) Его корневая система неглубокая.
d) Он используется как добавка в бензин для увеличения октанового числа.

e) В виде крахмала он используется в приготовлении пищи.

GRAMMAR

1. Find 4 Zero Conditional sentences in the text. Translate them.

2. Translate Zero Conditional sentences into English.

a) Если хочешь хороший урожай, посади кукурузу в середине мая.
b) Если дождя много, урожай хороший.
c) Если ты хочешь сухие зерна, убирай кукурузу поздно осенью.
d) Если хочешь купить кукурузные хлопья, сходи в супермаркет.
e) Если хочешь увеличить октановое число бензина, используй этанол.

SPEAKING

Work in pairs. You and your friend are going to grow maize. What information do you have to know? What are you going to start with? Write down 3 ideas. Compare your list with the list your partner has made. Use Zero Conditional where it is necessary.

MODULE 4. Vegetables

A VEGETABLE

STARTING UP

Discuss these questions.

• Что Вы знаете об овощах? Какие овощи выращивают в Вашем регионе?

VOCABULARY

Read and translate these words and word combinations into Russian.

Classify, production, section, temperature, climatic factors, productivity, season, tomato, mineral, organic, type, condition, cultivation, management, maximum.

READING

<u>Essential vocabulary</u>

biennial – двулетняя культура.
ease – облегчить.
edible – съедобный.
fertility – плодородие.
growth – рост.
influence – влияние.
loam – глина.
moisture – влага, влажность.

preferred –предпочтительный.
propagation – размножение.
provide – обеспечить.
requirement – потребность.
sandy loams – супесчаная почва.
tuber – клубень.

Longman dictionary defines a vegetable as "a (part of a) plant that **is** grown for food". Vegetables **are** generally classified according to the source of edible plant part(s):

- root (e.g. beet, turnip, carrot)
- bulb (e.g. onion, garlic)
- stem (e.g. asparagus)
- flower (e.g. cauliflower, broccoli)
- tuber (e.g. potato)
- seed (e.g. beans, peas)
- leaf (e.g. cabbage, lettuce)

Vegetables **are** generally annual plants. Some vegetables (onion, carrot, and beet) **are** grown as biennials for seed production. Propagation of vegetable crops **is** mostly by seed; potato **is** propagated by tubers or tuber sections.

Vegetables have highly variable climatic requirements. Temperature, enough water, day length **are** the climatic factors which have the greatest influence on productivity. Cool season vegetable crops (cabbage, lettuce, cauliflower, broccoli, onions) grow best between 12 and 20º C. Warm season vegetable crops (cucumber, eggplant, pepper, tomato) grow best between 18 and 28º C.

Vegetables **are** generally grown on mineral or organic soils. Most vegetable plants prefer mineral soils like sandy loams and loam soils. These soils provide desirable growth conditions and ease the cultivation. Careful management of soil fertility and moisture **are** necessary for high quality and maximum yield.

COMPREHENSION

1. Are the following statements TRUE or FALSE?

a) Vegetables are generally annual plants. **(TRUE / FALSE)**
b) Potato is propagated by seeds. **(TRUE / FALSE)**
c) Temperature is not important for vegetable productivity. **(TRUE / FALSE)**
d) Vegetables are generally grown on sandy loams and loam soils.**(TRUE / FALSE)**
e) Cool season vegetable crops are cucumbers, tomatoes, pepper. **(TRUE / FALSE)**

2. *Answer the questions.*

a) What is a "vegetable"?
b) How are vegetables classified?
c) Why are some vegetables grown as biennials?

d) What factors are important for vegetable productivity?
e) Why sandy loams and loam soils are the preferred types of soils?

VOCABULARY

1. Match the words with their definitions.

temperature	the upper layer of earth in which plants grow
tuber	each of the four divisions of the year
food	the degree of heat or coldness of a place or object
season	any nutritious substance that people or animals eat or drink, or that plants absorb, in order to maintain life and growth
soil	a fleshy underground part of a stem

2. Fill in the gaps using the words given in brackets.

a) _____ season vegetable crops grow best between 12 and 20º C.
b) _____season vegetable crops grow best between 18 and 28º C.
c) Vegetables are generally _____plants.
d) Most vegetable plants prefer _____soils.
e) Soil fertility is necessary for quality.

(mineral, cool, high, annual, warm)

3. Complete the chart below. Translate. Make up sentences with these nouns and verbs.

Noun	**Verb**
productivity	
propagation	
requirement	
cultivation	
management	
growth	

4. Find sentences in the text where the words *vegetable, plant, seed, tuber, day, mineral, loam, soil* ***are not nouns, but adjectives. Translate these word combinations into Russian.***

WRITING

Answer the questions in written form.

a) What edible parts of vegetables can you name?
b) What vegetable is propagated by tubers?
c) What cool season vegetable crops are grown in your area?

d) What soils are good for vegetables?
e) What is necessary for high quality and maximum yield?

GRAMMAR

1. Look at the sentences with the selected forms of the verb TO BE in the text and put them into the correct column.

Present Simple Active (to be)	Present Simple Passive (to be + Past Participle)

2. Find 3 sentences where the verb "*to grow****" is in the Present Simple Passive, 2 sentences where it is in the Present Simple Active and 1 sentence where there is a noun from this verb.***

3. Put down questions to the underlined words*.*

a) Vegetables are classified according to the source of edible plant part.
b) Onions, carrots, beets are grown as biennials for seed production.
c) Vegetables are generally grown on mineral or organic soils.
d) Warm season vegetable crops grow best between 18 and 28º C.
e) Moisture is necessary for high quality and maximum yield of vegetables.

4. Complete the table with the underlined nouns from the text (write them in the correct column)

COUNTABLE	UNCOUNTABLE

SPEAKING

Your friend knows nothing about vegetables. Give him/her general information. Information below may help you.

Овощи выращиваются для еды. В основном, все овощи – однолетние растения. Овощи выращивают в органических или минеральных почвах − супесчаных почвах или суглинках. Такие почвы обеспечивают высокое качество и максимальный урожай. Размножаются овощи преимущественно семенами, картофель размножается клубнями.

Температура, количество воды, продолжительность дня влияют на продуктивность овощей. Культуры прохладного сезона (капуста, лук, морковь) лучше растут при температуре от 12 до 20º С. Теплолюбивые культуры (помидоры, огурцы, перец, баклажаны) хорошо растут при температуре от 18 до 28º С.

Supplementary reading

Text I. THE POTATO

STARTING UP

Discuss this question.

- Для чего выращивают картофель в Вашем регионе?

VOCABULARY

Read and translate these words into Russian.

Farm, America, condition, calcium, cultivation.

READING

Essential vocabulary

alluvium-аллювий.
depend on-зависеть от.
dressing of manure-обогащение удобрением.
favourable-благоприятный.
moderate-умеренный.
potatoes do badly-картофель плохо растёт.
tolerate-выносить.
yield-урожайность.

The potato was introduced from South America in the 16 th century. As a producer of human food the potato is the most valuable crop grown in Great Britain.

The most suitable soil for potatoes is a light deep loam or alluvium but the crop does well on black-top or peaty land. The potato is one of the few farm plants that tolerate a rather highly acid condition of the soil, but the yield suffers where there is an extreme deficiency of calcium.

Potatoes do badly on heavy soils and under wet conditions. The most favourable seasons are those of moderate rainfall. The best eating quality is generally obtained when the last phase of the growing season is dry. As the potato crop usually receives a dressing of manure, the management of the cultivation will depend largely on the time of the year when the manure is applied. It is usually most economical labor to apply the manure during the winter.

The time of planting depends upon the district and variety that is being grown. It is a matter of prime importance that the land should be sufficiently dry and in good working order at planting time, as a crop put in cold wet soil seldom develops satisfactorily.

COMPREHENSION

1. Are the following statements TRUE or FALSE?

a) The potato was introduced from South America in the 16^{th}century. **(TRUE / FALSE)**

b) Potatoes do badly on light soils. **(TRUE / FALSE)**

c) It is usually the least economical of labor apply the manure during the summer. **(TRUE / FALSE)**

d) The time of planting depends upon the region. **(TRUE / FALSE)**

e) It is a matter of prime importance that the land should be sufficiently wet. **(TRUE / FALSE)**

2. Answer the questions.

a) Where was the potato introduced from?

b) What was introduced from South America in the 16^{th}century?

c) What kind of soil is the most suitable?

d) What seasons are the most favourable for growing potatoes?

e) When is it the most economical of labor to apply the manure?

VOCABULARY

1. Put the letters in the correct order to make nouns. The first letter is underlined.

1) tapoot _____ 5) robual _____

2) danl _____ 6) ayre _____

3) saenos _____ 7) taremt _____

4) rumena _____ 8) naectorpmi _____

2. ***Find English equivalents from the text.***

a) Картофель − самая ценная культура, выращиваемая в Великобритании.

b) Картофель −один из немногих растений, которые выносят довольно высокую кислотность почвы.

c) Большая недостаточность кальция пагубно сказывается на урожае.

d) Картофель плохо растет при влажных условиях.

e) Время посадки зависит от района.

WRITING

Write down questions to the underlined words.

a) As a producer of human food the potato is the most valuable crop grown in Great Britain.

b) The yield suffers where there is an extreme deficiency of calcium.

c) The best eating quality is generally obtained when the last phase of the growing season is dry.
d) The management of the cultivation will depend largely on the time of the year when the manure is applied.
e) A crop put in cold wet soil seldom develops satisfactorily

GRAMMAR

1. Fill in the blanks with the right words given in brackets.

a) The yield suffers where there is an extreme … of calcium.
b) Potatoes do … on heavy soils.
c) It is usually most economical of labor apply … during the winter.
d) The time of … depends upon the district.
e) The land should be … dry.
g) A crop put in cold wet soil seldom … satisfactorily.
(manure, develops, badly, deficiency, planting, sufficiently)

2. Change the sentences from Passive Voice into Active Voice. Translate them into Russian.

a) The manure is applied during the winter.
b) The potato was introduced in the 16^{th} century.
c) The potato is grown in Great Britain as the most valuable crop.
d) The best eating quality is obtained when the last phase of the growing season is dry.

SPEAKING

Your friend knows nothing about growing potatoes. Give him/her general information.

Text II. CARROTS

STARTING UP

Discuss these questions.

- Что Вы знаете о моркови? Чем морковь полезна?

VOCABULARY

Read and translate these words and word combinations into Russian.

Cylindrical, anise, texture, aromatic, doctor, hybridize, dose of beta-carotene, cultivate, decorate, locally, season, antioxidant.

READING

<u>Essential vocabulary</u>

anti-cancer – противораковый, противоопухолевый.
benefit – эффект, преимущества.
bitter – горький.
caraway – тмин.
cardiovascular – сердечнососудистый.
cluster – гроздь.
crunchy – хрупкий, ломкий.
dill – укроп.
flavourful – ароматный.
flu – грипп.
nutrient – питательное вещество.
parsley – петрушка.
parsnips – пастернак.
prescribe – прописать.
snakebite – укус змеи.
stalk – стебель, цветоножка.
taproot – стержнекорневое растение.
Umbrelliferae – зонтичные.

Carrots are a taproot plant, which grow in the soil. Carrots can be of different size and shape: round, cylindrical, fat, very small, long or thin. They belong to the *Umbrelliferae* family. They are named so after the umbrella-like flower clusters. Carrots are related to parsnips, parsley, anise, caraway, dill, etc. Carrot roots have a crunchy texture and a sweet and minty aromatic taste, while the greens are fresh tasting and slightly bitter.

In ancient times in India, China, Greece, and Japan carrots were used as a food crop. In Europe, however, they were not well known until the Middle Ages. At that time doctors prescribed them for everything − from flu to snakebite. In Holland, the original red, purple, yellow, and white varieties were hybridized to today's bright orange, with its potent dose of beta-carotene. In fact, only purple, yellow and red carrots were cultivated before the 15th or 16th centuries.

Later, carrots moved to England, during Elizabethan times. Some Elizabethans ate the roots as food; others used carrot stalks to decorate their hair, their hats, and their dresses.

Although carrots are available throughout the year, locally grown carrots are in season in the summer and autumn when they are the freshest and most flavourful. Carrots are perhaps best known for their rich supply of the antioxidant nutrient: beta-carotene. However, these delicious root vegetables are the source not only of beta-carotene, but also of a wide variety of antioxidants and other nutrients.

COMPREHENSION

1. Are the following statements TRUE or FALSE?

a) Carrot roots are bitter.
b) Carrots can't be of different size and shape.
c) There were times when people used carrot stalks to decorate their hair. Carrots are the source only of beta-carotene.
d) Carrots moved to England during Elizabethan times.

2. Answer the questions.

a) What family do carrots belong to?
b) What kind of roots do carrots have?
c) When did Europeans know carrots?
d) When did carrots move to England?
e) What are the benefits of carrots?

3. Find English equivalents from the text.

a) Морковь имеет сладкий и мятный ароматный вкус.
b) Другие использовали стебель для украшения своих шляп.
c) Когда они самые свежие и ароматные.
d) Эти корнеплоды источник не только бета-каротина.
e) Морковь может быть разных размеров и форм.

VOCABULARY

1. Match the words with their definitions

soil	how big or small something is
size	the part of a plant that grows down into the soil, conveying water and nourishment to the rest of the plant
root	a plant or part of a plant that is grown for food
nutrient	the top layer of the earth in which plants grow
vegetable	a substance providing what is needed for growth and life.

2. *Match a line in A with a line in B.*

A	*B*
crunchy	nutrient
ancient	texture
antioxidant	taste
colour	varieties
aromatic	times

WRITING

1. Find English equivalents from the text and copy them to your notebook.

a) Морковь имеет сладкий и мятный ароматный вкус.
b) Другие использовали стебель для украшения своих шляп.
c) Когда они самые свежие и ароматные.
d) Эти корнеплоды источник не только бета-каротина.
e) Морковь может быть разных размеров и форм.

2. Write down questions to the underlined words.

a) In ancient times carrots were known to both the Greeks and Romans.
b) In Holland, the original red, purple, yellow, and white varieties were hybridized to today's bright orange.
c) Carrots are in season in the summer and autumn.
d) Carrots are rich in the antioxidant nutrient that is named beta-carotene.
e) Carrots belong to the Umbrelliferae family.

GRAMMAR

Find 7 sentences in the text used in Passive Voice and copy them to your notebook. What tenses arte they used in? Change those sentences from Passive Voice into Active Voice. Translate into Russian.

SPEAKING

Tell about carrots using the phrases below:

As far as I remember carrots were named so …
In ancient times …
I know that in Holland …
During Elizabethan times...
I know that carrots are good for health because they …
If I am not mistaken carrots are ...
I was told that ...

Text III. TOMATOES

STARTING UP

Discuss these questions.

- Что Вы знаете о томатах? Что в них полезного?

VOCABULARY

Read and translate these words and word combinations into Russian.

Popular, popularity, paprika, alkaloid, dose, associate, type, reaction, season, Italian, vitamin, antioxidant, segment, concentration, lycopene, prostate.

READING

Essential vocabulary

adverse – неблагоприятный, вредный.
annual – однолетний.
bone – кость.
cancer – рак, злокачественная опухоль.
disease resistance – устойчивость к болезням.
eggplant –баклажан.
fibre – волокно, клетчатка.
fleshy – мясистый.
nightshade – паслён.
perennial – многолетний.
poisonous – ядовитый.
sensitive – чувствительный.

Tomatoes are the most popular vegetables in many countries. Tomatoes belong to the *Solanaceae* or nightshade family of plants, along with potatoes, sweet and hot peppers, eggplant, paprika. In early times tomatoes did not enjoy full popularity and were considered poisonous. And it's true that tomatoes contain alkaloids — substances that even in small doses can have adverse reactions in sensitive people.

Tomatoes are easy to grow. They are tender, warm perennials that are grown as annuals in summer gardens in many countries of the world. Hundreds of varieties of tomatoes are available for the home gardener. They vary in shape, size, colour, plant type, disease resistance and season of maturity. There are small cherry tomatoes, bright yellow tomatoes, Italian pear-shaped tomatoes, etc. Tomatoes have fleshy internal segments filled with slippery seeds surrounded by a watery matrix. They can be red, pink, yellow, orange/tangerine, green, purple, brown, or black in colour.

Tomatoes are packed with vitamin C, fibre and vitamin A. They are also known for their outstanding antioxidant content including their concentration of lycopene. Researchers suggest that lycopene may play a role in the fight against cancer, especially prostate cancer. Researchers also found an important connection between lycopene, its antioxidant properties, and bone health. The most important help from tomatoes is that they provide us with heart-protective benefits. Although lycopene is available in all ripe tomatoes, greater supply is more useful to the body in cooked tomatoes.

COMPREHENSION

1. Are the following statements TRUE or FALSE?

a) Tomatoes are perennials. **(TRUE / FALSE)**
b) There are only red tomatoes. **(TRUE / FALSE)**
c) Tomatoes have adverse reactions in all people. **(TRUE / FALSE)**
d) Lycopene is available only in cooked tomatoes. **(TRUE / FALSE)**
e) Lycopene may play a role in the fight against cancer. **(TRUE / FALSE)**

2. Answer the questions.

a) Why weren't tomatoes popular in early times?
b) What vegetables belong to the nightshade family?
c) What colour can tomatoes be?
d) Why are tomatoes good for people?
e) What role does lycopene play?

VOCABULARY

1. Match the words.

a) poisonous	1) семена
b) available	2) клетчатка
c) seeds	3) ядовитый
d) fibre	4) здоровье
e) health	5) доступный

2. Fill in the gaps using the words given in brackets.

a) Tomatoes were not popular and were considered _____.
b) Tomatoes vary in shape, colour, _____, etc.
c) Tomatoes have fleshy _____segments.
d) Tomatoes are packed with _____.
e) _____ tomatoes are more useful.
(vitamin A,internal , poisonous, size , cooked)

WRITING

1. Make sentences and write them in your notebook.

Tomatoes	contain	nightshade family
	vary	alkaloids
	provide	fleshy internal segments
	have	us with heart-protective benefits
	belong to	in shape, size, colour, plant type, etc.

2. Write down questions to the underlined words.

a) Tomatoes are the most popular vegetables in many countries.
b) Alkaloids even in small doses can have adverse reactions in sensitive individuals.
c) Tomatoes are grown as annuals in summer.
d) Tomatoes are packed with vitamin C, fibre and vitamin A.

GRAMMAR

1. Underline all the verbs "to be" in the text. Find 3 sentences where "to be" is a part of Passive Voice form.

2. Choose the Active or Passive forms of the verbs in these sentences.

a) Tomatoes *are grown / grow* as annuals in summer gardens.
b) Tomatoes *are considered / consider* poisonous.
c) Tomatoes *are helped* / *help* us with heart-protective benefits.
d) Tomatoes *are known / know* for their antioxidant content of lycopene.

Text IV. PEAS

STARTING UP

Discuss these questions.

- Что Вы знаете о горохе? Для чего его выращивают в Вашем регионе?

VOCABULARY

Read and translate these words and word combinations into Russian.

Atmosphere, protein, bacteria, organic system, economic, hectare, combine, August, alternative, import, soya.

READING

Essential vocabulary

consumption – потребление.
crop – с/х культура.
damage – повреждение.
favorable – благоприятный.
fertilizer – удобрение.
legumes – бобовые.
nitrogen – азот.

provide – обеспечить.

Peas are legumes that are able to make use of atmospheric nitrogen to enrich the protein content of both the plant and seed. Legumes do this by utilizing bacteria that inhabit nodules in the roots that fix the nitrogen. When the roots decay, the nitrogen in the root becomes available to the following crop as a fertilizer – an important source in organic systems. Legumes which are grown for their seeds are known as pulses.

In the UK peas are an important economic crop that has been grown for at least three thousand years. Peas are mainly grown for their seed which is rich in protein and are used for either human or animal consumption. About 50,000 hectares are grown annually for human consumption and about 70,000 for animal feed.

In the arable rotation they provide an excellent break crop because of their ability to fix atmospheric nitrogen. Peas cannot be grown safely more often than one year.

Green or fresh peas are harvested with a special harvester that is able to remove the pea without damage. They are almost exclusively grown to be frozen within a few hours of harvest. These are known as vining peas and most are grown in the West of England.

The majority of the pea crop however is harvested with a conventional combine harvester usually in August. These peas are cut when they are dry and are stored like any other cereal. The crop is sold and processed either for human consumption or for animal feed.

The biggest market for combine peas overall is for animal feed where they are useful because of their favourable protein content. Peas provide a good alternative to imported protein crops like soya bean and are used in pet food.

COMPREHENSION

1. Are the following statements TRUE or FALSE?

a) In the UK peas are an important crop that have been grown for three hundred years. **(TRUE / FALSE)**

b) Peas are grown for their seed which is poor in protein. **(TRUE / FALSE)**

c) Green peas are harvested with a special harvester to remove the pea with damage. **(TRUE / FALSE)**

d) The pea is processed only for human consumption. **(TRUE / FALSE)**

e) About 50,000 hectares are grown annually for animal feed. **(TRUE / FALSE)**

2. Answer the following questions.

a) What kind of crops are peas?
b) What do peas enrich in both the plant and seed?
c) When does the nitrogen in the root become available as a fertilizer?
d) How long have peas been grown in the UK?
e) How many hectares are grown annually for animal feeding?

VOCABULARY

Put the letters in the correct order to make nouns. The first letter is underlined.

goertnin_____ naritoto_____
nitorep_____ encbimo_____
ceosur_____ proc_____
postcinomun_____ vareths_____

WRITING

1. ***Write down questions to the underlined words.***

a) Legumes which are grown for their seed are known as pulses.
b) Peas are mainly grown for their seeds.
c) Around 50,500 hectares are grown annually for human consumption.
d) In the arable rotation they provide an excellent break crop because of their ability to fix atmospheric nitrogen.
e) The majority of the pea crop however is harvested usually in August.

2. ***Find English equivalents from the text and copy them to your copybooks.***

a) Горох может использовать атмосферный азот для обогащения белком.
b) Горох выращивают главным образом для семян.
c) Большую часть урожая собирают зерноуборочным комбайном.
d) Урожай продается и обрабатывается как для пищи, так и для корма.
e) Горох не может выращиваться безопасно более одного года.

GRAMMAR

1. Change Active Voice into Passive Voice.

to enrich
to inhabit
to do
to use
to provide

2. ***Change Passive Voice into Active Voice.***

are grown
are known
are used
are harvested
are stored

3. Change these sentences from Passive Voice into Active Voice. Translate into Russian.

a) 50 000 hectares are grown for human consumption.
b) Green peas are harvested with a harvester.
c) Vining peas are grown in the West of England.
d) The crop is sold for human consumption.
e) Peas are also used in pet food.

SPEAKING

Work in pairs. You and your friend are going to grow peas. What information do you have to know? What are you going to start with? Write down 3 ideas. Compare your list with the list your partner made.

ADDITIONAL READING

TEXT 1 THE PARTS OF A PLANT AND THEIR FUNCTIONS

to suffer – страдать; испытывать, претерпевать.
to prune – обрезать (корневища), подрезать.
to cut off – обрезать, отсекать.
root system – корневая система.
shoot – 1. росток, побег; веточка 2. рост; прорастание.
root hair – корневой волосок.
the tip of root – кончик корня.
to anchor – закреплять (корни), укоренять.
stem – 1. ствол; стебель; стебелек 2. цветонос; цветоножка 3. плодоножка 4. стержень.
stamen – тычинка.
to ripen – зреть; созревать.
ovary – *бот*. завязь.
to enclose – огораживать, закрывать.
seed – семя; семечко; зерно; *pl* семена, семенной (посевной) материал.

A plant is a living organism. It is made up of different parts, each of which has a particular purpose, or specialized function. If one part of the plant is not functioning properly the whole plant will suffer. But we may cut flowers off the plant or prune the roots. Such damage is only temporary and so the plant will continue to grow.

The basic parts of a plant are the root system, which is bellow the ground, and the shoot system above. The root of a plant has two main functions. It takes in, or absorbs, water and minerals from the soils through the root hairs, which are single cells hear the tip of each root. The other main function of the root is to hold or, anchor, the plant in firmly position in the soil.

The shoot system above the ground consists of the stem, the leaves, the flowers and fruits. One of the functions of the stem is to support the plant. Another important function is to enable water and minerals to pass up from the roots to the leaves and flowers. The leaves make food for the plant by the process known as photosynthesis. For this process sunlight is necessary. Water from the soil and carbon dioxide from the air are converted into sugars and other carbohydrates. During the process oxygen is formed and released into the air.

The flowers contain the reproductive organs of the plant. The stamens produce the male sex cells. The carpel produces the female sex cells. The fruit, the ripened ovary of the flower, encloses the seeds and protects them while they are developing.

Answer the following questions.

1. What is a plant?

2. Will the whole plant suffer, if one part of the plant is not functioning?
3. What are the basic parts of a plant?
4. What does the shoot system consist of?
5. What is the function of the stem?
6. What is necessary for the process known as photosynthesis?
7. What do the flowers contain?
8. What do the stamens produce?
9. What does the carpel produce?
10. What is the function of fruit?

TEXT 2 THE LIFE CYCLE OF A PLANT

germination – 1. прорастание (семян); начало роста или развития; образование почки 2. всхожесть (семян) 3. зарождение; развитие.
seed - семя; зерно, *pl* семена, семенной (посевной) материал.
resting (dormant) state – состояние покоя.
moisture – влага; влажность; сырость.
drained soil – дренированная (осушенная) почва.
primary root – главный (стержневой) корень; первичный корень.
emergence – появление, возникновение.
redicle – *бот.* корешок, мелкий корень; первичный корешок, зародышевый корень (о семенах).
stem – 1. ствол; стебель; стебелек 2. цветонос; цветоножка 3. плодоножка.
to spread – расти.
to muture – созревать, вызревать.
pollination – опыление.
fertilization – 1. оплодотворение 2. удобрение, внесение удобрений, подкормка удобрениями.
pollen – пыльца.
stamen – тычинка.
stigma of the carpel – рыльце плодолистика.

The life cycle of a plant can be divided into several stages. The first stage is germination . Seeds remain dormant or in a resting state, if they are kept cool or dry . When the amount of moisture and the temperature level are right, the seeds germinate and starts growing.

Certain conditions are necessary for this to happen. An essential condition is the seeds must be alive. Sometimes seeds are dried at a temperature which is too high.

Other condition for germination concerns the amount of moisture in the soil. If dry seeds are planted in a dry soil, they will not germinate until in rains. On the other hand, if there is too much water in the soil, the seeds will not germinate either. This is

because wet soils remain cold for a longer period of time than drier, well - drained soils. Dormant seeds require very little oxygen in order to stay alive, but when they start to germinate they require more.

In the first stage of germination the primary root, or radicle emerges. Then the stem pushes its way upward until it appears above the surface of the soil .at the same time the root system grows downward, and begins to spread through the soil .in early stages the development of seedlings depends entirely on the food store in the seed but as soon as the first leaves are produced, it is able to manufacture food for itself. The seedlings begin photosynthesis.

When the plant is mature enough, it flowers, and when this happens pollination and fertilization are ready to take place. In the process of pollination the pollen is carried by wind or insects from the stamens to the stigma of the carpel.

Answer the following questions.

1. What is the first stage of the life cycle of plant?
2. What an essential condition is necessary for the germination?
3. What does the other condition for germination concern?
4. When does the primary root or radicle emerge?
5. What does the development of seedlings depend on?
6. When are pollination and fertilization ready to take place?
7. What is carried by wind or insects from the stamens to the stigma of the carpel in the process of pollination?

TEXT 3 AGRONOMICAL CLASSIFICATION OF CROP PLANTS

wheat – пшеница.
rye – рожь посевная.
barley - ячмень посевной.
corn – зерно.
oat – овес посевной.
rice – рис посевной.
edible – годный в пищу, съедобный.
field (broad) beans – кормовые бобы.
field pea – горох полевой, горох кормовой.
peanut – арахис, земляной орех.
cowpea – *бот.* вигна китайская, горох коровий, лагута.
soybean – соя культурная.
hay – сено.
beet – свекла.
soilage – зеленый корм.
silage – силос.
pasture – подножный корм.
forage – фураж.
cereal – (хлеб6ный) злак.
sorghum – сорго.
corn fodder – кукурузный корм (с включением початки).
to cut - *здесь:* косить, жать; выкашивать, скашивать.
sweet potato - сладкий картофель, батат.
turnip- турнепс, репа (огородная).
rutabaga – брюква.
mangel – свекла кормовая.
cereals or grain –зерновые культуры.
forage crops - фуражные культуры.

root crops- корнеплоды legumes- бобовые

From the agronomical standpoint, crop plants are classified according to the way or ways in which they are used. On this principle, the following classification is often used.

Cereals or grain crops. It is known that a cereal may be defined as any grass grown for its edible grain. ”Grain” is a collective term for the fruit of cereals. Wheat, rye, barley, corn, oats and rice are considered to be the great cereals of the world. One should know that wheat, barley, and oats occupy by far the greatest part of the cultivated area occupied by cereals.

Legumes for seed. The term ”legumes’’ may be defined as a plant of the natural family Leguminoseae. It is field beans, field peas, peanuts, cowpeas and soybeans that are the principle legumes raised for their seeds.

Forage crops. The term ’’forage’’ may be defined as vegetable matter utilized as feed for animals in the form of harvested hay, soilage, silage, or a pasture

Forage crops include all grasses cut for hay, legumes cut for forage, sorghum, and corn fodder.

Root crops. A root crop is one grown for its edible roots. In this group are found such plants as turnips, rutabagas, and various form of the beet. The sweet potato is a true root crop, where as the potatoes is not. Many root crops such as **turnips, rutabagas, mangels** and carrots are grown far less in the United States than Canada and Europe.

Answer the following questions.

1. How may be defined cereals?
2. What is collective term for the fruit of cereals?
3. What are considerable cereals of the world?
4. How may be defined the term “legumes”?
5. How may be defined the term “forage”?
6. What do forage crops include?
7. Do root crops have edible roots?
8. What plants are found in the group of root crops?
9. Is the sweet potato a true root crop?
10. Where are grown such root crops as turnips, rutabagas, mangels?

TEXT 4 PLANT BREEDING

rearing – выведение, разведение, выращивание.

to breed – выводить, разводить, выращивать.

requirement – требование, нужда, потребность.
endeavour [in/devə] – попытка, старание.
heredity – наследственность.
plantlet – росток, проросток, сеянец.
to evolve – развиваться.
domestication – 1. одомашнивание (животных) 2. окультуривание (растений).
species – 1. вид; род 2. порода.
introduction – интродукция, введение, внедрение (нового вида, сорта или породы).
prerequisite [pri:´rekwəzit] – I a необходимый как условие II n предпосылка.
availability – 1. пригодность, полезность 2. наличие.
to discard – 1. выбрасывать, удалять; отбрасывать 2. браковать, отбраковывать.
to reject – забраковывать, отбраковывать.
to screen – просеивать, сортировать.
feature – признак, характерная черта
bulk (mass) selection – массовая селекция.
pure line selection – отбор по чистой линии.
field-grown plant - растение, выращенное в поле.
parentage – 1. происхождение; родство; линия родства; родословная 2. отцовство; материнство 3. родители, предки.
pedigree – 1. родословная дом. животных 2. происхождение (о людях).

As a part of agriculture, man started rearing plants and animals to meet his requirements. This is when humans started to learn how to influence the process of natural evolution so as to breed plant or animals.

Slowly and gradually, this process of expedited evolution, through selection and cultivation of plants, acquired the form of a routine endeavor—what we today call ‘plant breeding’. In this, heredity, which refers to the passage of various characteristic features from the main plant (the parent) to the plantlets (the progeny), plays an important role. The effects of heredity had been apparent to early man and he had taken advantage of them ever since the advent of agriculture.

Various methods have evolved in plant breeding. One of the most important methods is that of selection. The ability to choose gave birth to the idea of selection. This is the most primitive and the most successful method of plant breeding. Selection as a part of plant breeding started with the domestication of plants by early man. Domestication refers to the process of bringing wild species under human management. Not all selection over the years have been human influenced—many of the important crop species have resulted from the natural selection process, which is an integral part of evolution. As human knowledge of agriculture grew, man started shuffling crop species from one geographical terrain to another, thus making new introductions.

The first prerequisite of selection is the availability of variability, i.e. different types of forms. After a variable population is recognized, individuals that are the best performers for the desired feature, say fruit size in the case of tomatoes, are chosen and the rest of the population is discarded or rejected. The progeny of the selected individuals is grown further and again screened for the desired feature. This process is repeated until a uniform plant population is attained which has the best-desired characters. Eventually, a desired uniform crop variety is produced by this successive selection followed by multiplication of the selected individuals.

Selecting higher yielding plant varieties is no easy task. Various tools have been devised to deal with plant selection. In fact, the birth of genetics as an independent discipline in plant science started with some clever mathematical computations. This brainchild of yesteryears is now an important branch of genetics known as biometrics. Biometrics is defined as the application of statistics in biology. This has contributed greatly to the development of various systems based on which selection of plants is done. There are various methods by which plant selection is carried out, namely selection for uniform plants, known as pure line selection; selection from field-grown plants, known as bulk selection or mass selection; and selection from a well-documented list of parentage, commonly known as the pedigree system. Overall, the hallmark of selection lies in human ability to chose the best plants from a cluster of many.

Answer the following questions.

1. Why did a man start rearing plants and animals?
2. What effect had been apparent to early man?
3. What is the most successful method of plant breeding?
4. What are methods by which plant selection is curried out?

TEXT 5 THE TYPICAL SEED PLANT

seed plant – семенное растение.
pod – 1. боб; коробочка; стручок 2. фасоль 3. кожура, шелуха, лузга.
embryo – зародыш, эмбрион.
cotyledon – семядоля.
blossom – 1. цвет, цветение; период цветения 2. цветок.
yellowish – желтоватый.
offspring – потомство.
to reproduce – воспроизводить; размножаться.
pollen grain – пыльцевое зерно, пылинка.
male cell – мужская клетка.
sperm – семя, сперматозоид.
fertilized egg – оплодотворенная яйцеклетка.
spruce – ель.
pine – сосна.
peach – персик.
oak – дуб.
beet – свекла.
parsnip – пастернак посевной.

carrot- морковь.
lilac- сирень.
vapour – 1. пар; пары 2. туман.
unfavourable condition – неблагоприятное условие.
to survive – пережить, выдержать, перенести.
moisture – влага, влажность.
warmth – тепло.
annual – однолетнее растение.
biennial – двухлетнее растение.

The common garden bean is a typical seed plant. The vegetable called "bean" is the seed of the bean plant and is contained in a pod. This pod, with its seeds, is the fruit of the plant. The bean seed has two seed leaves, or cotyledons, that surround a baby bean plant, or embryo. The cotyledons supply the embryo with food and act as a protective covering. If the seed is planted properly in soil and is watered, it will germinate, meaning a young bean plant will emerge from the seed planted. This plant has roots, stems, and green leaves that have chlorophyll, enabling it to manufacture its own food.

The young plant grows rapidly, producing additional roots, stems, leaves, and finally blossoms. When the flowers appear the plant is ready to reproduce (produce offspring). Each bean flower has tiny yellowish pollen grains, which are transferred to its own female structure or that of another bean plant's flower. The pollen contains sperms, or male cells, that bring about fertilization of the eggs, or female cells, which are in the ovary of the female structure. The fertilized egg develops into an embryo, while the rest of the egg becomes its seed. The ovary wall enlarges to become a pod, which is the fruit of the bean plant, and the whole life process begins again. A similar process takes place in the pine, spruce, apple, peach, oak, grass, and all other seed plants.

The major parts of a seed plant are roots, stems, leaves, flowers, seeds, and fruit. Each of these structures plays an important part in the life of the plant. Some seed plants are annual, that is they complete their life cycle from seed to seed in one year; such plants include the bean, pea, and the grasses. Others are biennial3, needing two years for the cycle to be completed, these include the beet, parsnip, and carrot. Many are perennial, living for many years; among these are the oak, pine, rose, and lilac. Although there are many variations in different species of seed plant, their principle structures are basically alike and perform the same functions. The roots anchor the plant in the soil and support it. They absorb water and mineral salts from the soil and pass them along to the conducting tubes in the stem to be carried to the leaves. Many roots also store food.

The leaves carry on the process of photosynthesis and are equipped to give off excess water in the form of water vapour. The roots, stems and leaves all are

equipped to take in oxygen, which the plant uses to carry on all activities except photosynthesis.

The seed is the structure whereby seed plants can survive over long periods of time under unfavourable conditions. Many kinds of seeds can retain their ability to germinate for many years after they are formed, and need only moisture, warmth and soil to develop into a new plant.

Answer the following questions.

1) What is a typical seed plant?
2) What does the bean plant consist of?
3) What part do the cotyledons play in the life of the bean plant?
4) What plants are called annual?
5) What plants are called biennial?
6) What are perennial plants?
7) What are the main functions of the roots?
8) What are the functions of the leaves?

TEXT 6 WHAT IS A SOIL?

decomposition – расщепление; разложение, распад, гниение.
vegetation – 1. вегетация, рост; произрастание 2. растительность.
deposit – отложение, нанос, осадок.
alluvial soil – 1. аллювиальная (наносная, пойменная) почва 2. аллювий.
aeolian [|´əu|lən] soil – эоловая почва
volcanic ash – вулканическая зола.
weathering – выветривание; разрушение.
fertility – плодородие.
soil particle – почвенная частица
silt – 1. ил; тина; наносы; осадок 2. *почв.*пыль.
clay – глина; глинозем.
sandy loam – опесчаненный суглинок
clay loam – иловатый суглинок
layer – слой.
permeable – проницаемый.
plant nutrient – питательное вещество для растений.
to supply – снабжать; питать; поставлять.
fine soil – мелко-комковатая почва; мелкозем.
storage capacity – поглотительная (абсорбционная) способность.
soil reaction – реакция почвы, pH почвы.
crumb – *почв* .агрегат, комок.
to decompose – расщеплять; разлагать(ся), распадать(ся).
pollutant – загрязняющее вещество.
to ingest – глотать, проглатывать, заглатывать.
earthworm – червь дождевой, червь земляной.
insoluble – нерастворимый.
sulphur – *хим.* Сера.
nitrogen – азот.
soil depth – мощность почвы.

Soil is the uppermost surface of the earth, which has been slowly transformed by decomposition due to the effects of weather, vegetation and human activities. The parent material from which soil is formed can be the underlying rock, deposits from rivers and seas (alluvial soils) or the wind (aeolian soils), or volcanic ash. Soils is composed of: mineral particles, the products of weathering, organic matter, water and air.

Soil texture and structure are of special importance for soil fertility and plant growth:

Solid particles are classified by size into gravel and stones, sand, silt and clay.

Soil texture refers to the relative proportions of sand, silt and clay in the soil. Depending on the soil's texture, it is described as sand, sandy loam, loam, clay loam, clay, etc. Soil can also be characterized as light, medium or heavy based on its workability.

Soil structure refers to the aggregation of the finer soil particles into crumbs or larger sizes.

Soil supports plants by providing a permeable layer for their roots. It stores plant nutrients and water. Depending on their composition, soils differ in their ability to supply plant nutrients.

The main factors that determine soil fertility are:

- soil organic matter (including microbial biomass)
- soil texture
- soil depth
- nutrient content
- storage capacity (absorption capacity)
- soil reaction
- absence of toxic elements

Contrary to what is widely believed, the colour of the soil reveals very little about its fertility.

The activities of soil organisms are indispensable for high soil fertility and good crop production. Most of these activities are beneficial for the farmer. Soil organisms decompose organic matter to produce humus; aggregate soil particles to provide better structure; protect roots from diseases and parasites; retain nitrogen and other nutrients; produce hormones that help plants grow; and can convert pollutants that find their way into the soil.

After being mixed into the soil and ingested by earthworms, the insoluble forms of nitrogen phosphate and sulphur contained in the particles.

Farmers need good knowledge of their soils in order to improve their fertility.

Answer the following questions.

1. What is a soil?
2. What are the soil constituents?
3. For what are soil texture and structure of special importance?
4. What does soil do for plants?
5. What determines soil fertility?
6. What do soil organisms increase?

TEXT 7 THE ORIGIN AND COMPOSITION OF THE SOIL

residue – 1. остаток; отход 2. осадок, отстой 3. элювий, кора выветривания
to originate – происходить, брать начало, возникать
to derive – 1. происходить 2. устанавливать происхождение 3. получать, извлекать
rock – 1. горная порода 2. скальный грунт
to break down – разрушать(ся)
disintegration – 1. дробление; размельчение 2. дезинтеграция; распад 3. физическое выветривание; разрушение породы физическими агентами
parent (maternal) rock – *почв.* материнская порода
arid – аридный, засушливый; сухой
humid – влажный, сырой
to dissolve – растворять(ся); разлагать(ся) (на составные части)
insoluble – нерастворимый
resemblance – сходство
soil profile – почвенный профиль
horizon – *почв.* горизонт, слой
succession – последовательность
surface – поверхность
A horizon – гумусовый горизонт А
B horizon – горизонт В, иллювиальный горизонт
C horizon – горизонт С, материнская порода
top (surface) soil – верхний (пахотный) слой почвы
coarse-grained – грубозернистый, крупнозернистый
subsoil – подпочва, подпахотный слой; толща ниже горизонта А
to leach out – выщелачивать; вымывать
gravel – гравий
coarse sand – крупный песок
silt – 1. ил 2. *почв.* пыль
clay - глина; глинозем
loam – суглинок
silt loam – пылеватый суглинок
silty clay loam – пылевато-иловатый суглинок
clay soil – глинистая почва
heavy soil – тяжелая почва
crumb – *почв.* агрегат, комок

Soil is a residue of two main ingredients: mineral material and organic material. Organic material originates from dead plants and animals and materials other than this are derived from rocks of various kinds. These rocks are broken down into small particles by mechanical disintegration and chemical decomposition. This breaking down process, known as weathering, may thus both physical and chemical.

When weathering process is largely physical - by heat or wind, for instance – the composition of the soil is very similar to that of the parent rock. In arid regions weathering is mostly by physical means. But in humid regions chemical processes of weathering are equally important. In such regions rock particles are affected by water which may contain carbonic or other weak acid. These acids dissolve some of the particles in the rocks.

The mineral material that is left behind is insoluble. Consequently, the insoluble mineral residues in the soil have less resemblance to the original rocks. There are larger amounts of organic matter in the soil, too.

The process of soil formation results in the development of the soil profile. This is made up of a succession of horizontal layers of varying thickness, from the surface to the parent rock. Generally speaking, there are three distinct horizons, known as A, B, and C. A is a top soil, which is coarse-grained and dark in colour because of presence of humus.

B is known as a sub-soil which contains some of the products leached, or washed out of the A horizon. The C horizon consists of parent material which has been weathered in the upper part, and unweathered rock below.

Any sample of soil contains particles of different sizes. These have been divided into the following size groups.

TABLE 1

Material	Diameter (mm)
Gravel	more than 2.0
Coarse-sand	2.0-0.2
Fined sand	0.2-0.02
Silt	0.02-0.002
Clay	less than 0.002

Soils range from pure clays to pure sands. Most of them contain various proportions of sand, silt and clay and these varying proportions make up a soil`s textural class. The principal classes in order of increasing fineness of material are sand, loam, silt loam, silty clay loam, clay loam, silt and clay.

Any soil contains both mineral and organic matter. Clay particles are the most important of the mineral particles because they are the smallest.

Smaller sized particles have a greater exposed surface area than larger sized particles.

Smaller sized particles can react and combine with water ,nutrients and humus more easily than larger sized particles .Thus , a clay soil is more reactive than any other type of soil .Humus from decomposed organic matter is vital to a soil as it

makes a heavy soil lighter . In addition, it helps to bind the mineral particles together in ‘crumbs’.

Answer the following questions.

1. What is a soil?
2. What does organic material originate from?
3. What is a breaking down process?
4. What acids do dissolve some of the particles in the rocks?
5. What is a soil profile?
6. How many distinct horizons has the soil profile?
7. What is A horizon?
8. What is B horizon?
9. What is C horizon?

TEXT 8 THE BEGINNING OF SOIL FORMATION

rocky – скалистый, каменистый
ancestor – предок, прародитель
to enrich – обогащать; удобрять (почву)
solid matter – твердая частица
carbon – углерод
capable – способный
replicating – выщелачивание; вынос; промывка (почв)
to evaporate – испарять(ся); выпаривать(ся); улетучиваться
deposit – отложение; нанос; осадок
to eject – выделять, извергать, выпускать
molten – расплавленный
removal – 1. удаление 2. смыв, снос; вымывание (почвы)
dissolved – растворенный; разжиженный
vital activity – жизнедеятельность
stretch – промежуток времени; протяжение

It has taken billions of years to yield the soil as we know it now. Over the course of these stretches of time, the chemical elements on Earth came into existence, and the uniformly rocky surface of the planet gradually gave way to deposits of softer material. This softer matter, the earliest ancestor of soil, became enriched by the presence of minerals from the rocks and, over a longer period, by decaying organic matter.

After its formation from a cloud of hot gas some 4.5 billion years ago, Earth was pelted by meteorites. These meteorites brought with them solid matter along with water, forming the basis for the oceans. There was no atmosphere as such, but by about four billion years ago, volcanic activity had ejected enough carbon dioxide and other substances into the air to form the beginnings of one. The oceans began to cool, making possible the earliest forms of life—that is, molecules of carbon-based matter that were capable of replicating themselves.

All of these conditions - Earth itself, an atmosphere, waters, and life-forms—went into the creation of soil. Soil has its origins in the rocks that now lie below Earth's surface, from which the rain washed minerals. For rain to exist, of course, it was necessary to have water on the planet, along with some form of atmosphere into which it could evaporate. Once these conditions had been established (as they were, over hundreds of millions of years) and the rains came down to cool the formerly molten rock of Earth's surface, a process of leaching began.

Leaching is the removal of soil particles that have become dissolved in water, but at that time, of course, there was no soil. There were only rocks and minerals, but these features of the geosphere, along with the chemical elements in the atmosphere and hydrosphere, were enough to set in motion the development of soil. While the atmosphere and hydrosphere supplied the falling rain, with its vital activity of leaching minerals from the rocks, the minerals themselves supplied additional chemical elements necessary to the formation of soil.

Answer the following questions.

1. How many years ago did the chemical elements on the Earth come into existence?
2. What gave way to deposits of softer material?
3. How many years ago Earth was pelted by meteorites?
4. What conditions did go into the creation of soil?
5. When did a process of leaching begin?
6. What is a leaching?
7. What set in motion the development of soil?
8. What did the atmosphere and hydrosphere supply the falling rain with?

TEXT 9 EROSION OF SOIL

Soil erosion is the removal of soil from the land through the action of wind or water. It is a *natural process* that occurs even without human intervention. However, most forms of agriculture increase the erosion potential, especially practices that leave the surface of *erodible land* unprotected. Excessive erosion is a matter for serious concern. In a sustainable agriculture, soil erosion should not exceed the slow process of soil formation, and the prevention of soil erosion is a key issue in increasing the sustainability of agriculture.

Excessive erosion occurs with large variations in extent and causes between and within regions. It is difficult to measure and evaluate the gravity of the problem, but erosion is of special concern in areas such as the humid tropics, along the deserts and in parts of North America. In Europe, erosion is most serious in the Mediterranean regions.

Soil erosion by water generally begins where raindrops strike bare soil. Soil aggregates are broken up, the surface compacted, and water infiltration into the soil obstructed. Water with suspended fine soil particles runs off as surface water, giving sheet erosion, where a thin layer of surface soil is removed. The water flowing over the soil surface can form networks of eroding channels that cut into the topsoil. In the worst cases deep gullies are formed. Suspended particles increase the water density and channeling increases the velocity of water flow. Consequently, erosion starts gently and then rapidly accelerates.

The removal of forests has reduced water infiltration into soil in catchment areas and increased flood frequency and destructiveness. *Floods enhance erosion*.

Eroded material eventually settles out, filling up water reservoirs and estuaries. The silt deposit can improve the fertility of the receiving areas, but in general soil erosion degrades agricultural land.

Wind erosion occurs when bare soil is exposed to drought and wind, e.g., the dust bowl in the USA in the thirties and more recently in the USSR.

It follows from the mechanism of erosion that:

-sloping land is at greater risk than flat land, sloping land left fallow during the winter is at special risk

-erosion risks vary with soil type and structure

-vegetation reduces erosion, as leaves intercept raindrops and roots prevent channeling.

Overgrazing has damaged fragile grasslands and caused serious erosion, e.g., in Africa.

Ploughed land is at greater risk to erosion than grasslands. Specialized arable cropping generally suffers more erosion than mixed farming because with mixed farming part of the land is under grass and more organic matter is available for return to the arable part of the land. This gives some protection against erosion.

The extent of erosion is greatly influenced by soil management.

Techniques are available for *reducing soil erosion*, e.g.,

-water interception with soil banks, strips of grass or forests

-contour ploughing

-use of winter or catch crops, intercropping

-mulching

-no-till practices

-drainage

-terracing, forming horizontal patches of land on steep hills, a characteristic man-made landscape feature both in South-East Asia and elsewhere.

Proper fertilizer use can help minimize erosion by ensuring an ample supply of roots and plant residues. Where erosion has removed topsoil, liming and fertilization help the reestablishment of a good plant cover.

TEXT 10 WEEDS

barley – ячмень
oat – овес
undesirable – неприемлемый, нежелательный
to invade – поражать (о болезни)
to intrude – вторгаться
objectionable – вызывающий возражения; нежелательный
time and expense would be involved - потребовались бы время и известные затраты
to control weeds – бороться с сорняками
out of place – не на своем месте
to mature – созревать, вызревать
abandoned – заброшенный; оставленный
infestation – 1. инвазия, заражение паразитами 2. нападение, нашествие (вредителей) 3. засорение, засоренность (посевов)
soil moisture – влажность почвы; почвенная влага
heavy demand – усиленное требование; большой спрос
to deplete – истощать, исчерпывать
field dodder – повилика
to penetrate – проникать; проходить сквозь; пронизывать
sucker – корневой побег, пасынок
host plant – растение-хозяин
alfalfa – люцерна
clover – клевер
lespedeza – леспедеца; клевер японский
well in advance of the time when..... задолго до того времени, когда...
plants make heavy demands – растения предъявляют повышенные требования

A weed can be defined as a plant that is grown where it is not wanted. Barley growing in a field of oats, for example, would sometimes be considered a weed. It is true, however, that some people do not consider crop plants to be weeds, regardless of where they are found growing. To most of them a weed is an undesirable, wild plant that has invaded their fields.

From a purely practical point of view, it would be hard to justify classifying all intruding crop plants as weeds, although they might be considered such under certain conditions. Whether they should be called weeds or not would depend largely on how objectionable they actually are.

Barley growing in a field of oats that is to be used as feed for livestock could hardly, if ever, be called a weed because it is not objectionable under such conditions. However, if the same field of oats were being grown for seed, the mixture would be objectionable because considerable *time and expense would be involved* in removing the barley. In this instance, the barley would undoubtedly be considered a weed. In

reality, then, a weed *is not necessarily* a plant growing *out of place;* rather it is a plant that is growing where it is not wanted.

Much of the time and efforts of farmers is spent *in controlling weeds* to a point where crop plants can be grown successfully. That the farmers are only partially successful in their controlling weeds is evidenced by the fact that the an-nual loss in crop production in the United States caused by weeds is estimated to be about as much as 5.000.000.000 dollars. This loss is believed to be greater than the combined loss from insects and diseases of both plants and animals.

Weeds are common on the cropland, in the pasture of every farm in the United States, where, at times, infestations of certain weeds have become so severe that land has had to be abandoned. Weeds are objectionable for many reasons. Under most conditions, the greatest loss caused by weeds is in the reduced yield of the crop plants. Weeds reduce yields of crop plants by competing with them for soil moisture, nutrients, and light.

Weeds use soil moisture that would otherwise be available for crop plants and thereby reduce yields. Many weeds grow more rapidly and mature sooner than crop plants. Consequently, they deplete the moisture supply of the soil *well in advance of the time when* the more slowly-growing crop *plants make their heaviest demands* for it. Not only do weeds compete with crop plants for moisture, but for soil nutrients as well. They grow vigorously under most conditions and make heavy demands on the soil for nutrients.

Some weeds have the capacity of obtaining their water and food directly from crop plants rather than from the soil. An example of such a weed is field dodder. Its small suckers penetrate into the host plant, and they absorb the water and food needed for growth. When dodder fails to find a suitable host plant, it soon dies because of its being unable to manufacture its own food. The host plants of dodder are alfalfa, clover, and lespedeza.

Answer the following questions.

1. Why would barley sometimes be considered a weed?
2. Why is it hard to classify all intruding crop plants as weeds?
3. What is the annual loss in crop production in the USA caused by weeds?
4. Why do weeds reduce yields?

TEXT 11 THE CONTROL OF WEEDS AND PLANT DISEASES

sound farm practice – рациональный агротехнический прием (способ)
presowing – предпосевной
harvesting – уборка урожая; жатва
to compete – соревноваться; конкурировать

to plough up – вспахивать, распахивать
to rotate – чередовать, сменять (культуры)
to eradicate – истреблять, уничтожать (вредителей)
host - (растение-) хозяин; (животное-) хозяин (у паразита)
to rid – 1. расчищать от пней, корчевать 2. оздоровлять
soil-borne disease – болезнь, передаваемая через почву
to disseminate – распространять

In crop production the control of weeds, diseases and pests is essential to obtain high yields. All three may be controlled by sound farm practices. These include the choice of clean seed and the growing of varieties of crop which can resist disease. They also include careful cultivation, both presowing and post-sowing, and the use of chemicals.

Weeds reduce crop yields on account of the fact that they compete with crops for water, soil nutrients and light. They also make harvesting difficult. Most weeds are aggressive and invasive, they grow quickly and spread far, and so are difficult to get rid of. One recommended way of eradicating many persistent weeds is first to plough up the roots and underground parts of the plant. Then the soil may be cultivated lightly, or rotated, on one or more occasions after the first plowing.

The principal reason for cultivating the soil is to kill weeds. Weeds may also be killed by means of chemicals which have the collective name of herbicides. Weed-killers are of two basic types: selective and non-selective.

The former remove certain weeds from certain crops. For rice we can spray the herbicide 2:4-D or MCPA over the whole crop at low concentrations (1/2 – 1 lb. per acre). The rice will not be affected, but many of the rice weeds will be killed. Non-selective weed killers may be used for removing all vegetation e.g. as brush killers. They must be used extremely carefully for the simple reason that they will eradicate all plants on contact – which includes the crop itself. They are usually used before sowing or before sowing or before the emergence of the crop itself.

Plant diseases are caused by organisms which use the crop plant as a host. These are mainly micro-organisms e.g. fungi, bacteria and viruses.

These parasitic micro-organisms live off the food nutrients in the tissue cells of the plant or a part of it is damaged and killed. Micro-organisms are bacteria.

Wind, water, diseased plants, cuttings and tubers, animals, men and insects are some of the means whereby disease is disseminated.

It is very difficult to kill the fungi and bacteria, or to make the virus which is inside the host plant inactive. But the evolution of plant varieties which can resist disease has completely changed methods of disease control.

A number of varieties have been evolved and now available to farmers. So the control of plant diseases has increasingly become a matter of prevention. Fungi,

which attack the aerial parts of the crop, can be controlled by means of fungicides. These are sprayed or dusted on to the plant surfaces.

They should be applied before the plant is seriously damaged. In any case, it is necessary to examine crops frequently for signs of disease.

Soil-borne diseases are much more difficult to control. There are various ways of treating the soil. One way is to use chemicals that easily change into a gas or vapor, which enter the soil and kill the harmful organisms. The soil is covered with a polythene sheet and the volatile chemical is injected into the soil. After about 24 hours the sheet is removed and the soil is allowed to air for a few days before use.

TEXT 12 WEEDS, PLANTS DISEASES AND INSECT PROBLEMS

Weeds compete with crop plants for nutrients, water and sunlight. Weed infestation must therefore be kept below tolerable limits. Ample nutrients supplies benefit both the weeds and the crop. Fertilization increases early growth rate and canopy closing and thus gives the crop a competitive advantage over some weeds, but also furthers the growth of tall fast growing weeds, especially perennials. Some recent changes in agriculture practice (increased use of winter cereals, elimination of straw and stubble burning) have increased weed problems.

Crop damage through pests is a major constraint on food production.

Occasionally the attacks become national or continental disasters: beginning in 1845, blight (a fungal disease) destroyed the Irish potato crop; a root louse ravaged European vineyards between 1870 and 1900; blight destroyed much of the US corn crop in 1970; and lethal yellowing (an insect born disease) is currently devastating coconut plantations in the Caribbean. Such disasters are not limited to cultivated fields; Dutch elm disease and the African locust problem are recent examples.

Disasters of this magnitude are not common, but severe pest problems are usual on regional or local levels. Yields and quality reductions occur even when the attacks are slight or well controlled. Measures to protect crops have always been an important part of farming.

A wide variety of chemical is now used to help control weeds, crop diseases and other pests. Agrochemicals (originally copper and sulphur preparations) have been used for more than a hundred years, but their present development dates from discoveries made at the time of the Second World War.

Many current agrochemicals are complex organic compounds applied in water solution. They are an integral and indispensable tool in current agriculture though there remains plant disease (e.g., take-all in wheat) for which no protective pesticide is available.

Now, improved products are being developed, but the cost of research and testing to meet requirements for registration for a new compound is estimated to be

more than USD 50 million and takes six to ten years. The cost is even higher when unsuccessful projects are taken into account. The introduction of new pesticides has therefore diminished to about 2-3 per year at present.. The present trend is to reduce agrochemical use through increased attention to field conditions.

The use of agrochemicals is controversial.

There are many issues, e.g.

- the toxically and environmental persistence of some of the products
- risks in production and distribution
- risks to farmers and workers
- development of pest resistance
- concern about residues in produce.

Efforts to replace chemical pesticides by mechanical and biological control methods have had somewhat mixed success, but the search for such alternatives is continuing. The practical difficulties have been many and progress has been slow.

Any new method for pest control will start natural selection in the pest population. This in time results in development of adaptation or resistance by the pest. The quest for pest control methods is therefore an unending *challenge*. There are no easy solutions.

TEXT 13 ALTERNATIVE AGRICULTURE

Different alternative agricultural systems exist. Various names are in use for such systems, e.g., natural, organic, biological, sustainable or ecological farming.

The alternative agricultural systems differ greatly in their basic ideas and recommended practices, but have in common that they reject the use of soluble mineral fertilizers and pesticides.

Less than 1 per cent of the farms in Western Europe are presently practicing alternative farming. But in the last decade the movement towards alternative agriculture has gained in popularity and received official political recognition and support in the industrialized countries of the West. Today a main driving force is the market’s demand for agricultural products made without the use of man-made chemicals.

Many people find aspects of current agricultural practices disquieting and objectionable: pesticide residues in soil water and produce, increasing nitrate concentration in many ground and surface waters, landscape changes with reduced variety, animal husbandry methods that are perceived as unnatural, degrading and wasteful depopulation of the countryside and costly production in excess of domestic needs in developed countries.

Objections to the use of fertilizers are not based solely on the perception of fertilizers as a cause of pollution, soil improvement and degradation, reduced plant

resistance to diseases and diminished quality of the produce. It is also felt that the easy availability of fertilizers and pesticides has made possible practices that are regarded with distrust such us specialized farming and intensive agriculture.

Organic agriculture is now a rapidly expanding sector. Its adherents are concerned about an agriculture dependent on non-renewable resources and about "unwholesome" food with residues of chemicals. They fear degradation of the soil and are dismayed at many of the aspects of animal treatment in intensive husbandry.

Organic and other alternative agricultural farms are of various types depending on local conditions. Some are located in areas not readily suited to arable crops, have most of their land as grass-clover meadows and produce mainly milk and some meat. Some small farms are specialized vegetable producers. But more typically, an alternative farm will practice mixed animal arable farming with some 40 per cent of the land kept as grass-clover lays. Some of this is permanent grass; the rest is ploughed every 2-3 years as part of the rotation. Part or all of the cereals, roots and legumes may be used as feed for the animals. The stocking rate should match the feed produced on the farm, e.g., in Sweden about 0,6 cows or equivalent per ha used for feed production. All animals are free range, none are permanently confined.

The organic agricultural movement comprises groups that differ in their views on inputs of manure from other farms. Some restrict such inputs to manure from farms also practicing alternative agriculture. Others permit substantial purchases of animal manure from current farming enterprises provided these follow recognized standards for animal welfare. The latter group support their own production by fertilizer use on these other farms.

So in alternative agriculture nutrient losses are compensated through: growing legumes for their nitrogen fixation; application of ground mineral rocks (e.g., stone, phosphate rock, limestone) to supply phosphorus, potassium and other elements.

Soluble mineral fertilizers are not allowed, especially not nitrogen. Rock phosphate and other nutrient minerals with a low solubility can be used. Weed are removed or damaged by mechanical soil treatment or the use of fire. Extensive crop rotation and intercropping are adopted while monocultures are avoided.

Soluble fertilizers are regarded as detrimental to soil life and proper crop development, as they give "unnatural" soil conditions through enhanced nutrient concentrations. This is said to disturb the soil's processes and ecology and to give an unbalanced uptake of nutrients by the plants. Soil nutrient inputs should instead enhance soil nutrient reserves; the farmer should "feed the soil and no the plant". The supply of plant nutrients should derive from mineralization as a natural process.

But cropping patterns in alternative agriculture differ from those in specialized current agriculture. Grass-clover lays and fodder crops are necessary and extensive rotations are more common. Farms in alternative agriculture tend to have markedly

less grain and meat production than those in current agriculture, and produce a relatively larger proportion of dairy products, potatoes, pulses and some vegetables.

There is a wide-spread impression that the quality of produce from alternative farm is higher than that from current agriculture. Evaluation principally concerns nutritional value, absence of noxious compounds and taste.

Statements have been made that animals on alternative farms or given feed from such farms have fewer fertility problems, remain productive longer and in general have fewer health problems than animals in current agriculture.

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