

ПЕРЕДМОВА

Даний посібник призначено для студентів за спеціальністю агрономія.

Посібник націлено на забезпечення розвитку навичок читання, перекладу оригінальної літератури за спеціальністю та навичок мовлення в межах вивченої тематики.

Посібник складається з 10 уроків. Кожен урок посібника складається з 2 базових текстів та лексико-граматичних вправ до них. Окрім того, уроки супроводжуються добіркою окремих текстів для розвитку навичок перекладу як за допомогою словників, так і без них.

Лист незнайомих слів та термінів подається перед базовими текстами.

Для полегшення сприйняття змісту текстів деякі уроки містять малюнки, схеми та таблиці, що також сприяють активізації розумової діяльності та опрацюванню лексичного матеріалу завдяки візуалізації.

Передбачається, що базові тексти будуть розглядатися під час аудиторних занять під контролем викладача, але їх попередній розгляд разом з вивченням активної лексики уроку повинен бути виконаний студентами самостійно.

Також рекомендується в якості самостійних письмових завдань виконання граматичних вправ до уроків.

UNIT 1

Wordlist

1. branch	галузь	отрасль
2. to supply	постачати	обеспечивать
3. animal husbandry	тваринництво	животноводство
4. crop production	рослинництво	растениеводство
5. to harvest	збирати урожай	собирать урожай
6. grain crop	зернова культура	зерновая культура
7. to obtain	отримувати	получать
8. favourable	сприятливий	удобный
9. quality	якість	качество
10. livestock	поголов'я тварин	поголовье скота
11. manure	гній, органічне добриво	навоз
12. fertility	родючість	плодородие

I. Read the text and find out the role of agriculture in human life.

WHAT IS AGRICULTURE?

Agriculture is an important branch of economy. Economic growth of any country depends on the development of agriculture. Agriculture supplies people with food and clothing and industry with raw materials. We do not know when people began to grow crops. It was many thousand years ago. Now crop production and animal husbandry are highly developed branches of agriculture. Crop production is the practice of growing and harvesting crops. The most important crops grown by man are grain crops, vegetables and grasses. In order to obtain high yields crops are grown under favourable soil and climatic conditions. Farm mechanization helps farmers obtain the highest yields of good quality. Animal husbandry is a branch of agriculture including the breeding of farm animals and their use. Farm animals are highly important sources of food for man. They are kept for the production of meat, milk, and eggs. Many crops grown by man are used in feeding livestock. At the same time manure produced by farm animals is an important source for the maintenance of soil fertility. Applying manure, farmers improve the physical condition of the soil. Thus, crop production and animal husbandry are closely connected with each other.

II. Put these questions into the correct order and answer them.

Model : is/what/livestock/in/feeding/use

What is used in feeding livestock?

1. agriculture/an/economy/is/important/branch/of
2. growth/country/does/depend/economic/any/of/what

3. begin/when/people/crops/grow/to/did
4. are/developed/agriculture/of/highly/branches
5. consist/important/do/crops/what/of
6. animals/what/farm/for/kept/are
7. improve/how/farmers/of/physical/soil/do/the/condition

III. The following sentences have mistakes. Correct them.

1. Agriculture an important branch of economy.
2. Economic growth of any country depend the development of agriculture.
3. Agriculture supply people food and clothing and industry with raw materials.
4. It is many thousand years ago.
5. Crop production and animal husbandry is highly developed branches of agriculture.
6. The most important crops grown with man are grain crops.

IV. Put a word from the box in the correct place to complete the following sentences.

Branch, food and clothing, animal husbandry,
to obtain, breeding, livestock, manure

1. Many crops grown by man are used in feeding
2. Applying ..., farmers improve the physical condition of the soil.
3. Crop production and ...are main branches of agriculture.
4. Animal husbandry is a branch of agriculture including the ...of farm animals and their use.
5. In order... high yields crops are grown under favourable soil and climatic conditions.
6. Agriculture is an important ...of economy.
7. Agriculture supplies people with ...

V. Translate the text using the dictionary and write questions about the underlined information.

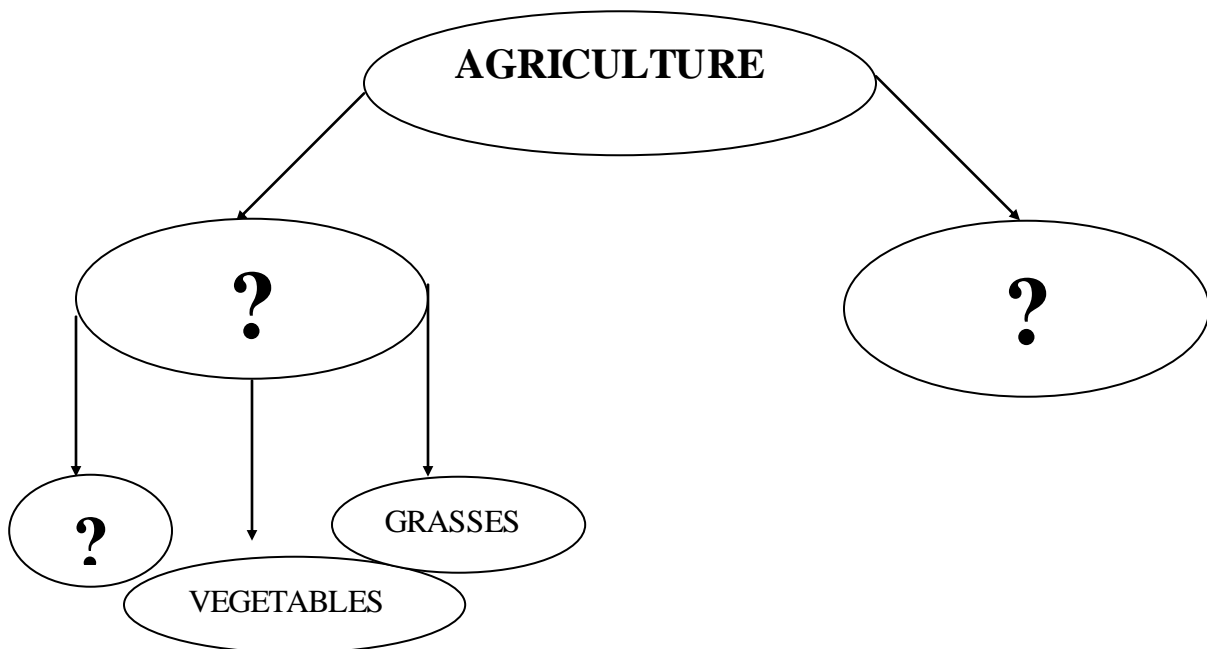
Agriculture is carried out for a great variety of purposes, but most of them are associated with obtaining products. The main products may be described as food, fiber or raw materials for industrial use.

The main purpose of agriculture is the satisfaction of human needs. Human needs include individual needs and national ones, which are closely interrelated.

If the agricultural products generated by the farm are entirely used by the farmer's family such farm is called a subsistence farm. Historically as the subsistence farms became more productive they began to exchange and later to sell a part of their products.

The individual farms generate the agricultural products for internal consumption and for sale. Resources, which are used for internal consumption, include food, feed for animals, materials, fuel. The second and the third national needs can be satisfied only by market oriented farming but not by the subsistence farming.

VI. Complete the information about the agriculture.



GRAMMAR EXERCISES

I. Put up four questions of different types (general, special, disjunctive, alternative) to each sentence.

Model: *Agriculture is an important branch of economy.*

- a) *Is agriculture an important branch of economy?*
- b) *Why is agriculture an important branch of economy?*
- c) *Agriculture is an important branch of economy, isn't it?*
- d) *Is agriculture or industry an important branch of economy?*

- 1) Economic growth of any country depends on the development of agriculture.
- 2) Agriculture supplies people with food and clothing and industry with raw materials.

- 3) Now crop production and animal husbandry are highly developed branches of agriculture.
- 4) Crop production is the practice of growing and harvesting crops.
- 5) Farm mechanization helps farmers obtain the highest yields of good quality.
- 6) Farm animals are highly important sources of food for man.
- 7) Applying manure, farmers improve the physical condition of the soil.

II. Use the verbs in brackets in the Present, Past or Future Simple.

1. Economic growth of any country (*to depend*) on the development of agriculture.
2. Agriculture (*to supply*) people with more food and clothing and industry with raw materials next year.
3. It (*to be*) many thousand years ago.
4. Now crop production and animal husbandry (*to be*) highly developed branches of agriculture.
5. Farm mechanization (*to help*) farmers obtain the highest yields of good quality last year.
6. Farm animals (*to be*) highly important sources of food for man.
7. Applying manure, farmers (*to improve*) the physical condition of the soil next year.

III. Make the sentences of the exercise II negative.

Wordlist

1. to devote	присвячувати	посвящать
2. drugs	ліки	лекарства
3. descriptions	опис	описания
4. to expande	розширювати	расширять
5. plant breeding	розмноження рослин	размножение растений
6. horticulture	садівництво	садоводство
7. ornamental plants	декоративні рослини	декоративные растения
8. field crops	польові культури	полевые культуры
9. distinction	різниця	различие
10. precise	точний	точный
11. forestry	лісівництво	лесоводство
12. recreation	відновлення	рекреация, восстановление
13. timber	деревина	древесина
14. reforestation	відновлення лісу	лесовозобновление
15. tillage	обробка ґрунту	обработка почвы
16. crop rotation	сівозміна	севооборот
17. breeding	розмноження, селекція	размножение, селекция
18. weed control	боротьба з бур'янами	борьба с сорняками
19. pasture	пасовисько	пастбище

I. Read the text and find out the place of agronomy between other practical aspects of botany

BOTANY AND AGRONOMY

Botany, science *devoted* to the study of plants. Botany, microbiology, and zoology together compose the science of biology. Man's earliest concern with plants was with their practical uses, i.e., for fuel, clothing, shelter, and, particularly, food and *drugs*. The establishment of botany as an intellectual science came in classical times. In the 4th cent. D.C., Aristotel and his pupil Theophrastus worked out *descriptions* and principles of plant types and functions that remained the prototype for botanical observation for 1,000 years.

Modern botany has *expanded* into all areas of biology, including molecular biology. Perhaps most significant was the work of Mendel in *plant breeding* at the middle (1859) of the 19th cent., from which grew the science of genetics. The various practical aspects of experimental botany have developed into specific scientific disciplines (e.g. agriculture, agronomy, horticulture, and forestry).

Horticulture [Lat. *Hortus*=garden], science and art of gardening and of cultivating fruits, vegetables, flowers, and *ornamental plants*. Horticulture generally refers to small-scale gardening, and agriculture to the growing of *field crops*, usually on a large scale, although the *distinction* is not always *precise* (for example, market gardening could be classed either way).

Forestry, the management of forest lands for wood, water, wildlife, forage, and *recreation*. Because the major economic importance of the forest lies in wood and wood products, forestry has been chiefly concerned with *timber* management, especially *reforestation*, maintenance of the extant forest stands at prime condition, and fire control.

Agronomy, branch of agriculture dealing with various physical and biological factors- including soil management, *tillage*, *crop rotation*, *breeding*, *weed control*, and climate- related to crop production. Agronomy commonly refers to field crops, e.g. wheat, rice, corn, sorghum, soybean, cotton, as well as *pasture*, sugar, and forage crops; while horticulture is concerned with fruits, vegetables, flowers, and ornamental plants; forestry with forest trees; and agroforestry, with mixtures of trees with other crops.

II. Answer the following questions:

1. What does the botany study?
2. When did the establishment of botany as a science come?
3. What does the horticulture study?
5. What is the difference between horticulture and agronomy?

III. Find the words in the text, which correspond to the following definitions.

- 1....branch of agriculture dealing with various physical and biological factors-

- including soil management, tillage, crop rotation, breeding, weed control, and climate- related to crop production.
- 2....together compose the science of biology.
 - 3....science devoted to the study of plant.
 - 4... science and art of gardening and of cultivating fruits, vegetables, flowers, and ornamental plants.
 - 5...the management of forest lands for wood, water, wildlife, forage, and recreation.

IV. Translate into English.

1.Ботаніка – це наука, що вивчає рослини. 2.Ботаніка, мікробіологія та зоологія разом складають науку біологію. 3. З роботи Менделя про розмноження рослин розпочалася наука генетика. 4. Практичні аспекти експериментальної ботаніки були розвинуті в специфічних наукових дисциплінах – агрономії, садівництві та лісництві. 5. Агрономія має справу з різними фізичними та біологічними факторами. 6. Агрономія, в основному, займається польовими, кормовими та фуражними культурами в той час, як садівництво приділяє увагу фруктовим та овочевим культурам, вирощуванню квітів та декоративних рослин.

V. Complete each sentence with a word or phrase from the box. Use each word or phrase only once.

management of forest lands, came in classical times, the science of genetics, various physical and biological factors, gardening and of cultivating fruits, the study of plants, the science of biology, into specific scientific disciplines

- 1) Botany, science devoted to....
- 2) Botany, microbiology, and zoology together compose....
- 3) The establishment of botany as an intellectual science
- 4) From the work of Mendel in plant breeding at the middle (1859) of the 19th cent grew....
- 5) The various practical aspects of botany have developed
- 6) Horticulture [Lat. *Hortus*=garden], science and art of
- 7) Forestry is the....
- 8) Agronomy, branch of agriculture dealing with

VI. Read the text without the dictionary and answer the following questions:

1. When and where was Gregor Mendel born?
2. What main occupations did he have?
3. What plants did Menedel study?
4. What theories did Mendel develop during his research?
5. What three basic laws of genetics did Mendel discover?

Wordlist

1. ordination	класифікація	классификация
2. theories of heredity	теорія спадковості	теория наследственности
3. pea pod plants	горох	горох
4. trait	риси, ознака	черта, признак

GREGOR MENDEL

1822 - 1884

Gregor Johann Mendel was born on July 22, 1822, in Heizendorf, Austria. He was the only son of a peasant farmer. In 1843 he began studying at the St. Thomas Monastery of the Augustinian Order in Bruno. He was ordained into the priesthood in August of 1847. After his ordination, Mendel was assigned to pastoral duties, but it soon became apparent that he was more suited to teaching.



In 1849, he was assigned to a secondary school. It was there that he took the qualifying examination for teacher certification and failed. In 1851 he entered the University of Vienna to train to be a teacher of Mathematics and Biology. It was at the University of Vienna that he developed his skills as a researcher, which he utilized later in his life. Mendel returned to teaching in Bruno in 1854. Two years later he again attempted the state certification examination. He became quite ill, perhaps as a result of severe debilitating test anxiety, and he withdrew. He did attempt to take the examination again, but returned to Bruno in 1856 where he continued to teach part-time. Toward the end of his life, in 1868, Mendel was promoted in the monastery to Abbot. He died on January 6, 1884.

During the middle of Mendel's life, Mendel did groundbreaking work into the theories of heredity. Using simple pea pod plants, Mendel studied seven basic characteristics of the pea pod plants. By tracing these characteristics, Mendel discovered three basic laws, which governed the passage of a trait from one member of a species to another member of the same species.

The first law states that the sex cells of a plant may contain two different traits, but not both of those traits. The second law stated that characteristics are inherited independently from another. The third theory states that each inherited characteristic is determined by two hereditary factors (known more recently as genes), one from each parent, which decides whether a gene is dominant or recessive. In other words, if a seed gene is recessive, it will not show up within the plant, however, the dominant trait will. Mendel's work and theories, later became the basis for the study of modern genetics, and are still recognized and used today.

VII. Name a word or a word combination, which is not a part of the logical group.

1. Agronomy, soil management, management of forest lands, crop rotation, breeding, weed control, climate- related to crop production, field crops.

2. Forestry, timber management, fruits, wood, water, wildlife, forage.
3. Horticulture, tillage, vegetables, flowers, ornamental plants

GRAMMAR EXERCISES

I. Put up four questions of different types (general, special, disjunctive, alternative) to each sentence.

Model: *Gregor Johann Mendel was born on July 22, 1822.*

- a) *Was Gregor Johann Mendel born on July 22, 1822?*
- b) *When was Gregor Johann Mendel born on July 22, 1822?*
- c) *Gregor Johann Mendel was born on July 22, 1822, wasn't he?*
- d) *Was Gregor Johann Mendel born on July 22, 1822 or on June 22, 1822?*

- 1) In 1851 he entered the University of Vienna to train to be a teacher of Mathematics and Biology.
- 2) Mendel returned to teaching in Bruno in 1854.
- 3) He died on January 6, 1884.
- 4) Mendel did groundbreaking work into the theories of heredity.
- 5) Mendel studied seven basic characteristics of the pea pod plants.
- 6) The sex cells of a plant may contain two different traits, but not both of those traits.
- 7) Characteristics are inherited independently from another.
- 8) Each inherited characteristic is determined by two hereditary factors

II. Put the verbs in brackets into the appropriate form and explain the usage of that form in the sentence.

1. In the 4th cent. D.C., Aristotel and his pupil Theophrastus (*to work out*) descriptions and principles of plant types and functions. 2. Modern botany (*to expand*) into all areas of biology, including molecular biology. 3. The various practical aspects of experimental botany (*to develop*) into specific scientific disciplines (e.g. agriculture, agronomy, horticulture, and forestry). 4. He (*to be*) the only son of a peasant farmer. 5. In 1849, he (*to be was assigned*) to a secondary school. 6. Toward the end of his life, in 1868, Mendel (*to be promoted*) in the monastery to Abbot. 7. The second law (*to state*) that characteristics are inherited independently from another.

III. Make the sentences of the exercise II negative.

UNIT 2

Wordlist

1. rock	скельовий ґрунт	скальный ґрунт
2. weathering	вивітрювання	выветривание
3. solidification	тверднення	отвердевание
4. aggregate	сукупність	совокупность
5. plant remains	залишки рослини	остатки растения
6. decay	розпад, гниття	распад, гниение
7. uppermost	верхній пласт(ґрунту)	верхний слой (почвы)
8. leaching	вилуговування	выщелачивание
9. tint	відтінок	оттенок
10. clay	глина	глина
11. silt	мул	ил
11. subsoil	підґрунтя	подпочва
12. manure	ґній	навоз
13. fertilizer	добриво	удобрение
14. potash	поташ	поташ
15. peat	торф	торф
16. fen	болото	болото
17. bound	зв'язаний	связанный
18. clod	грудка	ком
19. crumb	крихта	крошка
20. potassium	калій	калий
21. sulphur	сірка	сера
22. lime	вапно	известь
23. boron	бор	бор

I. Read the text and answers the following questions:

1. What are the main stages of soil formation?
2. What are the differences between soil and subsoil?
3. What does the character of a soil depend on?
4. Call six primary elements of soil.
5. What is a role of microelements in the growth of plants?

THE SOIL (part 1)

Soil Formation. Soil is produced from *rock* by the process of *weathering* and by the activities of plants, animals, and man. **Primitive or igneous rocks**,¹ formed by the *solidification* of the magma in the process of the cooling of the earth consist of

aggregates of mineral crystals, which are large, or small **according to the rate at which cooling took place.**²

The weathering of a rock **is generally due to**³ a combination of physical and chemical actions. The weathered products of rock alone do not constitute a soil. **Plants establish themselves very soon after weathering begins,**⁴ and the mineral material thus becomes mixed with plant remains. These remains, in the process of decay, form an addition to the products of rock weathering. Soil is therefore a mixture of organic and inorganic material containing a large and complex population of living things.

The general character of a soil depends to a considerable extent on the nature of the **parent material.**⁵ Thus a **coarse-grained sandstone**⁶ will generally produce a sandy soil, and a **stratum of shale**⁷ a "heavy" soil.

Soil and Subsoil. Natural soils that have been long undisturbed are composed of horizons. Soil scientists distinguish three main horizons — the uppermost (A), from which material has been removed by leaching; the second (B), in which has been deposited some of the material removed from (A); and the third (C), which consists of the parent material, e.g.² the partly disintegrated rock.

The top soil is dark because of its high content of decaying vegetable matter (humus) while the subsoil varies from reddish or yellowish to a pale gray tint. Another usual difference is that the **top soil is coarser grained**⁸ than the subsoil, the difference being caused by the washing down of a proportion of the finer clay and silt particles.

In general,⁹ the top soil **will be richer in nitrogen (10)** and phosphate than the subsoil, since manures and fertilizers **are largely held in the former,**¹¹ but the subsoil may frequently contain more potash.

Soil Particles. Typical soils (excepting peats and black fen types) are composed largely of particles and fragments of mineral matter. We must remember that these particles **are not all free one from another**¹² — indeed it is obvious that they are often bound together to form clods or crumbs. Nevertheless the character of a soil depends very much upon the sizes of the particles of which it is composed.

An important distinction is to be drawn between sand and silt on the one hand and clay on the other. The coarser fractions in general form the "skeleton" of the soil.

Primary elements.¹³ Of the eleven essential elements obtained from the soil by plants, six are used in relatively large quantities.

They are nitrogen, phosphorus, potassium, calcium, magnesium and sulphur. Because they are used by plants in relatively large amounts they are sometimes called the primary elements. Plant growth may be retarded **because these elements are lacking in the soil,**¹⁴ because they become available too slow, or **because they are not balanced by other nutrients.**¹⁵ **This is very often true with nitrogen.**¹⁶

When nitrogen, phosphorus and potassium are artificially applied to the soil, they are usually added as farm manure and especially as commercial fertilizers. Therefore, they are often called **fertilizer elements**. In the same way calcium and magnesium are applied as lime and are called lime elements. Sulphur usually goes into the soil as an incidental ingredient of such fertilizers as farm manure, super-phosphate, and sulphate of ammonia.

Microelements. The other nutrient elements (iron, manganese, copper, zinc and *boron*) are used by higher plants in very small amounts and therefore are sometimes called microelements. These elements are just as important for the growth of plants as the primary elements.

Notes

1. **primitive or igneous rocks** — корінні та вулканічні породи
2. **according to the rate at which cooling took place** — в залежності від того, з якою швидкістю відбувалося охолодження землі
3. **is generally due to** — звичайно обумовлюється... **due to** — завдяки, внаслідок
4. **Plants establish themselves very soon after weathering begins** — згодом після початку вивітрювання з'являються рослини
5. **parent material** — материнська порода
6. **coarse-grained sandstone** — крупнозернистий пісчаник
7. **a stratum of shale** — пласт глинистого сланцю
8. **the top soil is coarser grained** — верхній горизонт має більш крупнішу структуру
9. **in general** — загалом
10. **be richer in nitrogen** ... — мати більш високий вміст азоту ...
11. **are largely held in the former** — в значній мірі знаходяться в першому (верхньому горизонті)
12. **are not all free one from another** — усі зв'язані один з одним
13. **primary elements** — основні елементи (макроелементи)
14. **because these elements are lacking in the soil** — за відсутністю цих елементів у ґрунті
15. **because they are not balanced by other nutrients** — тому що вони не поповнюються у відповідній мірі іншими поживними речовинами
16. **this is very often true with nitrogen** — особливо це стосується азоту

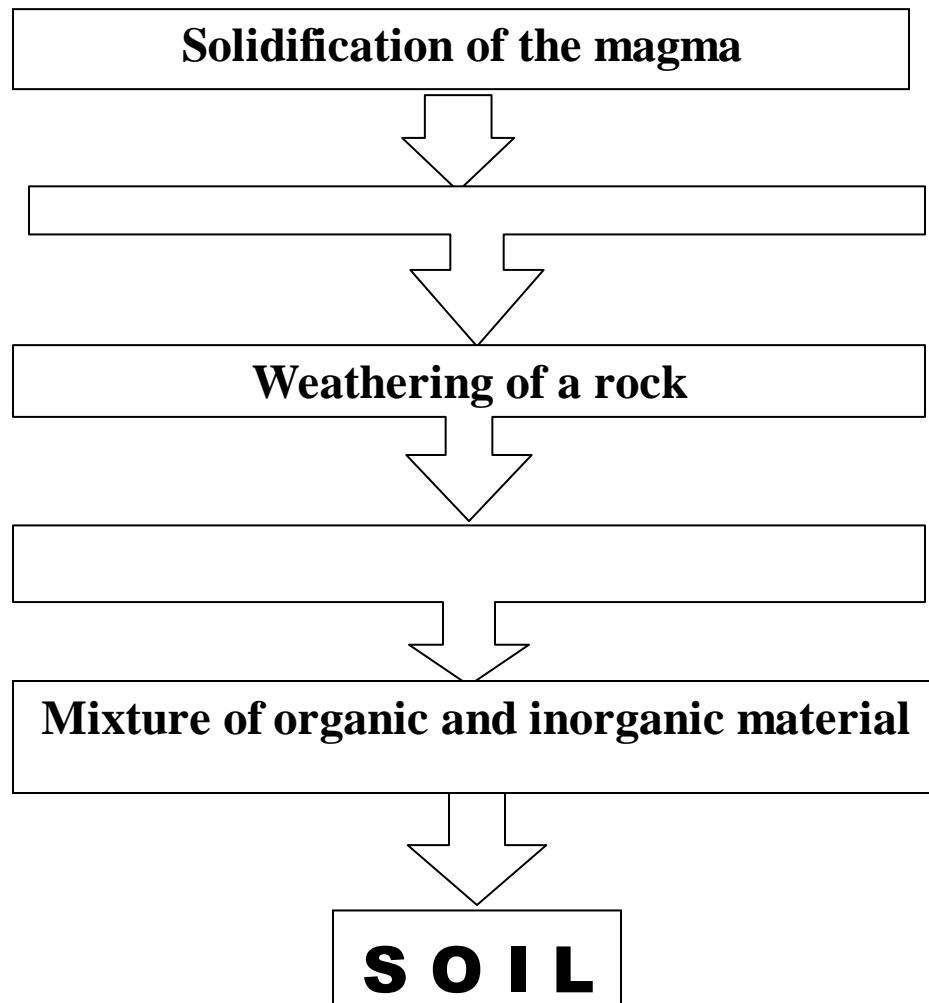
II. In the second column select the words and the word combinations equivalent to those in the first one.

- | | |
|--------------------------------|-------------------|
| 1. rock | 1. азот |
| 2. process of weathering | 2. пісчаний ґрунт |
| 3. solidification of the magma | 3. торф |
| 4. boron | 4. залишки рослин |
| 5. nitrogen | 5. выщелачивание |
| 6. sulphur | 6. сірка |
| 7. fen | 7. болото |
| 8. leaching | 8. калій |
| 9. parent material | 9. бор |

10. plant remains
11. sandy soil
12. peats
13. potassium

10. твердження магми
11. процес вивітрювання
12. скельний ґрунт
13. материнська порода

III. Label this diagram to illustrate the passage devoted to the soil formation.



IV. Find the words in the text, which correspond to the following definitions.

1. ... main horizons, which consists of the parent material, e.g. the partly disintegrated rock.
2. ... main horizons, from which material has been removed by leaching.
3. ... main horizons, in which has been deposited some of the material removed from the uppermost horizon.

V. Complete each sentence with a word or phrase from the box.

1. ...are usually added as farm manure and as commercial fertilizers.
2. ...as the primary elements.
3. ...as farm manure, superphosphate, and sulphate of ammonia.
4. ...to be obtained from the soil by plants in relatively large quantities.
5. ...to be used by higher plants in very small amounts. They are called trace or microelements.
6. ...because of primary elements lacking in the soil.

1. Nitrogen, phosphorus, potassium, calcium, magnesium and sulphur are known ...
2. Iron, manganese, copper, zinc and boron are known ...
3. Being artificially applied to the soil nitrogen, phosphorus, and potassium...
4. Sulphur is known to be an incidental ingredient of such fertilizers ...
5. It is known that plant growth may be retarded ...
6. The microelements are as important for plant growth ...

VI. Translate the text paying attention to the different meanings of ing-forms:

1. Soil is produced from rock by weathering. 2. Plants establish themselves very soon after weathering begins. 3. Having decayed plants form an addition to the products of rock weathering. 4. Sizes of mineral crystals depend upon the rate at which cooling took place. 5. Each mineral is a chemical compound having specific chemical and physical properties. 6. Igneous rocks having been exposed to changing temperatures, moisture, etc., slow processes of disintegration and decomposition begin.

GRAMMAR EXERCISES

I. Transfer the sentences from Active into Passive.

Model: *The process of weathering and the activities of plants, animals, and man **produce** the soil from rock.*

*Soil **is produced** from rock by the process of weathering and by the activities of plants, animals, and man.*

1. The solidification of the magma forms primitive or igneous rocks in the process of the cooling of the earth. 2. A coarse-grained sandstone will generally produce a sandy soil, and a stratum of shale a "heavy" soil. 3. Soil scientists distinguish three main horizons. 4. Particles and fragments of mineral matter constitute typical soils.

II. Put the verbs in brackets into the appropriate form and explain the usage of that form in the sentence.

1. The weathered products of rock alone (*not constitute*) a soil. 2. The general character of a soil (*to depend*) to a considerable extent on the nature of the parent material. 3. They (*to be*) nitrogen, phosphorus, potassium, calcium, magnesium and sulphur. 4. Because they (*to be used*) by plants in relatively large amounts they are sometimes called the primary elements. 5. Plants (*to establish*) themselves very soon after weathering (*to begin*).

III. Make the sentences of the exercise II negative.

Wordlist

1. colloidal residue	колоїдний залишок	КОЛЛОИДНЫЙ ОСТАТОК
2. soil texture	будова ,текстура ґрунту	сложение, текстура ґрунта
3. to impart	передавати	передать
4. sponge	губка	губка
5. porosity	пористість	пористость

I. Read the text and find out the effects of humus on the physical properties of soils.

**THE SOIL
(part 2)**

Physical Properties of Soils. Soils are classified and mapped generally on the basis of physical characteristics which the surveyors can recognize by visual inspection. Many of the important chemical and biological properties are reflected by the physical properties of the soil. Furthermore, the physical properties of soils determine **to a large extent**¹ their productive capacity. The aeration and moisture relations, as well as area of root penetration, are determined largely by the physical makeup of soil profile.

Some of the physical properties are: texture, structure, *porosity*, colour and temperature relations.

Soil Texture. Texture refers to size of soil particles. **Based on**² size of soil particles there are three fractions: sand, silt and clay.

The sand fraction is further divided into five groups, resulting in a total of seven size groups. The seven groups are designated as seven soil separates.

Fraction

Sand

Coarse sand

Fine sand

Soil Separate

Fine gravel

Medium sand

Very fine sand

Silt
Clay

Silt
Clay

The determination of the proportionate amounts of sand, silt and clay is called mechanical analysis. There are two laboratory methods of analysis. Both methods are based on the determination of the settling velocity of suspended particles in water.

The coarse materials settle rapidly, while the fine materials settle slowly.

Humus. True humus which consists of the *colloidal residue* of organic matter has great effects on *soil texture* and fertility.

Whenever it is present in considerable quantity it *imparts* its black or dark-brown colour to the soil, and since dark-coloured materials absorb more of the sun's heat than light-coloured ones, its presence tends to raise the soil temperature. Moreover, in **well-aerated**³ soils humus **is constantly undergoing oxidation**,⁴ with **liberation of simple compounds of nitrogen**⁵ which can be taken up by plant roots. Most important is the fact that humus has many of the properties of mineral colloids — it increases the soil's power of retaining moisture and it absorbs and holds plant nutrient substances. When organic matter is added to light soils the **resulting humus**⁶ tends to bind the mineral particles into crumbs which absorb and hold water like miniature *sponges*.

It has already been noted that "**raw**" **humus**⁷ in the absence of lime imparts to the soil a strongly acid reaction which is unfavourable to the growth of most higher plants.

If the humus content is to be maintained at a high level, **repeated applications**⁸ of organic matter have to be made.

The means of maintaining the humus content include the use of manure and composts and **the ploughing in of "green manuring" crops**.⁹

Notes

1. **to a large extent** — у більшій мірі
2. **based on** — на основі
3. **well-aerated** — добре збагачуваний повітрям
4. **is constantly undergoing oxidation** — постійно окислюється
5. **liberation of simple compounds of nitrogen** — утворення простих з'єднань азоту
6. **resulting humus** — гумус, який утворюється в результаті цього
7. "**raw**" **humus** — молодий гумус
8. **repeated applications** — повторне внесення
9. **the ploughing in of "green manuring" crops** — зорення культур зеленого добрива

II. Complete each sentence with a word or phrase from the box.

- | |
|---|
| <ol style="list-style-type: none">1. while the fine materials settle slowly.2. mechanical analysis3. the physical properties of the soil4. size of soil particles5. their productive capacity |
|---|

1. The physical properties of soils determine....
2. The coarse materials settle rapidly,....
3. Texture refers to....
4. Many of the important chemical and biological properties are reflected by....
5. The determination of the proportionate amounts of sand, silt and clay is called....

III. Name a word or a word combination, which is not a part of the logical group.

1. texture, structure, porosity, smell, colour, temperature relations
2. sand, glue, silt, clay
3. fine sand, coarse sand, fine sand, very fine sand
4. humus, manure, compost, composts

IV. Translate the text:

1. True humus is known to consist of the colloidal residue of organic matter. 2. We know humus to have great effects on soil texture and fertility. 3. Humus is known to absorb and hold plant nutrient substances. 4. Organic matter being added to light soils, the resulting humus binds the mineral particles into crumbs. 5. A strongly acid reaction imparted to the soil by "raw" humus in the absence of lime is unfavourable to the growth of higher plants. 6. We can maintain the humus content at a high level by using manure and composts, and by ploughing in "green manuring" crops.

V. Translate into English:

1. Мінеральні частки, зв'язані гумусом, абсорбують та утримують воду як губки. 2. Гумус підвищує здібність ґрунту утримувати вологу та допомагає рослинам абсорбувати поживні речовини. 3. Кислотна реакція, що виникає після внесення «сирого» гумусу без достатньої кількості вапна, не сприяє швидкому росту рослин. 4. Для підтримки високого вмісту гумусу необхідне повторне внесення органічних добрив. 5. Застосування гною, а також внесення зелених добрив підтримують належний вміст гумусу в ґрунті. 6. Температура ґрунту може бути значно підвищена за рахунок внесення гумусу.

VI. Read and understand this text without dictionary.

ORGANIC MATTER AND ESSENTIAL ELEMENTS

Since all plants require 16 elements for proper growth, it is logical to conclude that the dead remains of these plants, like manure, contain all essential elements.

Organic matter, in addition to containing elements essential for plants, also contains elements necessary for livestock and man. These are sodium, cobalt, and iodine which are essential for animals but not for plants. Organic matter also contains traces of nickel and gold; in fact most of the elements in nature are found in plants.

Although organic matter contains all of the elements necessary for plant growth, these elements may not always be in the right balance for producing maximum crop yields.

VII. Translate this text without the dictionary and find out the answers to the questions given below.

Successful Farming Depends on the Soil.

Successful farming means making the best and the most scientific use of natural conditions, land, crops, livestock, machinery and all the other things which have to be put together to make the farming system work. Important points to be taken into consideration are: the soil types of the district, annual rainfalls, maximum and minimum temperature. The various factors that make up soil fertility are: moisture conditions, plant food and soil structure. All these factors influence the quality of plant, what later results in yield. The important job for farmer is to get the land into good condition and to keep it that way. Such land is more easily cultivated, provides better conditions for germination of seed and for crop growth and in the end produces better crops. The only crops, which supply part of their plant food needs, are the legumes. By means of their roots they take the nitrogen they need from the air, and with it they feed not only themselves but other plants growing with and sometimes other crops grown in the following year. That's why legumes are said to improve soil and manure, or form the fertilizers applied.

In order to understand the scientific growing of crops one must know the temperature requirements of plants as well, the optimum temperature for germination and growth varying with different kinds of plants. In fact crops vary in their climatic requirements. For example, winter wheat is grown in regions where the climate is cool and somewhat dry harvest period. A good winter wheat climate is not the same as that for corn. Corn is a summer crop; not being planted until after the soil has been well warmed up. Oats and barley do best in cool, moist climate, as well as potatoes. Their yield is better in cool regions. Cotton is highly important crop throughout the warmer parts of the world. It can withstand periods of drought and still produce satisfactory yields. Vegetables, because of their high adaptability, are grown over a wild range of soil and climatic conditions, soils of good physical properties being

especially important. Such vegetables as tomatoes and cucumbers are often grown on a large scale under glass.

To obtain a high yield of good quality crop it is necessary to choose the proper variety best adapted to the conditions of the soil of the region where it is to be grown.

Answer the questions.

1. What does successful farming mean?
2. What are the important points of successful farming?
3. What are the factors that make up the soil fertility?
4. What does the cultivated soil provide?
5. Do the legumes improve the soil fertility?
6. What must we know before growing the plants?
7. What is necessary to do to obtain a high yield of good quality crop?

VIII. Retell the text.

GRAMMAR EXERCISES

I. Translate sentences paying attention to the words: due to, to be due to ...:

1. Soil formation is due to the process of weathering rock and to the activity of plants, animals, and man. 2. The weathering of a rock is generally due to a combination of physical and chemical actions. 3. The general character of a soil is partly due to the nature of the parent material. 4. The decay of organic matter is due to the activity of microorganisms, bacteria, moulds and other fungi.

II. Put the verbs in brackets into the appropriate form and explain the usage of that form in the sentence.

1. Many of the important chemical and biological properties (*to be reflected*) by the physical properties of the soil. 2. Texture (*to refer*) to size of soil particles. 3. The sand fraction (*to be*) further divided into five groups, resulting in a total of seven size groups. 4. There (*to be*) two laboratory methods of analysis. 5. The means of maintaining the humus content (*to include*) the use of manure and composts.

III. Make the sentences of the exercise II negative.

UNIT 3

Wordlist

timberland	лісові угіддя	лесные угодья
diversification	різноманітність	разнообразие
nutrient	поживна речовина	питательное вещество
legume	плід бобових, бобові	плод бобовых, бобовые
virgin soil	цілинний ґрунт, цілина	целинная почва, целина
treatment	обробка ґрунту	обработка почвы
deterioration	погіршення	ухудшение
wet	вологий	влажный
neglecting	нехтування	пренебрежение
depletion	виснаження	истощение
handling	обробка	обработка
fertilizer	добриво	удобрение

I. Read the text and answers the following questions:

1. What is the crop rotation?
2. What is the way of returning nitrogen to the soil?
3. What is the difference between virgin soils and the soils for crops and pastures?
4. What things may contribute to the deterioration of soil structure?
5. What properties determine the agricultural quality of soils?

USES AND CARE OF SOILS

There has always been great variation in the quality of soils available for agriculture. In most instances, the better soils are used for crops, and the less suitable ones are kept for pastures or *timberlands*.

The systematic alternating of crops from field to field is known as crop rotation, which is one of the methods of soil conservation. A good rotation system consists of adjusting the crop arrangement to the physical nature of the land and, in the same time, maintaining a balanced economic farming programme. Rotation implies the growing of more than one crop on a farm. In other words, rotation and *diversification* go hand in hand.

Since no two crops make identical demands on the soil, one crop may require excessive amounts of a given *nutrient*, which another crop may be able to supply. For example, *legumes* return nitrogen to the soil, but most other crops require more nitrogen than the soil can normally supply.

Time makes little change in *virgin soils*. But when soils are used for crops or pasture, the balance that nature has given them is upset in various ways and to varying degrees. Changes in the nature of soils cannot be avoided as they are put to

diverse uses. These changes may result in improvement in productivity. Frequently, however, soil use results in soil damage and decreased yields. Thus careful *treatment* of soils in ways that will keep them productive through continuous use is the aim of every good agricultural programme.

Improper use may result in the *deterioration* of soil structure; several things may contribute to this deterioration, including: plowing when soil is too *wet*; failure to return organic matter; unwise use or lack of lime; *neglecting* to rotate crops. An even more serious and widespread kind of soil damage is the loss of essential plant nutrients. This may result from continuous growing of the same crop and from failing to fertilize it properly. Still another serious cause of *depletion* in most soils is known to be the loss of organic matter.

Properties that determine the agricultural quality of soils include: 1) ability to produce high crop yields under good management and careful *handling*; 2) the ease with which they can be used profitably; 3) the amount and kind of care they require. Good soils respond well to proper management, which involves correct cropping practices, use of *fertilizers*, and effective protection against damage. Without good care all crop land deteriorates with continuous use. The loss that results from improper care of good soils is greater than from improper care of poor soils, since the former are more valuable. Nevertheless, it is highly important to give the best possible care to all soils, and particularly to the best soils. This is one of the first essentials of good farming methods.

II. In the second column select the words and the word combinations equivalent to those in the first one.

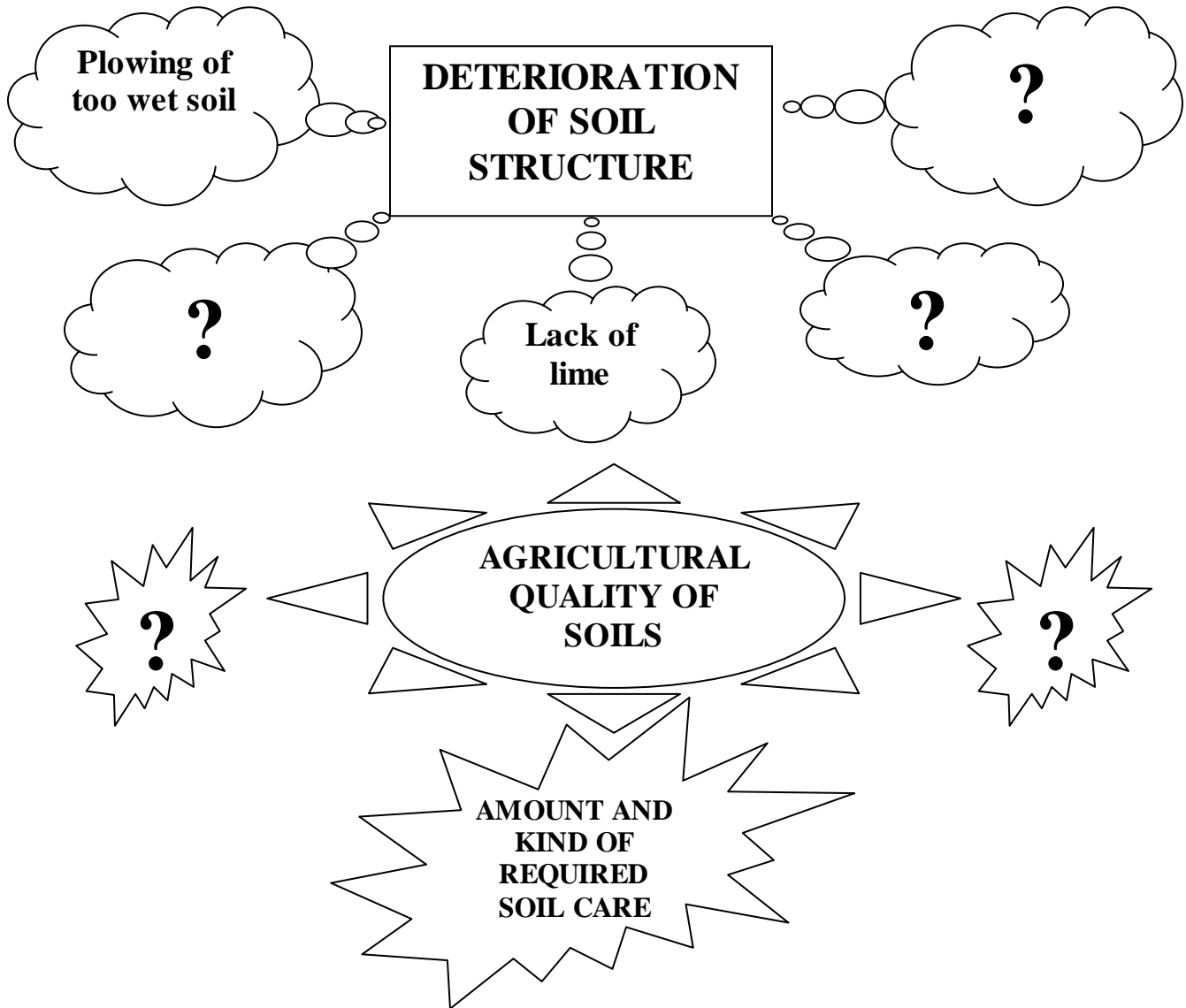
- | | |
|-------------------------|--------------------------------|
| 1. effective protection | 1. ретельна обробка |
| 2. lack of lime | 2. чергування культур |
| 3. virgin soils | 3. велике різноманіття |
| 4. alternating of crops | 4. незайманні ґрунти |
| 5. great variation | 5. ефективний захист |
| 6. quality of soils | 6. недостача вапна |
| 7. crop rotation | 7. бідні врожаї |
| 8. decreased yields | 8. чергування зернових культур |
| 9. careful handling | 9. якість ґрунтів |

III. Complete each sentence with a word or phrase from the box

- | |
|--|
| 1. the deterioration of soil structure |
| 2. crop rotation |
| 3. Without good care |
| 4. they are put to diverse uses. |
| 5. pastures or timberlands. |
| 6. virgin soils |

1. ... all crop land deteriorates with continuous use.
2. Changes in the nature of soils cannot be avoided as ...
3. The systematic alternating of crops from field to field is known as ...
4. In most instances, the better soils are used for crops, and the less suitable ones are kept for ...
5. Time makes little change in ...
6. Improper use may result in ...

IV. Fill in the blanks in the given figures, explain the reasons of deterioration of soil structure and name the properties for improvement of agricultural quality of soils.



V. Give the name to each paragraph of the text.

VI. Read and understand this text without dictionary.

ROTATIONS

A rotation is a succession of crops usually fixed in a certain definite order. Nowadays rotations are not so fixed as before. To meet the changing conditions and the needs of the market, new crops can be introduced into rotations and changes made

when and where needed.

The opposite of a rotation is to grow one crop year after year. This is known as monoculture and can lead to troubles, particularly disease. The one crop, which can be grown in this way, is grass; permanent grass, if farmed properly, can be productive for a long time.

GRAMMAR EXERCISES

I. Put up four questions of different types (general, special, disjunctive, alternative) to each sentence.

Model: *Good soils respond well to proper management.*

1) *Do good soils respond well to proper management?*

2) *What do good soils respond well to?*

3) *Good soils respond well to proper management, don't they?*

4) *Do good soils respond well to proper management or good care?*

1. A good rotation system consists of adjusting the crop arrangement to the physical nature of the land.
2. There has always been great variation in the quality of soils available for agriculture.
3. Rotation and diversification go hand in hand.
4. Legumes return nitrogen to the soil
5. Time makes little change in virgin soils.
6. Improper soil use may result in the deterioration of soil structure.

II. Put the verbs in brackets into the appropriate form and explain the usage of that form in the sentence.

1. There (*to be*) always great variation in the quality of soils available for agriculture. 2. Rotation (*to imply*) the growing of more than one crop on a farm. 3. But when soils (*to be used*) for crops or pasture, the balance that nature (*to give*) them (*to be*) upset in various ways and to varying degrees. 4. Frequently, however, soil use (*to result*) in soil damage and decreased yields. 5. Without good care all crop land (*to deteriorate*) with continuous use.

III. Make the sentences of the exercise II negative.

Wordlist

inherent fertility	природна родючість	естественное плодородие
bulky	велика кількість	большое количество
manure	гній	навоз
furnish	забезпечити	снабдить (поставить)
amenable	той, що піддається	поддающийся
ameliorate	підвищити якість	повысить качество
farmyard	фермерський двір	фермерский двор, скотный двор

potassium	калій	калий
soluble	розчинний	растворимый
compound	склад	состав
break down	розпадатися	распадаться
moisture-holding capacity	здатність утримувати вологу	способность удержания влажности
drought resistance	посухостійкість	засухоустойчивость
binding effect	ефект зв'язування	эффект связывания
incorporation	асиміляція	ассимиляция
base-exchange capacity	ємність катіонового обміну	емкость катионного обмена

I. Read the text and find out the paragraphs about the results of using combined fertilizers.

FERTILIZATION

In spite of the increasing use of synthetic fertilizers in agricultural practice and the subsequent raise of crop yields, it is found generally that, to maintain a high level of *inherent fertility*, their use must be accompanied by periodic applications of *bulky* organic *manure*, either in the form of farm manure, compost, or other organic by-product, either of the farm or of certain industries.

The maintenance of high productivity depends on a number of factors: the soil must be in the optimum condition for crop growth and must be in a position to *furnish* both food and water; it must have a suitable reaction in the chemical sense, and it must contain no substances toxic to growth. It must be physically *amenable* to cultivation, resistant to forces of erosion, and the micro-flora and micro-fauna must be of a character to *ameliorate* the general chemical and physical properties of the soil and the soil-plant relationship. Any substance which when added to the soil brings about an improvement in any one of those directions could be considered as a fertilizer or manure using the terms in their widest sense, and it is in connection with these indirect benefits that organic manures are of such great importance in fertilizer practice.

As a source of plant food, *farmyard* manure contains all the important nutrients although their availability is variable. The *potassium* present is readily *soluble* and immediately available; the nitrogen is present in both available forms, and in *compounds*, which only slowly *break down*; the phosphate compounds also decompose slowly.

Whatever the type of soil, applications of manure can have a beneficial action upon the physical properties. Heavy soils can be made easier to work, and the aeration and drainage improved by means of the increased organic-matter content, whilst on sandy soils the *moisture-holding capacity* of the manure increases *drought resistance*, the *binding effect* of the organic matter controls erosion and the increased *base-exchange capacity* improves the power of the soil to retain plant nutrients. Soil

colour will be darkened by the *incorporation* of humus, with an increase in the heat-absorbing power.

II. Find in the text the words with the similar meaning.

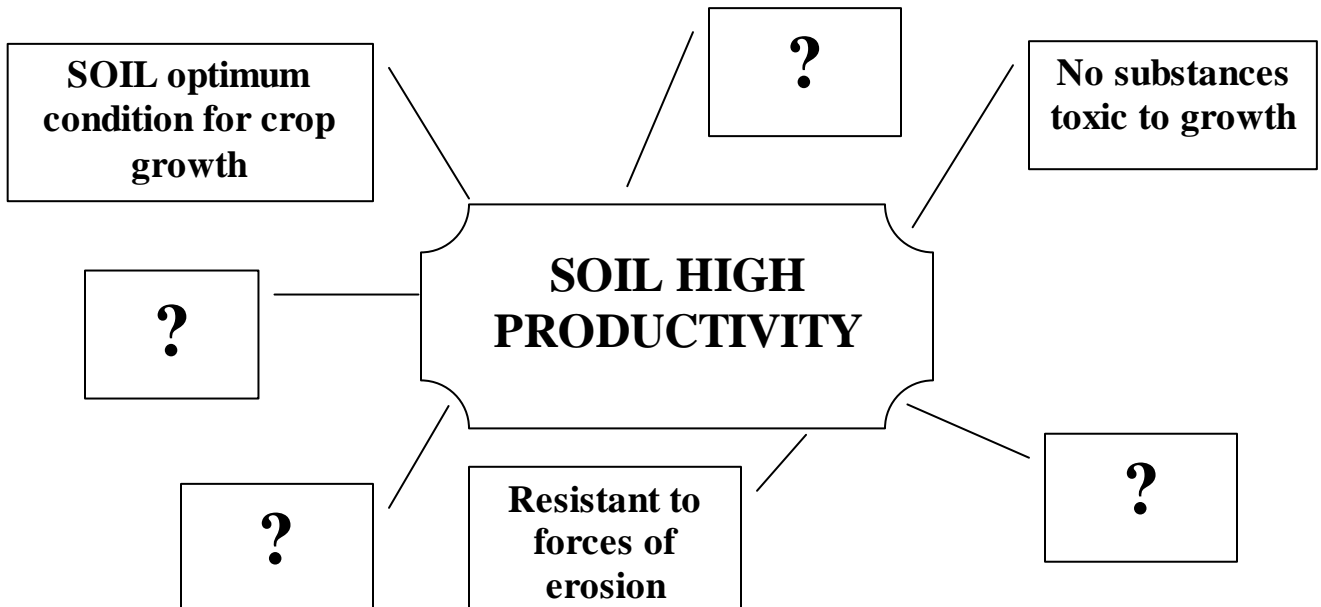
to check erosion, decrease in yields, to keep high fertility, to break down, to add, especially, the following crop

III. Find in the text all international words and translate them.

IV. In the second column select the words and the word combinations equivalent to those in the first one.

- | | |
|-----------------------------------|--------------------------------|
| 1. moisture-holding capacity | 1. піщані ґрунти |
| 2. heavy soils | 2. стійловий гній |
| 3. nutrients | 3. природна родючість |
| 4. resistant to forces of erosion | 4. урожайність |
| 5. organic manure | 5. стійкий до ерозії |
| 6. crop yields | 6. важкі ґрунти |
| 7. synthetic fertilizers | 7. здібність утримувати вологу |
| 8. inherent fertility | 8. поживні речовини |
| 9. physically amenable | 9. органічний гній |
| 10. farmyard manure | 10. синтетичні добрива |
| 11. beneficial action | 11. той, що піддається фізично |
| 12. sandy soils | 12. вигідне діяння |

V. Fill in the blanks in the given figures, explain the necessity of the soil fertilization.



VI. Answer the following questions:

1. How is it possible to maintain the high level of inherent fertility?
2. What factors does the maintenance of high soil productivity depend on?

3. What substance could be considered as a fertilizer or manure?
4. What important nutrients does farmyard manure contain?
5. What are the effects of the manure application for heavy and sandy soils?

VII. Read the text without the dictionary, divide it for paragraphs and give the name to each paragraph.

APPLICATION OF FERTILIZERS

Fertilizer must be put into the seedbed, where it will do most good to the young plant as it grows. This is done in two ways: a) fertilizer is spread on the seed-bed before the seed is sown and usually harrowed in; b) fertilizer is put in at the same time as the seed and usually near to it in the soil. Top-dressing means putting a fertilizer onto a growing crop. It is commonly done with nitrogen fertilizers on growing grain crops such as a spring dressing of sulphate of ammonia for a crop of winter wheat. If the nitrogen had been applied in the seedbed, most of it would be washed out during the winter. Lime and plant foods in fertilizers are not all used up in the year they are applied to the land. Some of the value is left over for a year or more and helps later crops.

GRAMMAR EXERCISES

I. Put up four questions of different types (general, special, disjunctive, alternative) to each sentence.

Model: *Farmyard manure contains all the important nutrients.*

- 1) *Does farmyard manure contain all the important nutrients?*
- 2) *What does farmyard manure contain?*
- 3) *Farmyard manure contains all the important nutrients, doesn't it?*
- 4) *Does farmyard manure or chemical fertilizer contain all the important nutrients?*

1. Soil must have a suitable reaction in the chemical sense.
2. Soil must contain no substances toxic to growth.
3. The potassium present is readily soluble and immediately available.
4. Applications of manure can have a beneficial action upon the physical properties.
5. Soil colour will be darkened by the incorporation of humus.

II. Put the verbs in brackets into the appropriate form and explain the usage of that form in the sentence.

1. The maintenance of high productivity (*to depend*) on a number of factors.

2. Applications of manure (*can, to have*) a beneficial action upon the physical properties. 3. The aeration and drainage (*to improve*) by means of the increased organic-matter content. 4. On sandy soils the moisture-holding capacity of the manure (*to increase*) drought resistance. 5. The binding effect of the organic matter (*to control*) erosion.

III. Make the sentences of the exercise II negative.

UNIT 4

Wordlist

plant	рослина	растение
animal	тварина	животное
cell	клітина	клетка
unicellular organisms	одноклітинні організми	одноклеточные организмы
protozoan	найпростіше	простейшее (животное)
evolve	еволюціонувати	развиваться, эволюционировать
tissue	тканина	ткань
DNA	ДНК	ДНК
prokaryote	прокаріот	прокариот
segregate	відокремлювати	отделять, изолировать
nucleus	ядро	ядро
eukaryote	еукаріот	эукариот
RNA	рибонуклеїнова кислота	рибонуклеиновая кислота
adenosine triphosphate	трифосфат аденозину	трифосфат аденозина
double layer	подвійний пласт	двойной слой
plant kingdom	світ рослин	мир растений
algae	морські водорості	морские водоросли
stimuli	стимули	стимулы
rigid	твердий	твердый
adult	дорослий	взрослый
meristem tissue	тканина меристеми	ткань меристемы
root	коріння	корень
stem tip	верхівка стебла	верхушка стебля
bud	брунька	почка

I. Read the text and answers the following questions:

1. What is the cell?
2. How can cells be separated?
3. What is the difference between prokaryotes and eukaryotes?
4. What are the common properties of all cells?
5. What are the main distinguishing indications between plants and animals?

CELL AND PLANT

Cell, in biology, the unit of structure and function of which all *plants* and *animals* are composed. The *cell* is the smallest unit in the living organism that is capable of integrating the essential life processes. There are many *unicellular organisms*, e.g., bacteria and *protozoans*, in which the single cell performs all life functions. In higher organisms, a division of labor has *evolved* in which groups of cells have differentiated into specialized *tissues*, which in turn are grouped into organs and organ systems.

Cells can be separated into two major groups—*prokaryotes*, cells whose *DNA* is not *segregated* within a well-defined *nucleus* surrounded by a membranous nuclear envelope, and *eukaryotes*, those with a membrane-enveloped nucleus. The bacteria are prokaryotes. They are smaller in size and simpler in internal structure than eukaryotes and are believed to have evolved much earlier. All organisms other than bacteria consist of one or more eukaryotic cells.

All cells share a number of common properties: they store information in genes made of DNA; they use proteins as their main structural material; they synthesize proteins in the cell's ribosomes using the information encoded in the DNA and mobilized by means of *RNA*; they use *adenosine triphosphate* as the means of transferring energy for the cell's internal processes; and they are enclosed by a cell membrane, composed of proteins and a *double layer* of lipid molecules, that controls the flow of materials into and out of the cell.

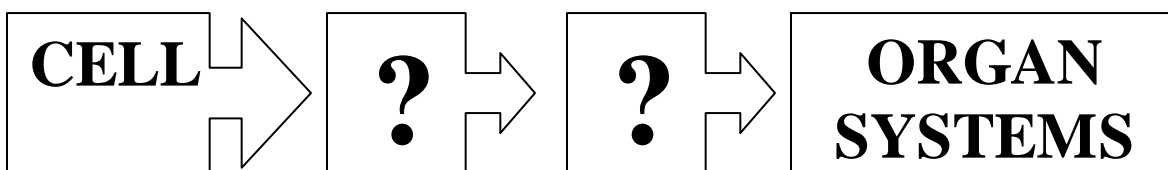
Any organism of the *plant kingdom*, as opposed to one of the animal kingdom. A plant may be microscopic in size and simple in structure, as are certain one-celled *algae*, or a gigantic, many-celled complex system, such as a tree.

Plants are generally distinguished from animals in that they possess chlorophyll, are usually fixed in one place, have no nervous system or sensory organs and hence respond slowly to *stimuli*, and have *rigid* supporting cell walls containing cellulose. In addition, plants grow continually throughout life and have no maximum size or characteristic form in the *adult*, as do animals. In higher plants the *meristem tissues* in the *root* and *stem tips*, in the *buds*, and in the cambium are areas of active growth. Plants also differ from animals in the internal structure of the cell and in certain details of reproduction.

II. Find the words in the text, which correspond to the following definitions.

1. ...- molecules, that controls the flow of materials into and out of the cell.
2. ...- cells whose DNA is not segregated within a well-defined nucleus surrounded by a membranous nuclear envelope.
3. ...- the unit of structure and function of which all plants and animals are composed.
4. ...- cells with a membrane-enveloped nucleus.

III. Using the text “Cell and Plant” fill in the blanks in the given figures and explain the evolution of cell into organ systems.



IV. Name a word or a word combination, which is not a part of the logical group.

1. unicellular organisms, genes, bacteria and protozoans;
2. prokaryotes, eukaryotes, adenosine triphosphate;
3. meristem tissues, root, stem tips, buds, chlorophyll

V. Using this table correct answer concerning the availability of the distinguishing indications for plants and animals if it's necessary.

INDICATIONS	PLANTS	ANIMALS
possession of chlorophyll	NO	NO
usually fixed in one place	YES	NO
nervous system	YES	NO
sensory organs	NO	YES
respond slowly to stimuli	NO	YES
rigid supporting cell walls containing cellulose	YES	NO
grow continually throughout life	NO	YES
have no maximum size	NO	NO
have no characteristic form in the adult	NO	YES

VI. Find out the mistakes in the computer translation of the following passage from the text "Cell and Plant".

Ячейки могут быть отделены в две главных группы-prokaryotes, ячейки, чей DNA - не отдельный(выделен) в пределах четкого ядра, окруженного мембранной ядерной оболочкой, и eukaryotes, те с окутанным мембраной ядром. Бактерии - prokaryotes. Они меньше в размере и более просты во внутренней структуре чем eukaryotes и верит, чтобы развиться намного ранее. Все организмы другие чем бактерии состоят из один или более eukaryotic ячейки.

Все ячейки разделяют множество общих(обычных) свойств: они хранят информацию в генах, сделанных DNA; они используют белки как их главный структурный материал; они синтезируют белки в рибосомах ячейки, использующих информацию, кодируемую в DNA и мобилизованный посредством РИБОНУКЛЕИНОВОЙ КИСЛОТЫ; они используют adenosine triphosphate как средства передачи энергии для внутренних процессов ячейки; и они приложены мембраной ячейки, составлены белков и двойного слоя молекул липида, который управляет потоком материалов из ячейки.

GRAMMAR EXERCISES

I. Put up four questions of different types (general, special, disjunctive, alternative) to each sentence.

Model: *Plants grow continually throughout life.*

1) *Do plants grow continually throughout life?*

2) *How do plants grow?*

3) *Plants grow continually throughout life, don't they?*

4) *Do plants grow continually throughout life or during some periods of their life?*

1. The cell is the smallest unit in the living organism.
2. Cells can be separated into two major groups—prokaryotes and eukaryotes.
3. The bacteria are prokaryotes.
4. All organisms other than bacteria consist of one or more eukaryotic cells.
5. Cells store information in genes made of DNA.
6. Cells use proteins as their main structural material.

II. Put the verbs in brackets into the appropriate form and explain the usage of that form in the sentence.

1. Cell, in biology, the unit of structure and function of which all plants and animals (*to compose*). 2. There (*to be*) many unicellular organisms, e.g., bacteria and protozoans. 3. DNA of prokaryotes' cells (*not to segregate*) within a well-defined nucleus surrounded by a membranous nuclear envelope, 4. Eukaryotes (*to have*) a membrane-enveloped nucleus. 5. All organisms other than bacteria (*to consist*) of one or more eukaryotic cells. 6. All cells (*to share*) a number of common properties 7. Plants generally (*to distinguish*) from animals in that they possess chlorophyll.

III. Make the sentences of the exercise II negative.

Wordlist

fossil	скам'янілість	окаменелость
comparison	порівняння	сравнение
nucleic acid sequence	нуклеїново-кислотна	нуклеиновая кислотная
	последовність	последовательность
clarify	роз'яснювати	разъяснять
thallophytes	таллофіт	таллофит, талломное (слоевищное) растение
embryo	ембріон	эмбрион
alternating	той, що чергується	чередующийся
undifferentiated thallus	недиференційований	недифференцированный

lacking	талом	таллом, слоевище
stem	тут: той, що не має стебло	зд.: не имеющий стебель
leave	лист	лист
fungi	грибок, пліснява	грибок, плесень
embryophyte	ембріофіт	эмбриофит
vascular tissues	судинні тканини	сосудистые ткани
moist	сирий	сырой
xylem	ксилема	ксилема
phloem	флоема	флоэма, луб
inhabit	обживати	обитать
species	вид, рід, порода	вид, род, порода
club moss	плаун	плаун
horsetail	хвощ	хвощ
extinct	зниклий	исчезнувший
fern	папоротник	папоротник
cone-bearing gymnosperms	голонасінні	голосемянные
angiosperms	покритонасінні	покрытосемянные
		растения
true flowering plants	справжні квіткові рослини	истинные цветковые растения
seed	насіння	семя
spermatophyte	насіннева рослина	семенное растение
perennial	багаторічний	многолетний
order	порядок	отряд
conifer	хвойне (дерево)	хвойное (дерево)
ginkgo	гінкго	гинкго
cycad	саговник	саговник
monocotyledonous plants	однодольна рослина	однодольные растения
cotyledon	насіння-доля	семя-доля
scattered	розкидані	рассеянный
vascular bundles	судинні пучки	сосудистые пучки
vein	жилка	жилка
dicotyledonous plants	дводольна рослина	двудольные растения
cattail	очерет	камыш
tiny herbs	невеличка трава	крошечные травы
ornamental	декоративна рослина	декоративное растение

I. Read the text and answers the following questions:

1. How can we clarify the relationships among plants nowadays?
2. What large groups was the plant kingdom traditionally divided into?
3. What is the common and different between thallophytes and embryophytes?
4. What groups are embryophytes composed of?
5. What are the main parts of the vascular plants?

THE PLANT KINGDOM

The systems of classification of the plant kingdom vary in naming and placing the larger categories because there is little reliable *fossil* evidence, as there is in the case of animals, to establish the true evolutionary relationships of and distances between these groups. However, *comparisons of nucleic acid sequences* in plants are now serving to *clarify* such relationships among plants as well as other organisms.

The plant kingdom traditionally was divided into two large groups, or subkingdoms, based chiefly on reproductive structure. These are the *thallophytes*, which do not form *embryos*, and the embryophytes, which do. All embryophytes and most thallophytes have a life cycle in which there are two *alternating* generations. The plant form of the thallophytes is an *undifferentiated thallus lacking* true roots, *stems*, and *leaves*. The *thallophytes* are composed of more than 10 divisions of algae and *fungi*. The embryophytes are composed of two groups: the bryophytes, which have no *vascular tissues*, and a group consisting of seven divisions of plants that do have vascular tissues.

The vascular plants have true roots, stems, and leaves and a well-developed vascular system composed of *xylem* and *phloem* for transporting water and food throughout the plant; they are therefore able to *inhabit* land. Three of the divisions of the vascular plants are currently represented by only a very few *species*. They are the *Psilotophyta*, with only three living species; the *Lycopodiophyta* (*club mosses*); and the *Equisetophyta* (*horsetails*). All the plants of a fourth subdivision, the *Rhyniophyta*, are *extinct*. The remaining divisions include the dominant vegetation of the earth today: the *ferns*, the *cone-bearing gymnosperms*, and the *angiosperms*, or *true flowering plants*. The latter two classes, because they both bear *seeds*, are often collectively called *spermatophytes*, or seed plants.

The gymnosperms are all woody *perennial* plants and include several *orders*, of which most important are the *conifer*, the *ginkgo*, and the *cycad*. The angiosperms are separated into the *monocotyledonous plants*—usually with one *cotyledon* per seed, *scattered vascular bundles* in the stem, little or no cambium, and parallel *veins* in the leaf—and the *dicotyledonous plants*—which as a rule have two cotyledons per seed, cylindrical vascular bundles in a regular pattern, a cambium, and net-veined leaves. There are some 50,000 species of monocotyledon, including the grasses (e.g., bamboo and such cereals as corn, rice, and wheat), *cattails*, lilies, bananas, and orchids. The dicotyledons contain nearly 200,000 species of plant, from *tiny herbs* to great trees; this enormously varied group includes the majority of plants cultivated as *ornamentals* and for vegetables and fruit.

II. In the second column select the words and the word combinations equivalent to those in the first one.

- | | |
|---------------------------------|---------------------|
| 1. cylindrical vascular bundles | 1. паралельні жилки |
| 2. woody perennial plants | 2. судинна система |
| 3. dominant vegetation | 3. світ рослин |

- | | |
|------------------------------|--------------------------------|
| 4. vascular tissues | 4. репродуктивна структура |
| 5. reproductive structure | 5. домінуюча рослинність |
| 6. systems of classification | 6. циліндричні судинні пучки |
| 7. plant kingdom | 7. деревні багаторічні рослини |
| 8. life cycle | 8. провідні (судинні) тканини |
| 9. vascular system | 9. системи класифікації |
| 10. seed plants | 10. життєвий цикл |
| 11. parallel veins | 11. насінневі рослини |

III. Find the words in the text, which correspond to the following definitions.

1. ... plants, which as a rule have two cotyledons per seed, cylindrical vascular bundles in a regular pattern, a cambium, and net-veined leaves.
2. The two classes of vascular plants, because they both bear seeds, are often collectively called
3. ... plants, which have no vascular tissues
4. ... plants, which form embryo.
5. is an undifferentiated thallus lacking true roots, stems, and leaves.
6. ... plants, which do not form embryo.
7. ... plants that do have vascular tissues.
8. ... plants usually with one cotyledon per seed, scattered vascular bundles in the stem, little or no cambium, and parallel veins in the leaf.

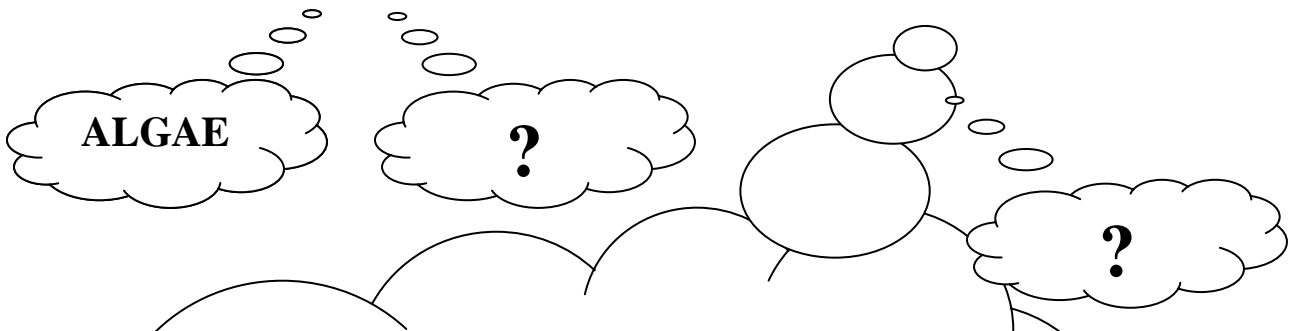
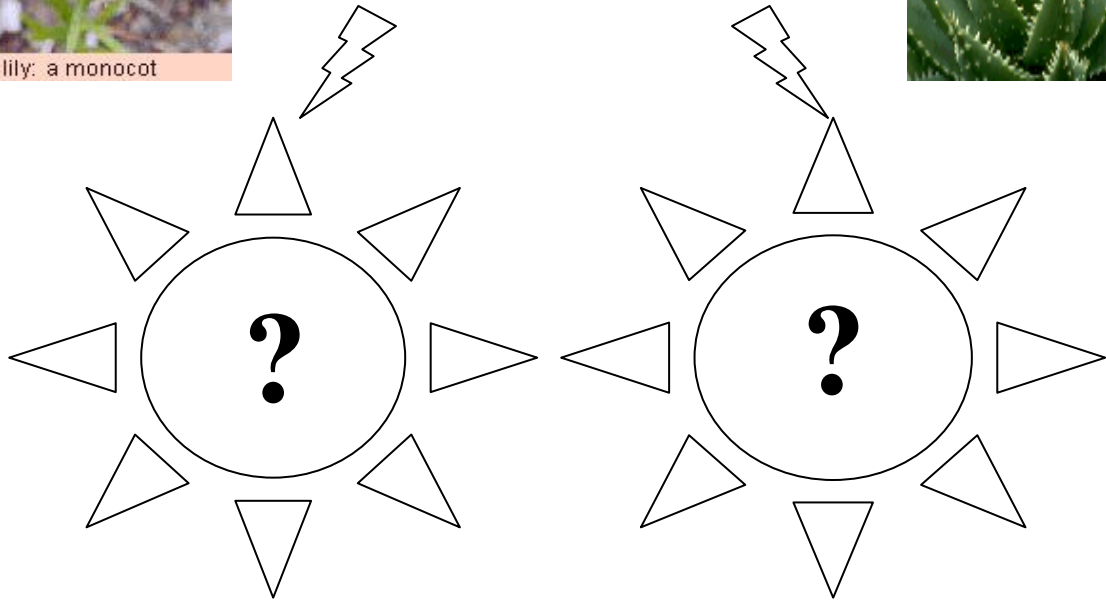
IV. Translate this text into English.

Усі рослини земної кулі поділяють на дві великі групи: нижчі рослини, або сланюваті (Thallophyta), і вищі — зародкові (Embryobionta, Embryophyta), або листостеблові (Cormophyta, Cormobionta). Хоч такий поділ рослин і не таксономічний, а умовний, проте він зручний і ним широко користуються. Вперше такий поділ рослин запропонував англійський ботанік Роберт Броун у 1827 р.

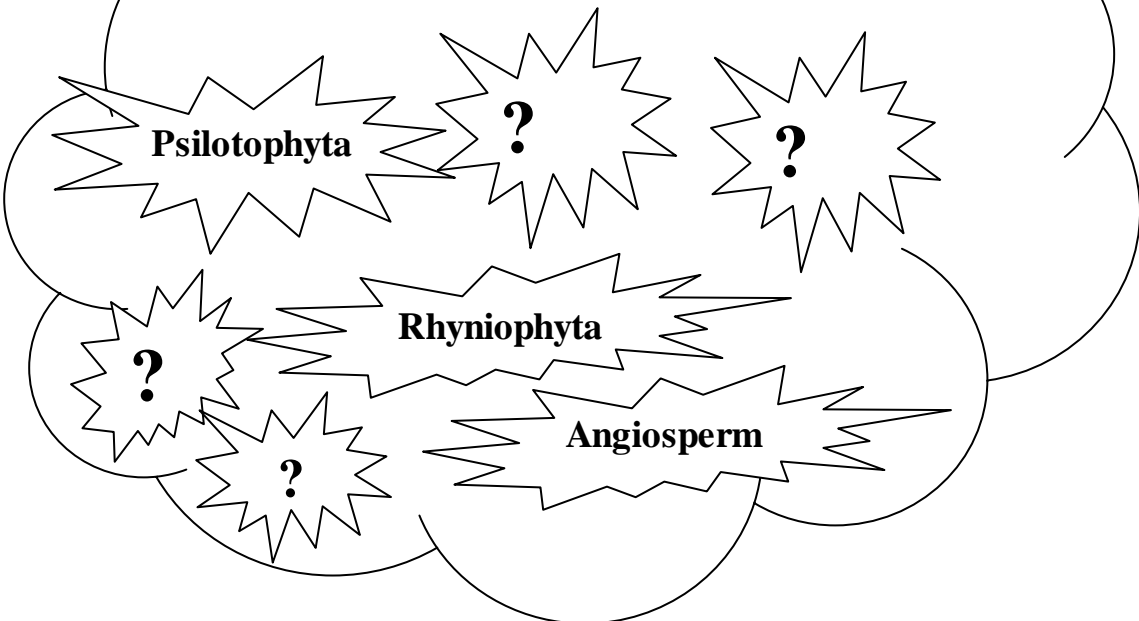
До вищих рослин належать відділи: Мохоподібні (мохи і печіночники), Риніофіти, Псилотоподібні, Плауноподібні, Хвощоподібні, Папоротеподібні, Голонасінні і Покритонасінні. Крім покритонасінних, усі інші групи вищих рослин — від мохоподібних до голонасінних включно — характеризуються наявністю багатоклітинного жіночого статевого органа, що називається архегонієм. Звідси виникла й спільна назва для цих груп вищих рослин — *архегоніати (Archegonlatae)*. Їх уперше виділили одночасно у 80-х роках ХІХ ст. відомий російський ботанік І. Горожанкін і німецький морфолог К. Гебель.

V. Fill in the blanks in the given figures, explain the plant classification.

PLANT KINGDOM



VASCULAR PLANTS



VI. Read the text without the dictionary and express the main its idea.

Gymnosperms have seeds but not fruits or flowers. *Gymnos* means naked, *sperm* means seed: gymnosperm = naked seeds. Gymnosperms developed during the Paleozoic Era and became dominant during the early Mesozoic Era. There are 700 living species placed into four divisions: conifers, cycads, ginkgos, and gnetales (such as *Ephedra*).

The ginkgos also were a much more prominent group in the past than they are today. The sole survivor of this once robust and diverse group is *Ginkgo biloba*, the maidenhair tree. Extensively used as an ornamental plant, *Ginkgo* was thought extinct in the wild until it was discovered growing natively in a remote area of China. Ginkos are dioecious, with separate male and female plants. The males are more commonly planted since the females produce seeds that have a nasty odor. Pollination is by wind. Recently, *Ginkgo* has become the current herbal rave.

VII. Read the following text and answer the questions:

1. What is taxonomy?
2. What is the difference between Carolus Linneus's and Robert Whittaker's classification of organisms?
3. What system do the most biologists employ now?

Taxonomy is that branch of biology dealing with the identification and naming of organisms. The ancient Greek philosopher Aristotle apparently began the discussion on taxonomy. British naturalist John Ray is credited with revising the concept of naming and describing organisms. During the 1700s, Swedish botanist Carolus Linneus classified all then-known organisms into two large groups: the kingdoms Plantae and Animalia. Robert Whittaker in 1969 proposed five kingdoms: Plantae, Animalia, Fungi, Protista, and Bacteria. Other schemes involving an even greater number of kingdoms have lately been proposed, however most biologists employ Whittaker's five kingdoms.

VIII. Translate this text into English.

1. Систематика, або таксономія, вищих рослин має основним завданням класифікацію їх, тобто розміщення в більш або менш близькі однорідні групи на основі спорідненості. 2. У системі вищих рослин ці групи розміщуються (класифікуються) в серію підпорядкованих споріднених таксонів, яких сучасна систематика налічує до 25. 3. Основні систематичні одиниці, або таксони, якими оперує нині систематика вищих рослин, такі, як *відділ (divisio, або phylum)*; відділи поділяють на *класи (classis)*, класи — на *порядки (ordo)*, порядки — на *родини (familia)*, родини — на *роду (genus)*, роди — на *види (species)*. 4. Кожний

З цих таксонів можна поділити, якщо треба, на дрібніші, проміжні, скориставшись префіксом *під-(sub)*. Наприклад, *підвідділ (subdivisio)*, *підклас (subclassis)*, *підродина (subfamilia)*, *підрід (subgenus)* тощо.

IX. Using the text “The Plant Kingdom” and exercises VII and VIII complete the following table and explain the organisms’ classification employing Whittaker’s five kingdoms.

5 KINGDOMS

BACTERIA				
?	Algae	Protozoans		
FUNGI	Zygomycota	Basidiomycota		
?	Nonvascular Seedless		Bryophyta	
	Vascular Seedless		Pretophyta	
	Vascular Seed	Gymnosperms	Coniferophyta	
			Ginkgophyta	
		?	Anthophyta	
			Monocotyledones	
		?		
ANIMALIA				

X. Read the text without the dictionary and answer the following questions:

1. What plants were the first on our planet?
2. Why are ferns, club-mosses, and horsetails called as the seedless vascular plants?
3. What is the difference between gymnosperms and angiosperms?
4. What does "Gymnos" mean?
5. What does angio mean?
6. What main parts are seeds composed of?
7. What are the main groups of angiosperms?

PLANT EVOLUTION

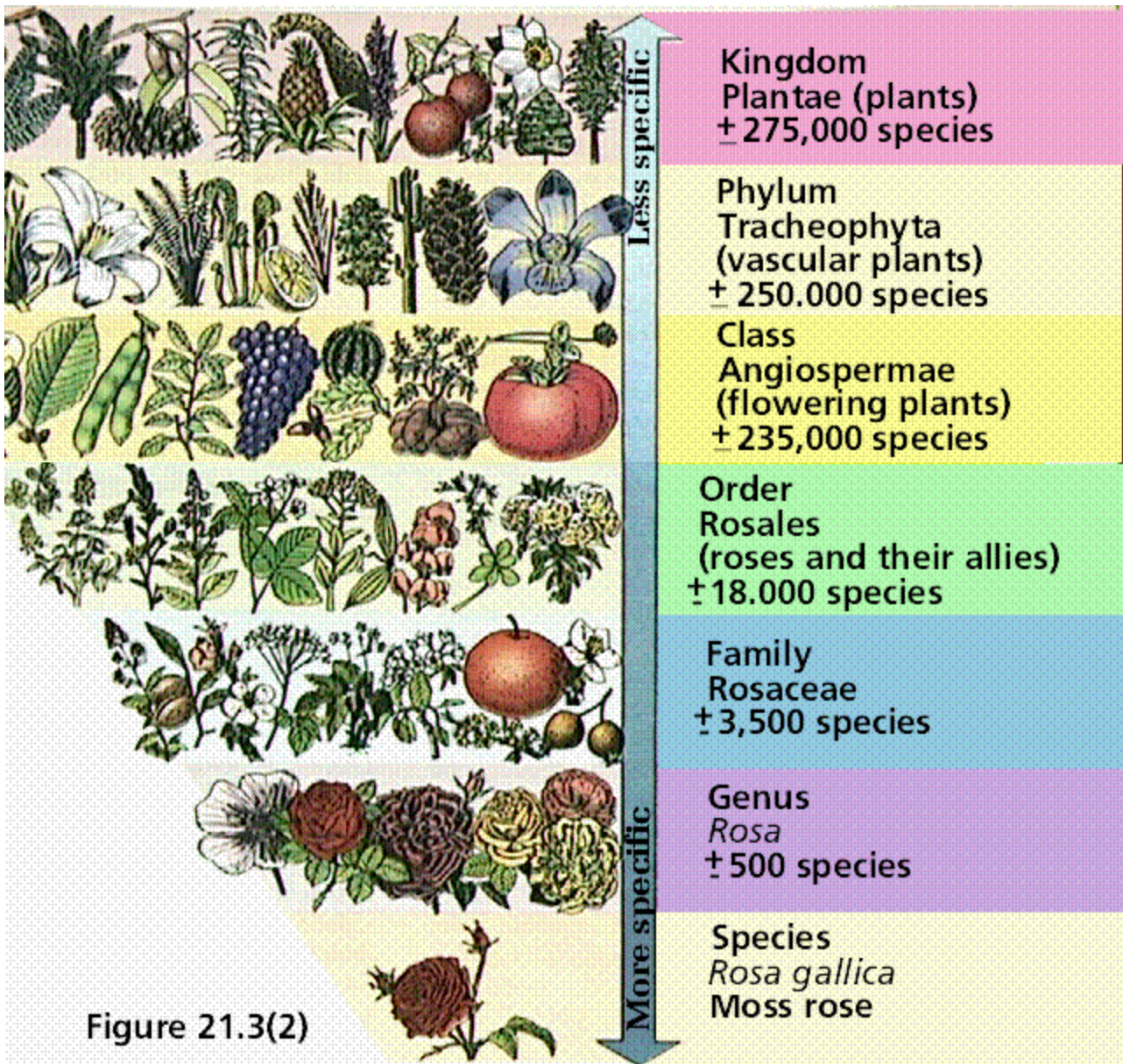
The first terrestrial plants to evolve, over 400 million years ago during the Paleozoic, were **Bryophytes** such as mosses (мохи). These show some of the first adaptations to land, including a waxy cuticle and enclosed gametangia (structures which produce gametes (статеві клітини) for sexual reproduction). All other plants developed vascular tissue, which transports water and nutrients throughout the plant.

The **seedless vascular plants** include ferns (папоротники), club-mosses (плауни), and horsetails (хвощі). They reproduce by spores and have vascular tissues. All other plants developed seeds for reproduction.

The **gymnosperms** include conifers and cycads. Gymnosperms have vascular tissue and reproduce with seeds. "Gymnos" means "naked" in Greek, and the seeds of gymnosperms do not have a special chamber enclosing them, in contrast with the angiosperms. Christmas trees, which are usually spruce (ялина) or pine (pine is the "no-shed" Christmas tree), are conifers.

The **angiosperms**, or flowering plants, include most obvious plants, from an oak (дуб) tree to the pansies (фіалки). Angio means container in Greek, and the angiosperms have developed flowers around the protective chamber called the ovary which, when the egg is fertilized, produces the seed. Seeds are composed of an embryo together with a food supply for its early development, inside a protective seed coat. Seed coats protect the embryo from threats such as drought and fire, and some species seeds can remain viable (able to develop) for many years in the soil. Angiosperms also have vascular tissue. This group, which numbers about 235,000 species, is further divided into monocots, such as daffodils, grass, and tropical palm trees, and dicots (or eudichots), such as beech trees, violets, and daisies.

XI. Using the following figure make the classification of Moss Rose.



UNIT 5

Wordlist

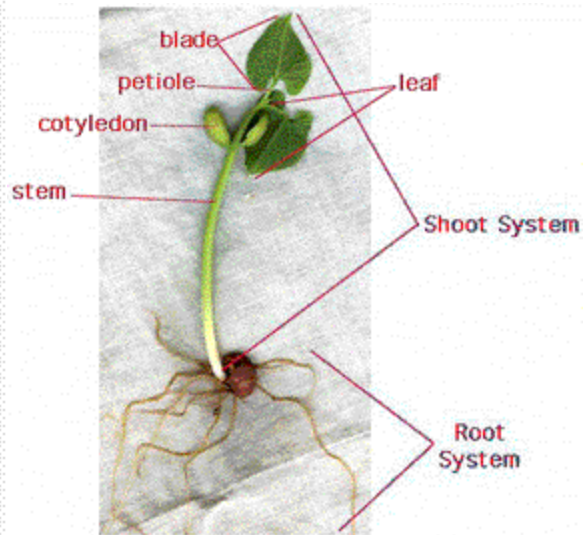
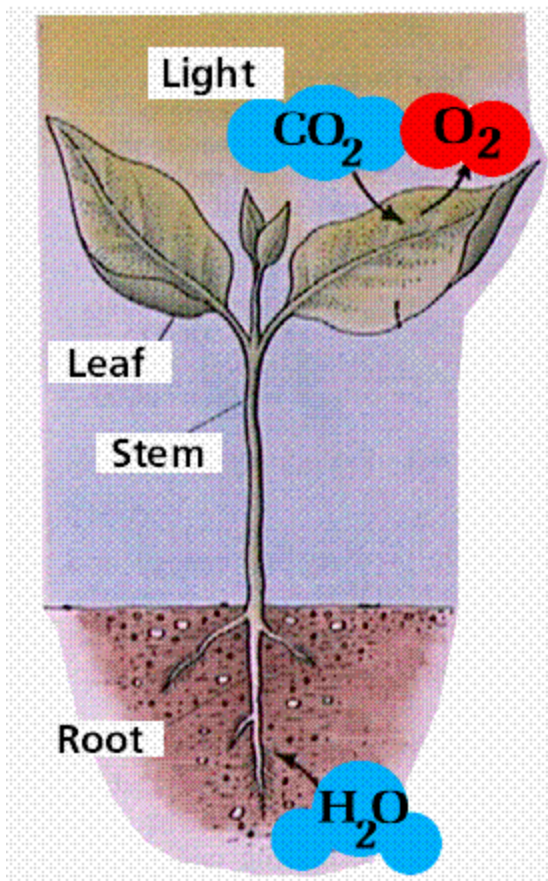
shoot system	вегетативна система	вегетативная система
root system	коренева система	корневая система
bud	брунька	почка
stem	стебло	стебель
tuber	бульба	клубень
rhizome	кореневище	корневище
meristem	меристема	меристема, образовательная ткань
tissue	тканина	ткань
dermal	шкіряний	кожный
ground	покровний	покровный
vascular	судинний	васкулярный, сосудистый
waxy cuticle	воскова кутикула	восковая кутикула

I. Read the text and find out the main parts of plant.

General Plant Organization

A plant has two organ systems: 1) the *shoot system*, and 2) the *root system*. The shoot system is above ground and includes the organs such as leaves, *buds*, *stems*, flowers (if the plant has any), and fruits (if the plant has any). The root system includes those parts of the plant below ground, such as the roots, *tubers*, and *rhizomes*.

Plant cells are formed at *meristems*, and then develop into cell types which are grouped into *tissues*. Plants have only three tissue types: 1) *Dermal*; 2) *Ground*; and 3) *Vascular*. Dermal tissue covers the outer surface of herbaceous plants. Dermal tissue is composed of epidermal cells, closely packed cells that secrete a *waxy cuticle* that aids in the prevention of water loss. The ground tissue comprises the bulk of the primary plant body. Vascular tissue transports food, water, hormones and minerals within the plant.



Major organ systems of the plant body.

II. Using the wordlist read the text and name each paragraph.

ROOT SYSTEM

Wordlist

ascending axis
 dissolve
 anchor
 tap-root system
 diffuse
 slender
 parsnip
 dandelion
 alfalfa
 ramified
 tip
 meristematic tissue
 thrust
 split

вісь зростання
 розпущений
 закріплювати
 система головного коріння
 розкиданий
 тонкий
 пастернак посівний
 кульбаба
 люцерна
 розгалужений
 кінчик
 меристематична тканина
 поштовх
 розколювати

ось виростаючого
 розпущений
 укріплять
 система головного корня
 розбросаний
 тонкий
 пастернак посівний
 одуванчик
 люцерна
 розгалужений
 кінчик
 меристематична тканина
 толчок
 раскалывать

Root, in botany, the descending axis of a plant, as contrasted with the stem, the *ascending axis*. In most plants the root is underground. Roots function to absorb water and *dissolved* minerals from the soil, to transport water and nutrients, to *anchor* the plant, and often to store food.

There are two main types of root system: the *tap-root system*, in which there is a main primary root larger than the other branching roots; and the *diffuse* (or fibrous) root system, in which there are many *slender* roots with numerous smaller root branches. *Tap roots* are characteristic of most trees and of many other plants, including the carrot, *parsnip*, radish, beet, and *dandelion*. The grasses (e.g., corn, rye, and *alfalfa*) have diffuse roots; in the sweet potato some of the larger fibrous roots swell to store food—although these should not be confused with the tuber of the Irish potato, which is a modified underground stem.

Root systems often far exceed in mass the aboveground portions of the plant: alfalfa roots sometimes reach 40 ft (12 m) in length, and the combined length of all the roots of a mature rye plant has been measured at 612 km. These *ramified* root systems are important agents in preventing soil erosion. Roots grow primarily in length; only the older roots may develop a cambium layer that increases their diameter.

Protecting the constantly growing *tip* of the root is a cap of cells that break off as the root probes through the soil; they are replaced by new cells from a layer of *meristematic tissue* just behind them. Although root hairs are less than 1/3 in. (.84 cm) long, their great number enables the plant to collect enormous quantities of water, most of which is promptly lost into the air by transpiration. In spite of their *slenderness* and delicate structure, the spiraling forward *thrust* of the root tips and the pressure of their expanding cells is sufficient to *split* solid rock.

III. Answer the following questions.

1. What are roots functions?
2. What two main types of root system do you know?
3. How do roots grow?
4. What is a function of the root tip?

IV. Complete each sentence with a word or phrase from the text.

1. Roots grow primarily...
2. ...in which there is a main primary root larger than the other branching roots
3. ...the descending axis of a plant, as contrasted with the stem, the ascending axis.
4. ...comprises the bulk of the primary plant body.
5. Plant cells are formed at meristems, and then develop into...
6. ...is above ground and includes the organs such as leaves, buds, stems, flowers
7. ...includes those parts of the plant below ground.
8. ...covers the outer surface of herbaceous plants.
9. ...transports food, water, hormones and minerals within the plant.

10. ...to absorb water and dissolved minerals from the soil, to anchor the plant, and often to store food.
11. ...in which there are many slender roots with numerous smaller root branches.
12. In spite of their slenderness and delicate structure, the spiraling forward thrust of the root tips and the pressure of their expanding cells is sufficient...

V. In the second column select the words and the word combinations equivalent to those in the first one.

1.split	1.розпущений
2.ramified	2. кінчик
3.dissolve	3.система головного коріння
4.stem	4.брунька
5.root system	5.васкулярний, судинний
6.shoot system	6.розколювати
7.bud	7.розгалужений
8.vascular	8.стебло
9.tap-root system	9.вегетативна система
10.tip	10.коренева система

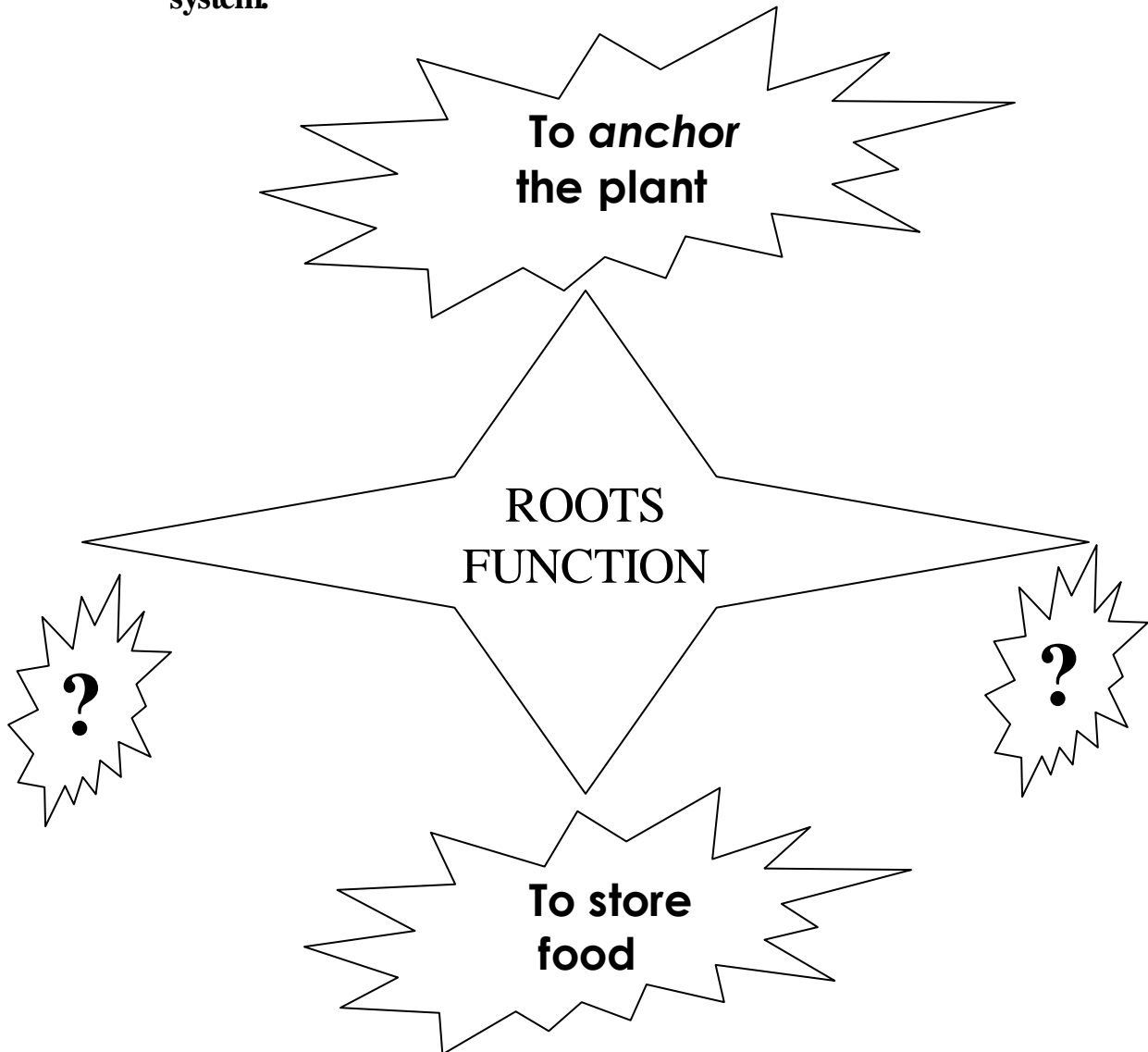
VI. Name a word or a word combination, which is not a part of the logical group.

1. Shoot system, root system, cell.
2. Dermal, Ground, Vascular, dandelion.
3. Tap-root system, diffuse (or fibrous) root system, taxonomy.

VII. The following sentences have mistakes. Correct them.

1. Protecting the constantly growing tip of the root is a head of cells.
2. Tap roots are characteristic of most grasses.
3. Roots function to dissolve minerals from the soil, to anchor the plant, and often to store water.
4. Plants have only two tissue types: 1) Dermal; 2) Ground.
5. The shoot system is under ground and includes the organs such as leaves, buds, stems, flowers (if the plant has any), and fruits and vegetables (if the plant has any).
6. The shoot system includes those parts of the plant below ground, such as the roots, tubers, and rhizomes.
7. Vascular tissue transports food, water, hormones and minerals outside the plant.
8. There are three main types of root system.
9. Roots grow primarily in width.

VIII. Fill in the blanks in the given figures, explain the main functions of root system.



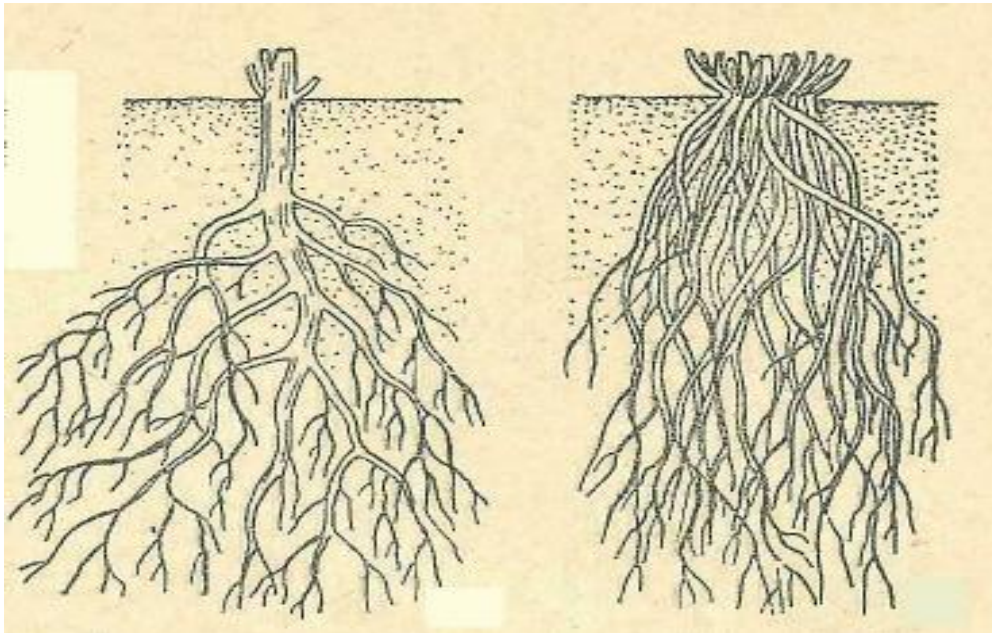
IX. Translate into English.

Корінь — вегетативний орган з необмеженим ростом, який забезпечує закріплення рослин у субстраті, поглинання і транспорт води та розчинених у ній мінеральних речовин та продуктів життєдіяльності ґрунтових мікроорганізмів і коренів інших рослин.

За формою розрізняють два типи кореневих систем: стрижневу і мичкувату. *Стрижнева* має добре виражений головний корінь, що займає в ґрунті вертикальне положення, від якого відходять бічні корені. Вона зустрічається у більшості дводольних рослин.

У *мичкуватій* системі всі корені майже однакові за розмірами, за походженням це додаткові корені, які пучком ростуть від основи стебла. Така система характерна для більшості однодольних рослин.

- X. Using the text “ROOT SYSTEM” describe the figures giving the main differences between two main types of root system.



GRAMMAR EXERCISES

- I. Put up four questions of different types (general, special, disjunctive, alternative) to each sentence.

Model: *In most plants the root is underground.*

- 1) *Is the root underground in most plants?*
- 2) *What root is in most plants?*
- 3) *In most plants the root is underground, isn't it?*
- 4) *Is the root underground or ground in most plants?*

1. There are two main types of root system.
2. There is a main primary root larger than the other branching roots in the tap-root system.
3. There are many slender roots with numerous smaller root branches in the diffuse (or fibrous) root system.
4. The grasses (e.g., corn, rye, and alfalfa) have diffuse roots.
5. Roots grow primarily in length.

- II. Put the verbs in brackets into the appropriate form and explain the usage of that form in the sentence.

1. The grasses (e.g., corn, rye, and alfalfa) (*to have*) diffuse roots 2. In the sweet potato some of the larger fibrous roots (*to swell*) to store food 3. Root systems often far (*to exceed*) in mass the aboveground portions of the plant. 4. These ramified root systems (*to be*) important agents in preventing soil erosion.

III. Make the sentences of the exercise II negative.

Wordlist

vegetative shoot	вегетативний пагон	вегетативный побег
floral shoot	квітковий пагон, квітконіжка	цветковый побег, цветоножка
stem	стебло	стебель
node	вузол	узел
internode	міжвузля	междоузлие
axillary bud	пазухова брунька	пазушная почка
apex	верхівка, кінчик стебла	верхушка, кончик стебля
terminal bud	верхівкова брунька	верхушечная почка
apical	апікальний	апикальный
exposure	розростання	разрастание
reproductive shoot	репродуктивний пагон	репродуктивный побег
vegetative branch	ростовий пагон	ростовая ветвь
flattened blade	гладка пластина	гладкая пластина
petiole	черешок	черешок

I. Read the text and answer the following questions:

1. What main parts does the shoot system consist of?
2. Where is shoot growth usually concentrated?
3. What is apical domination?
4. What difference between a reproductive shoot and a vegetative branch?
5. What do leaves in general consist of?
6. How is it possible to classify plants?

SHOOT SYSTEM

The shoot system consists of vegetative shoot (stem and attached leaves) and floral shoots terminating in flowers.

STEM

A stem has an alternation of nodes (points where leaves are attached) and internodes (the stem segments between nodes) and an axillary bud (the angle formed by each leaf and the stem). Shoot growth is usually concentrated at the apex of a shoot where there is a terminal bud with developing leaves and a compact series of nodes and internodes. The terminal bud plays a part in apical dominance, inhibiting the growth of axillary buds. Apical dominance is an evolutionary adaptation that increases the plants exposure to light by concentrating resources on growing taller. To increase the exposure of the shoot system to the environment branching becomes important and under certain conditions, axillary buds begin to grow. Each bud has the potential to give rise to either a reproductive shoot (bearing flowers) or a vegetative branch.

LEAVES

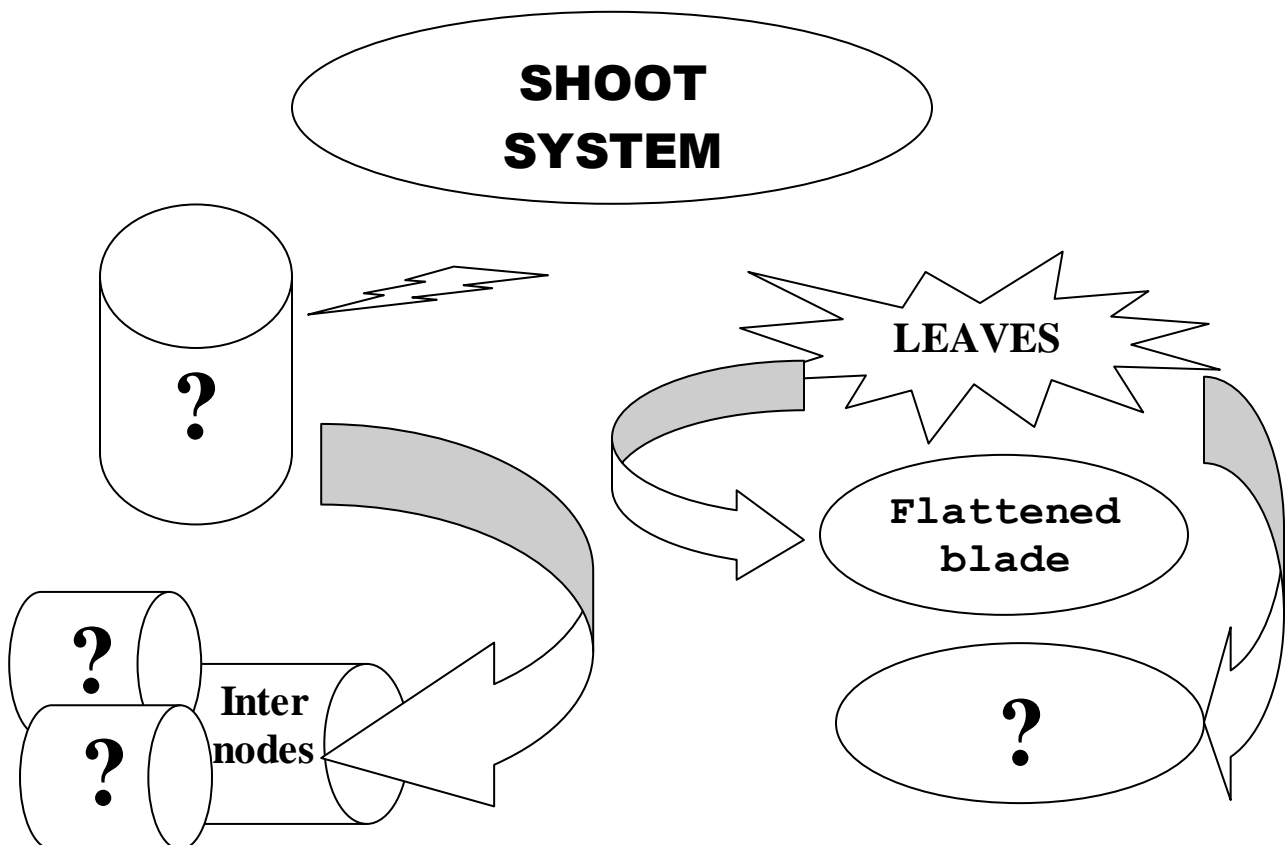
Leaves are the main photosynthetic organs of most plants. They vary in form but in general consist of a *flattened blade* and a *petiole* (stalk), which joins the leaf to a node of the stem. Vascular arrangement, leaf shape and leaf placement on a stem can help to identify or classify plants.

II. Put a word from the box in the correct place to complete the following sentences.

a petiole, floral shoots, a vegetative branch, to identify or classify plants, an auxiliary bud, apex

1. Vascular arrangement, leaf shape and leaf placement on a stem can help...
2. Each bud has the potential to give rise to either a reproductive shoot (bearing flowers) or...
3. A stem has an alternation of nodes and internodes and ...
4. The shoot system consists of vegetative shoot (stem and attached leaves) and...
5. Shoot growth is usually concentrated at the ...
6. They vary in form but in general consist of a flattened blade and ...

III. Complete the information about the shoot system and leaves.



IV. Name a word or a word combination, which is not a part of the logical group.

1. Tap roots, vegetative shoot, shoot system, floral shoots.
2. Axillary bud, nodes, tip, stem, internodes.
3. Plants exposure to light, meristems, terminal bud, apical dominance.
4. Petiole, thrust, leaves, flattened blade.

V. Translate the text without the dictionary.

Stem and Leaves of Maize

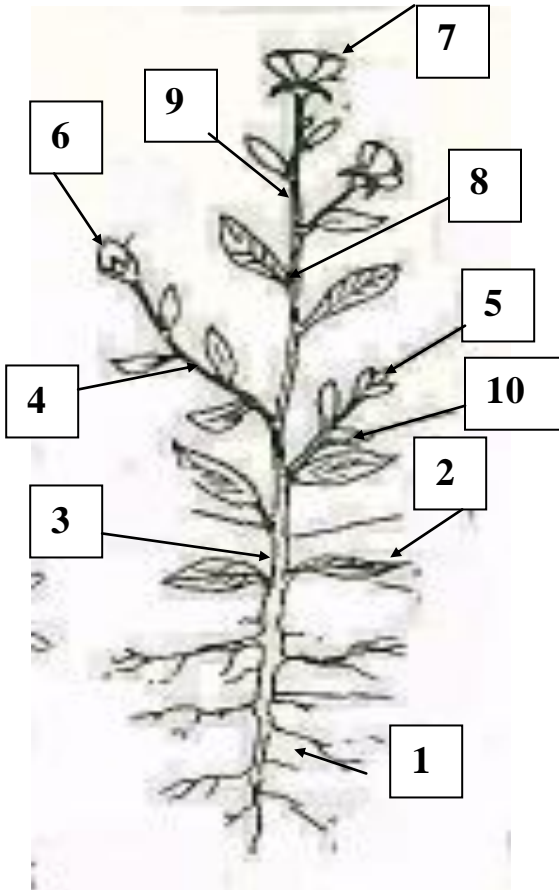
The stem is normally 2 to 3 metres high. Individual quick-ripening varieties mature at a height of only 90 centimetres and certain varieties of popcorn reach a height of only 30 to 50 centimetres. In subtropical and tropical regions, on the other hand, plants can reach a height of 6 to 7 metres. As a rule, the stem grows to a thickness of 3 to 4 centimetres and normally possesses 14 (8 to 21) internodes. These stem internodes, which are short and fairly thick at the base of the plant, become longer and thicker higher up the stem, and then taper again to the male inflorescence, which terminates the axis.

The number of leaves varies between 8 and 48 and averages 12 to 18. Quick ripening varieties have few leaves whereas late ripening varieties have many leaves. The leaf length varies between 30 and 150 centimetres, and the leaf width can be up to 15 centimetres. Some varieties have a strong tendency to grow side-shoots. This tendency depends to a large extent on the variety, climatic conditions and soil type.

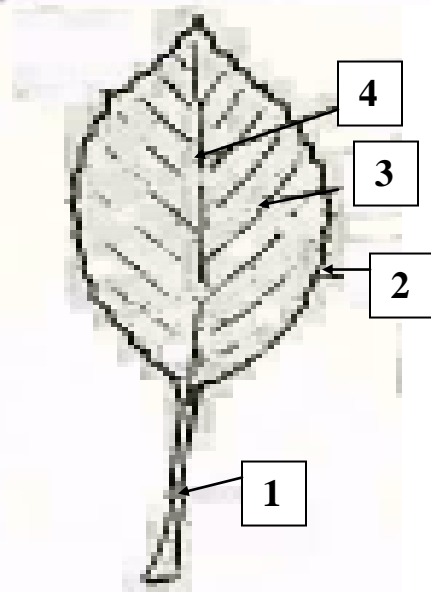
VI. Translate the text using the dictionary and write questions about the underlined information.

A terrestrial plant inhabits two very different environments at the same time: soil and air. The soil provides water and minerals, while air is the main source of carbon dioxide. To harness these resources the plant body is differentiated into two main systems: a root system and an aerial shoot system (stems, leaves and flowers). Neither system can survive without the other; sugar and other organic nutrients are imported into the roots from the photosynthetic tissues of the shoot system. The shoot system depends on water and minerals absorbed from the soil by the roots. Vascular tissues allow for the transport of materials between roots and shoots. Each vein has two types of vascular tissue: xylem which transports water and dissolved minerals up from the roots to the shoots and phloem which transports food made in the leaves (photosynthesis) to the roots and to non-photosynthetic parts of the shoot system.

VII. Label these diagrams with the following:



Stem
nodes
internodes
flower bud
terminal bud
reproductive shoot
vegetative branch
root
leave
flower



flattened blade
petiole (stalk)
venetion (veins, nervures, ribs)
midrib (nerve)

VIII. Translate into English.

Стебло — вегетативний орган, який здійснює зв'язок всіх частин рослини, збільшує її поверхню за рахунок галушення, утворює і несе на собі бруньки і листки, забезпечує транспорт води, мінеральних і органічних речовин, служить для вегетативного розмноження і фотосинтезу, запасує поживні речовини.

Нерозгалужене стебло з листками і бруньками, яке виростало за один

вегетаційний період, називають *пагоном*. На пагоні виділяються вузли і міжвузля. *Вузол* — це місце прикріплення листків до стебла. *Міжвузля* — відстань між сусідніми вузлами.

Кут між листком і стеблом називається *листковою пазухою*. Розрізняють бруньки за місцем їх розташування (пазушні та верхівкові) та за їхнім функціональним призначенням (вегетативні, плодові, сплячі, додаткові). Верхівкові бруньки розташовуються на верхівках стебла і його бічних відгалужень. У дерев і кущів пазушні бруньки бувають *ростовими* (вегетативними), з зачатками листків і стебла і *квітковими* з зачатками квіток.

Ріст стебла у висоту забезпечує *верхівкова брунька*, або *брунька зародка насінини*.

GRAMMAR EXERCISES

I. Put up four questions of different types (general, special, disjunctive, alternative) to each sentence.

Model: *The shoot system consists of vegetative shoot (stem and attached leaves) and floral shoots terminating in flowers.*

- 1) *Does the shoot system consist of vegetative shoot (stem and attached leaves) and floral shoots terminating in flowers?*
- 2) *What does the shoot system consist of?*
- 3) *The shoot system consists of vegetative shoot (stem and attached leaves) and floral shoots terminating in flowers, doesn't it?*
- 4) *Does the shoot or root system consist of vegetative shoot (stem and attached leaves) and floral shoots terminating in flowers?*

1. Shoot growth is usually concentrated at the apex of a shoot.
2. Leaves are the main photosynthetic organs of most plants.
3. The leaves consist of a flattened blade and a petiole (stalk).
4. Vascular arrangement, leaf shape and leaf placement on a stem can help to identify or classify plants.

II. Put the verbs in brackets into the appropriate form and explain the usage of that form in the sentence.

1. Vascular tissues (*to allow*) for the transport of materials between roots and shoots. 2. A terrestrial plant (*to inhabit*) two very different environments at the same time: soil and air. 3. The number of leaves (*to vary*) between 8 and 48 and averages 12 to 18. 4. Some varieties (*to have*) a strong tendency to grow side-shoots. 5. The shoot system (*to depend*) on water and minerals absorbed from the soil by the roots.

III. Make the sentences of the exercise II negative.

UNIT 6

Wordlist

cereals	хлібні злаки	хлебные злаки
grains	зерно	зерно
wheat	пшениця	пшеница
rice	рис	рис
maize	кукурудза	кукуруза
rye	жито	рожь
barley	ячмень	ячмень
oats	овес	овес
sorghum	сорго	сорго
millet	просо	просо
seed grains	насіннєвий матеріал	семенной материал
till	обробляти ґрунт	обрабатывать почву
weed	бур'ян	сорняк
yield	врожай	урожай

I. Read the text and answer the following questions:

1. What family do the cereals belong to?
2. Where is the original home of barley?
3. Where is the original home of wheat?
4. What advantage has the rye in compare with other cereals?

CEREAL GRAINS

The *cereals* are crop plants belonging to the grass family (Graminea). The cereal *grains* are *wheat*, *rice*, *maize*, *rye*, *barley*, *oats*, *sorghum* and *millet*. They are the most important source of food for man and domestic animals. Cultivation of all the cereal grains except oats and rye began before the dawn of history. Wheat, barley and millet were cultivated in many parts of the Old World.

Long before the beginning of civilization the *seed grains* of wild grasses were gathered by primitive man and formed an important part of his food. Later, as man began to *till* the soil, cereal grasses were his first crops. The history of the cereals was the history of civilization.

Wheat and barley, oats and rye, all have been cultivated **for so long**¹ in many lands that their original homes are forgotten. We know that the greatest number of varieties of a plant is found in its original home. Not less than eighteen kinds of the common barley are found in Abyssinia, about five in Southern Europe and only one in Norway, at the northern limit of barley cultivation.

Abyssinia is the original home of barley. Later the barley was carried down the Nile to Egypt.

In the early times of cultivation wheat was widely spread over Europe. Its original home lies in the great mountainous area of Persia and Afghanistan. How and when wheat arrived in Europe is an unsolved problem. One thing is certain, it did not come alone. **Along with**² it came a number of *weeds*. Rye was one of them. It is a hardier plant than wheat and can grow on poorer soils and in colder climates. The cultivation of rye in Europe extends to the Arctic circle. The story of oats has **much in common**³ with the story of rye. Many kinds of oats travelled as weeds in the wheat crops. The oat plant, like rye, is hardier than wheat.

Soil and climatic conditions are very important for growth, *yield* and quality of cereals. Wheat, maize, rye, barley, oats, sorghum and some of the *millets* are generally grown in the temperate climates.

Notes

1. **for so long** — так довго

2. **along with** — разом з

3. **much in common** — багато спільного

II. What meaning have the following word combinations in the text?

The grass family, the most important source of food, the dawn of history, the Old World, long before the beginning of civilization, primitive man, original home, varieties of a plant, in the early times, one thing is certain.

III. The following sentences have mistakes. Correct them.

1. The cereal grains are wheat, rice, maize, rye, barley, oats, sorghum and corn.
2. Not less than eighteen kinds of the common barley are found in Norway, about five in Southern Europe and only one in Abyssinia, at the northern limit of barley cultivation.
3. The wheat is hardier than oat.
4. The Southern Europe is the original home of barley.
5. Maize original home lies in the great mountainous area of Persia and Afghanistan.

IV. Визначте ступені порівняння прикметників та перекладіть речення.

1. Wheat, rice, maize, rye, barley, oats, sorghum and millet are the most important source of food for man and domestic animals.
2. We know that the greatest number of varieties of a plant is found in its original home.
3. The climate of Norway is much colder than that of Persia.
4. This soil contains less humus than that one.
5. Rye is a hardier plant than wheat and can grow on poorer soils and in colder climates.
6. The oat plant is hardier than wheat.

V. Поставте питання до кожного члена речення.

1. Wheat is grown in the temperate climate. 2. Yesterday we studied the history of wheat cultivation. 3. Wheat belongs to the grass family. 4. This plant was planted three months ago. 5. We have planted many trees in this town. 6. Barley came to Europe from Abyssinia. 7. We shall sow cereals at our experimental-training farm next year.

VI. How much do you know about the history of the cereals?

1. ... family do the cereals belong to?

- (a) Bambusoideae
- (b) Gramineae
- (c) Rosaceae

2. ... is the original home of barley?

- (a) Egypt
- (b) Norway
- (c) Abyssinia

3. ... is the original home of wheat?

- (a) Europe
- (b) Afghanistan
- (c) Persia

GRAMMAR EXERCISES

I. Put up four questions of different types (general, special, disjunctive, alternative) to each sentence.

Model: *The history of the cereals was the history of civilization.*

- 1) *Was the history of the cereals the history of civilization?*
- 2) *What was the history of the cereals?*
- 3) *The history of the cereals was the history of civilization, wasn't it?*
- 4) *Was the history of the cereals the history of civilization or not?*

- 1. The cereals are crop plants belonging to the grass family.
- 2. Cultivation of all the cereal grains except oats and rye began before the dawn of history.
- 3. Wheat, barley and millet were cultivated in many parts of the Old World.
- 4. In the early times of cultivation wheat was widely spread over Europe.
- 5. Abyssinia is the original home of barley.

II. Put the verbs in brackets into the appropriate form and explain the usage of that form in the sentence.

1. Wheat, barley and millet (*to cultivate*) in many parts of the Old World. 2. Soil and climatic conditions (*to be*) very important for growth, yield and quality of cereals. 3. Many kinds of oats (*to travel*) as weeds in the wheat crops. 4. The cultivation of rye in Europe (*to extend*) to the Arctic circle. 5. Wheat original home (*to lie*) in the great mountainous area of Persia and Afghanistan. 6. Later the barley (*to carry*) down the Nile to Egypt.

III. Make the sentences of the exercise II negative.

Wordlist

cultivation	обробка	культивирование
seed-bed	рілля	ложе семени
tilth	глибина оранки	глубина вспашки
clod	грудка	ком
capping	кепірування	кэппирование
crust	кора	корка
drilling	рядкове внесення добрив	рядковое внесение удобрений
nutrient	поживна речовина	питательное вещество
nitrogen	азот	азот
stiff-strawed	з міцним стеблом	с жестким стеблем
cwt/acre	англійський центнер	английский центнер(50,8 кг)/акр
moisture	вологість	влажность

I. Read the text and find out the main features of the wheat cultivation, manuring and harvesting.

WHEAT

Wheat-growing was extensively practiced throughout Europe in prehistoric times and this cereal was of great importance in the ancient civilizations of Persia, Greece and Egypt. It spread to all the temperate countries where it now plays a major part in the food supply of many nations and it is also widely cultivated in tropical and subtropical areas.

Cultivation. It is often said that winter wheat does best on a well-formed seed-bed. Ploughing should be done as early as possible and the normal depth would be in the region of 6 inches. The type of seed-bed required for winter wheat can be described as one with a reasonable tilth in the top 2-3 inches, with a surface containing a high proportion of clods the largest of these being about the size of a man's hand. This is to prevent capping, a condition which can easily arise with heavy rain, when the soil surface runs together forming a crust.

Manuring. With all crops it is essential to ensure that adequate supplies of phosphate and potash are available during the first few weeks of growth. Once observed it is not possible to correct properly any deficiency and both of these major elements are required either in advance of *drilling* or they may be combine-drilled with the seed. Combine-drilling is the most economical way of applying these fertilizers, but with winter wheat time of sowing being of prime importance, the faster method of application using fertilizer spinners is more often preferred. Previous cropping, local environment and to some extent cultural techniques can also influence the optimum level of this *nutrient*. When the soil is likely to supply some *nitrogen* for early growth of a winter crop, then it is unlikely that any autumn fertilizer nitrogen would be required.

The short, *stiff-strawed* varieties of wheat can stand high levels of fertilizer nitrogen whereas the taller one used to produce quality straw will only tolerate moderate amounts. Of all the cereals winter wheat will give the highest response on this fertilizer and to obtain the best return the proper dressing should be applied at the correct time.

Seeding Rates. The amount of seed required for autumn wheat will vary between 1 and 2.5 *cwt/acre*. Early sowings need the least since the temperatures for germination are higher than those later on and a larger number of the seeds produce plants.

Harvest. Winter wheat is normally harvested from August to October (in Britain), depending on the type of summer experienced and also the geographical location. Spring wheat matures much later than winter wheat and later than the other cereals.

Following a hot, dry summer grain may be combine-harvested under very good conditions; and if the moisture does not exceed 14% then it can be stored without drying. *Moisture* tests can be carried out at harvest and these are often used to indicate the stage of ripeness or readiness for combining.

II. Answer the following questions.

1. What is the normal depth of ploughing for wheat cultivation?
2. What is the capping? What is the way to prevent it?
3. What two important elements should be supplied for the wheat growing?
4. What kind of drilling is the most economical way of applying the fertilizers?
5. What can also influence the optimum level of the fertilizers?
6. What is the amount of seed required for autumn wheat?
7. When are winter and spring wheats normally harvested?
8. What kind of tests can be carried out to indicate the stage of the wheat ripeness and readiness for combining?

III. Look back at the text and choose the correct words to go together.

1. *Throughout/over* Europe.
2. Wheat does best *on/in* a well-formed seed-bed.

3. The normal depth would be on/in the region of 6 inches.
4. A condition, which can easily arise by/with heavy rain.
5. Both of these major elements are required either together with/in advance of drilling.
6. The amount of seed required for autumn wheat will vary among/between 1 and 2.5 cwt/acre.
7. Winter wheat is normally harvested from/with August up/to October.
8. Dry summer grain may be combine-harvested with//under very good conditions.
9. Moisture tests can be carried on/out at/on harvest.

IV. Which words are missing from the following sentences?

1. ...tests can be carried out at harvest and these are often used to indicate the stage of ripeness or readiness for combining.
2. Thevarieties of wheat can stand high levels of fertilizer nitrogen whereas the taller one used to produce quality straw will only tolerate moderate amounts.
3. With all crops it is essential to ensure that adequate supplies ofare available during the first few weeks of growth
4. It is often said that ...wheat does best on a well-formed ...
5. This cereal was of great importance in the ancient civilizations of
6. This is to prevent... a condition, which can easily arise with heavy rain, when the soil surface runs together forming....
7. When the soil is likely to supply some ...for early growth of a winter crop, then it is unlikely that any autumn fertilizer ...would be required.
8. ...wheat matures much later than ...wheat and later than the other cereals.

V. Read the text without the dictionary and find out the time for the spring wheat planting.

Where spring wheat is grown, it will usually yield better if seeded early. It needs to make its growth largely before hot weather. Since spring wheat can stand a great deal of cold weather there is little, if any danger from low temperatures when seeding is done early.

VI. Read the text without the dictionary and find out its main idea.

Seed-bed preparation is the most expensive and one of the most important phases in wheat production. The basic aim is to make the soil favourable for sprouting the seed and growing the plant. Timely and proper tillage is more important than the type of farm machines used. Where rainfall is limited, the seed-bed should be prepared so as to retain as much soil moisture as possible. In areas where rainfall is more liberal development of nitrates is more important than the conservation of moisture.

VII. Read the text and put the questions to the underlined words.

1. A new drought resistant variety of wheat has been developed by this scientist. 2. A large number of wheat varieties has been grown in this country. 3. Perfect crops of wheat have been raised on heavy loams and clays. 4. The great majority of our wheat has been produced by artificial cross-fertilization of pre-existing distinct varieties. 5. High yields of wheat have been obtained on all except very light soils. 6. This plant has been bred (breed — *выводить*) by hybridization of certain species of wild grasses. 7. A new winter hardy (зимостойкий) wheat variety has been grown by us this year. 8. Much starchy and nitrogenous food material has been found in wheat grains.

VIII. Find the correct Ukrainian translation of the following sentences.

1. The quality of wheat is expected to be poor on peaty soils. 2. Winter hardiness is considered to be of great importance in winter varieties. 3. The wheats proved to be self-fertilized. 4. The great majority of wheats appears to have been produced by artificial cross-fertilization of pre-existing varieties. 5. Wheat is thought to grow well on heavy loams and clays. 6. This crop seems to be greatly valued by plant breeders (селекціонерами). 7. The cultivation of wheat is believed to have begun in prehistoric times. 8. Cultivated wheats seem to have originated from certain species of wild grasses. 9. Wheat is known to be an extremely deep-rooted and drought resistant crop.

1. Гадають, що сорти пшениці, які культивуються, виникли від певних видів диких злакових.. 2. Цей врожай, здається, високо оцінений селекціонерами рослин. 3. З'ясовується, що більшість сортів пшениці виведено шляхом штучного перехресного запліднення раніше існуючих сортів. 4. Вважається, що зимостійкість має велике значення для різноманітності зимових сортів пшениці. 5. Якість пшениці, очікується, буде низькою на торф'яних ґрунтах. 6. Пшениця, як відомо, є глибокоукоріненою та дуже засухостійкою культурою. 7. Доведено, що сорти пшениці удобрюються самостійно. 8. Пшениця, вважається, росте добре на важких суглинках та глинах. 9. Вважають, що вирощування пшениці почалося в доісторичні часи.

IX. Translate into Ukrainian paying attention to the different meanings of the word as:

1. In Britain rye is cultivated as a forage crop. 2. As rye is a drought resistant plant it is productive upon almost any class of soil. 3. As to rye it is considerably more winter-hardy than wheat. 4. The seedbed is prepared as for wheat, and the grain may either be broadcast or drilled. 5. Rye is a cereal as well as wheat. 6. Where rye is grown as a forage crop it must be cut early—before it shoots, as towards the end of its growing period it becomes hard, dry and unpalatable. 7. Rye must be cut as soon as the ear has filled. 8. Rye is mostly cultivated for forage purposes and feeding-off as well.

- X. Read the text without the dictionary, divide it into the paragraphs and give the name to each of them.

Rye

Rye is a drought resistant plant, which thrives under a great variety of conditions; it is productive upon almost any class of soil and very resistant to acid conditions. When rye is grown for grain on good soil it is usually less profitable than the other cereals, and **its cultivation is therefore confined to districts**¹ of poor, dry, light land that produce inferior wheat and oats. **It also succeeds on peaty soils**² and on the poorer sorts of black fen. Rye does best on good loams, which however, yield 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 and it is extremely valuable for feeding-off or for soiling. The seed-bed is prepared **as for wheat**,³ 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 about the beginning of August. When high-quality rye straw is required for special purposes it may be cut **before the ear has filled**⁴ then dried and used: this avoids the threshing process which damages the stems considerably. Where it is grown as a forage crop, it must be cut early — **before it shoots**⁵ as towards the end of its growing period it becomes hard, dry, and unpalatable. In Britain rye is cultivated as a forage crop, but more largely for its grain and straw.

Notes

1. **its cultivation is therefore confined to districts ...** — тому її вирощування обмежено районами ...
2. **it also succeeds on peaty soils** — воно (жито) дає також добрі врожаї на торф'яних ґрунтах
3. **as for wheat** — як для пшениці
4. **before the ear has filled** — до наливання колосу
5. **before it shoots** — до виходу в трубку

GRAMMAR EXERCISES

- I. Put up four questions of different types (general, special, disjunctive, alternative) to each sentence.

Model: *In Britain rye is cultivated as a forage crop.*

- 1) *Is in Britain rye cultivated as a forage crop?*
- 2) *What is cultivated in Britain as a forage crop?*
- 3) *In Britain rye is cultivated as a forage crop, isn't it?*
- 4) *Is in Britain or in the USA rye cultivated as a forage crop?*

1. Combine-drilling is the most economical way of applying these fertilizers.
2. The amount of seed required for autumn wheat will vary between 1 and 2.5 cwt/acre.
3. Winter wheat is normally harvested from August to October.
4. The basic aim is to make the soil favourable for sprouting the seed and growing the plant.
5. A new drought resistant variety of wheat has been developed by this scientist.

II. Put the verbs in brackets into the appropriate form and explain the usage of that form in the sentence.

1. High yields of wheat (*to obtain*) on all except very light soils. 2. The seedbed (*to prepare*) as for wheat 3. Rye (*to do*) best on good loams. 4. Rye (*to be*) a drought resistant plant. 5. The cultivation of wheat (*to believe*) to have begun in prehistoric times.

III. Write the following sentences in the Passive Voice:

*Example: We have found a new wheat variety.
A new wheat variety has been found by us.*

1. Our scientists have found much starchy and nitrogenous food material in wheat grains. 2. This scientist has developed a new drought resistant variety. 3. We have grown perfect crops of wheat on heavy loams and clays. 4. Our experimental station has developed a new frost resistant variety of wheat. 5. Frost has killed this young plant. 6. This winter wheat variety has produced a high yield.

UNIT 7

Wordlist

fen	болото	болото
water-table	рівень ґрунтових вод	уровень ґрунтовых вод
clay	глина	глина
loam	суглинок	суглинок
kainit	мін. каїніт	мин.: каинит
bread cereal	хлібний злак	хлебный злак
malting	солодування	соложение
peaty land	торф'яник	торфяник
by-product	побічний продукт	побочный продукт
harrowing	боронування	боронование
rolling	коткування	каткование (почвы)
artificial	штучний	искусственный
smut	головня	головня
leaf-stripe	червоно-бура п'ятнистість	красно-бурая пятнистость

I. Read the text and find out the main differences between oats cultivation and wheat and barley cultivation.

Oats

The oat is the most extensively cultivated cereal in Britain, and is grown in every country and under widely different conditions of soil and climate. **While not as resistant to winter cold as wheat and barley, oats are much more successful than these cereals in wet districts.**¹

The number of oat **varieties in cultivation**² is very large, and since the crop is grown **under a very wide range of soil and climate conditions**³, from the poorest to the most fertile soils, and under annual rainfalls of 20 to perhaps 70 in., it will be obvious that a wide choice of types is desirable.

There is a fairly sharp distinction between true winter varieties (which are normally sown in October and are usually ripe for harvest before the end of July) and the spring varieties, for which seed-time ranges from late February to the middle of April and which ripen from early August to late September, or even as late as October in the extreme north.

The oat is the best of the commonly cultivated cereals for growing on poor soil, in dull rainy districts, and where the summer temperature is rather low; it can be ripened by a minimum of sunshine. Very high rainfall encourages the development of straw rather than grain. Lower rainfall and better soil lead to the development of more and better grain but less straw of lower feeding value.

In the *fens* the rainfall is low; very fine crops of oats can be grown because the soil receives a constant supply of moisture from the high *water-table*. A *clay loam*

that is supplied with abundant moisture is the best soil for this crop, but black-top and *peaty lands* give almost as good results.

Manuring. While the oat crop is capable of producing a fair yield on very poor soil, it nevertheless responds **to liberal manuring**,⁴ **and it is common to treat it with nitrogenous, phosphatic, and under certain circumstances, potassic dressing**.⁵ A common treatment is to give **1 to 3 cwt.**⁶ of superphosphate according to local conditions, up to 2 cwt. of sulphate of ammonia at seed-time and if the soil is light, an addition of 2 cwt. of *kainit* applied **a month or so before sowing**.⁷ On good soils that are **in high condition**,⁸ first-class crops of oats can be grown without the application of any manure.

Notes

- 1. While not as resistant to winter cold as wheat and barley, oats are much more successful than these cereals in wet districts.** — Овес не такий стійкий до зимових холодів, як пшениця та ячмінь, але він росте набагато краще, ніж ці злакові у районах з вологим кліматом.
- 2. varieties in cultivation** — сорта, що вирощуються
- 3. under a very wide range of soil and climate conditions** — в найрізноманітніших умовах
- 4. responds to liberal manuring** — реагує на велику кількість добрив
- 5. it is common to treat it with ... dressing** — за звичай під нього вносять добрива
- 6. 1 to 3 cwt (hundred weight)** — від 1-го до 3-х англійських центнерів (1 cwt=50,8 кг)
- 7. a month or so before sowing** — за місяць або приблизно за місяць до сівби
- 8. to be in high condition** — знаходиться в дуже доброму стані

II. Put these questions into the correct order and answer them.

- Great Britain, cultivated, What, in, is, the most cereal?
- barley, are, Where, more, and, than, oats, successful, wheat?
- varieties, the winter, distinction, is, What, between, oats, varieties, spring, the, sharp, and, oats?
- grain, encourages, rather, of, oat, What, the, development, straw, than?
- oats, elements, What, the, comprise, liberal, manure, for?
- any, can, Where, of, the, crops, first-class, the, of, oats, be, without, grown, application, manure?

III. What meaning have the following word combinations in the text?

The most extensively cultivated cereal, under widely different conditions of soil and climate, from the poorest to the most fertile soils, under annual rainfalls, a fairly sharp distinction, true winter varieties, the spring varieties, seed-time, the best

of the commonly cultivated cereals, dull rainy districts, it can be ripened by a minimum of sunshine, a fair yield.

IV. The following sentences have mistakes. Correct them.

1. On good soils that are in high condition, first-class crops of oats cannot be grown without the application of any manure.
2. The wheat is the most extensively cultivated cereal in Britain.
3. A clay loam that is supplied with abundant moisture is the best soil for this crop, but black-top and peaty lands give almost as bad results.
4. Very high rainfall discourages the development of straw rather than grain.
5. Lower rainfall and better soil lead to the development of more and better straw but less grain of lower feeding value.
6. The rye is the best of the commonly cultivated cereals for growing on poor soil.

V. Which words are missing from the following sentences?

1. On good soils that are in high condition,can be grown without the application of any manure.
2. While not as resistant to winter cold as....., oats are much more successful than these cereals in wet districts.¹
3. While the oat crop is capable of producing a fair yield on very poor soil, it nevertheless responds to....., and it is common to treat it with..., ..., and under certain circumstances, ...dressing.
4. ...rainfall and ... soil lead to the development of more and better grain but less straw of lower feeding value.
5. In the fens the rainfall is low; very fine crops of oats can be grown because the soil receives a constant supply of moisture from... ..
6. Very high rainfall ...the development of straw rather than grain.

VI. Read this text without the dictionary, understanding the meaning of words in **arial black using the surrounding words.**

Barley

Barley has been cultivated **from time immemorial**,¹ and is **believed to be derived from wild grasses native to northern Africa and western Asia**.² It is widely grown in all subtropical and temperate countries, and large areas **are devoted** to its cultivation in many parts of the British Isles. It is used for human food and is an important *bread cereal* in some parts of Europe. Barley is also used for *malting*, and **its degree of suitability** for this purpose determines the

marked **value of the crop**, the **straw** being strictly a *by-product*. Barley can be grown under almost any conditions of soil and climate, **the only frequent cause of failure being soil acidity**;³ but all conditions do not give equally good barley for malting purposes. Barley is generally believed **to do best**⁴ on a very fine and moderately deep seed-bed, and this should be prepared by *harrowing* and *rolling*.

Barley has a shorter period of growth than the other cereals, and in a late season crops can be obtained from seed put in as late as May.

When barley is grown on land in high condition, or on land where **a root crop** has been consumed, it is not as a rule necessary to supply any *artificial* fertilizers; but under conditions where the land is so rich that **luxuriant vegetation**⁵ and late ripening may **endanger** the quality of the crop, it may be desirable to apply 2 or even 3 cwt. of superphosphate per acre and to balance this with an **appropriate** amount of potash.

Barley **suffers from fungoid diseases**, such as *smut* and *leaf-stripe*.

Notes

1. **from time immemorial** — з незапам'ятних часів
2. **barley is believed to be derived from wild grasses native to northern Africa and western Asia** — вважають, що ячмінь походить від диких злакових рослин, батьківщиною яких була північна Африка та західна Азія.
3. **the only frequent cause of failure being soil acidity** — єдиною частою причиною неврожаю є кислотність ґрунту
4. **to do best** — найкраще рости
5. **luxuriant vegetation** — буйна вегетативна маса

VII. Read without the dictionary the following text and answer the question: "Which fertilizers should be used for oats?"

The fertilizer of the oat crop will depend upon the fertility level of the soil and the fertilization programme followed on the preceding crops. It is a common practice to fertilize the preceding crop, such as corn, rather heavily and then reduce the amount applied on the oats crop. To soils that are low in fertility, additional fertilizer should be applied. The amount of fertilizer to be used should be determined by soil test.

When oats are planted on soils of a low fertility level, a complete fertilizer such as 5-20-20 may be used. The application of nitrogen should be considered on soils low in organic matter. Avoid the application of too much nitrogen since it may cause lodging.

When a legume such as alfalfa is seeded with, oats, additional potash may be required for the legume seeding.

Unless the soil is exceedingly low in fertility, the direct application of barn-

yard manure to oats is rarely advisable.

**VIII. Read the following text without the dictionary and answer the question:
"What is the rate of barley seeding and what does it depend on?"**

The best rate of seeding for any particular field is determined by the amount of moisture likely to be available (especially during critical periods in the development of the crop) by the fertility of the soil and by the size of the seed used. The average rate of seeding barley is 1 to 2 bushels per acre. A lower rate should be employed on rich soils well supplied with moisture than on poorer upland fields, because there will be less trouble (осложнения) from lodging on the poorer lands.

Reductions in rate of seeding will lead to the development of stronger straw that is better able to support the weight of the heads.

**IX. Read the following text without the dictionary and answer the question:
"Why is the addition of too much nitrogen harmful for barley yields?"**

The fertilizer requirements for barley are about the same as those of oats and wheat. Barley will generally respond to an application of nitrogen, phosphorus, and potash-especially on soil of lower fertility. On the lighter-textured soils, top-dressing of the crop with nitrogen will increase yields. However, the addition of too much nitrogen will increase the danger of lodging. It may also increase the protein content of the grain, which may be undesirable in the production of malting (солодование) barley.

X. Translate the following text, using the dictionary, for 10 minutes.

FEEDING BARLEY

Barley is one of the best of the small grains for feed. Ground barley is an excellent feed for dairy cows. Studies conducted have shown that, ton for ton, ground barley is equal corn in feeding value for dairy cows when used as 40 to 60 per cent of the concentrate of "grain" mixture. Ground barley is rated as being somewhat better than ground oats for milk production.

Because barley ripens early in summer, long before corn does, it fits in well with swine production where high carbohydrate crops are needed during summer months. Hogs can be fed on barley in late summer, finished off, and put on the market early. Barley is also used as feed for beef cattle, where corn cannot be grown or is too expensive.

GRAMMAR EXERCISES

I. Translate into Ukrainian paying attention to the different forms and functions of the Infinitive:

1. The oat can be grown under widely different conditions of soil and climate. 2. Oats are known to be not so resistant to winter cold as wheat and barley. 3. The oat can be ripened by a minimum of sunshine. 4. The oat is a crop to be grown under a very wide range of soil and climate conditions. 5. The oat is the best of our common cereals to be cultivated on poor soil, in dull rainy districts. 6. Different varieties of oats must be cultivated to choose the best variety to be grown in a given district. 7. The oat crop is known to respond well to liberal manuring. 8. First-class crops of oats can be grown without the application of any manure. 9. We know the number of cultivated oat varieties to be very large. 10. We want this variety of oats to develop more and better grain but less straw.

II. Translate into Ukrainian, paying attention to Absolute Participle Construction.

1. Barley is widely grown in all subtropical and temperate countries, large areas being devoted to its cultivation in many parts of the British Isles. 2. Barley is used for human food, its straw being strictly a by-product. 3. Barley can be grown under almost any conditions of soil and climate, the only frequent cause of failure being soil acidity. 4. Barley does best on a very fine and moderately deep seedbed, the seedbed being prepared by harrowing and rolling. 5. Barley has a shorter period of growth than the other cereals, sometimes crops being obtained from seed put in as late as May. 6. Barley being grown on land in high condition, it is not necessary to supply any artificial fertilizers.

Wordlist

allocated	розподіляти, розташовувати	распределять, размещать
dent maize	кукурудза зубовидна	кукуруза зубовидная
flint maize	кукурудза кремниста	кукуруза кремнистая
sweet corn	кукурудза цукрова	кукуруза сахарная
soft maize	кукурудза крохмальна	кукуруза крахмалистая
waxy maize	кукурудза воскова	кукуруза восковая
pod maize	кукурудза плівчаста	кукуруза пленчатая
texture	будова	строение
avoid	уникати	избегать
draining	осушення	осушение
oxygen	кисень	кислород
alkaline	лужний	щелочной
germination	проростання	прорастание
inter-row cultivation	міжрядна культивация	междурядная культивация
rot	гнили	гнить
survive	виживати	выживать

I. Read the text and answer the following questions:

1. What main groups of maize do you know?
2. Where is successful maize cultivation achieved?
3. Why is draining so important on maize land?
4. How should phosphate, potash and the nitrogen be applied for maize seeding?
5. What kind of ploughing, cultivation and seed-beds does maize require?
6. What minimum temperature is preferable for maize growing?

MAIZE

Types of Maize. Several thousand varieties of maize now grown throughout the world and most of these can be *allocated* to one of the seven most important groups: *dent maize*, *flint maize*, *sweet corn*, *soft maize*, popcorn, *waxy maize*, *pod maize*.

Soil Requirements. Successful maize cultivation is more frequently and more easily achieved on soils, which are of medium *texture*. As the soils become lighter the greater is the chance of their "drying out" in midsummer and although there is really nothing else against them, the very light sandy soils should be *avoided*.

Having suggested light to medium textured soils for maize, it must also be stressed that organic status and fertility should be high.

The maize land should be free *draining* in order that as much of the heat as possible is employed in raising soil temperatures and not removing excess of soil moisture. The soil should be naturally free draining to enable a full rooting system to develop in a plentiful supply of *oxygen*.

Maximum yields are believed to be obtained between pH 4 and 9. Some scientists believe maize to be successfully cultivated on the moderately acid soils (pH 6-7 as optimal). Others say that maize growing can be successful under *alkaline* conditions provided there are no serious deficiencies of the micronutrients.

Application of Fertilizers. It has been suggested that phosphate and potash should be applied to the land well in advance of drilling and the nitrogen incorporated into the seedbed just prior to drilling, otherwise much of it would be lost by leaching.

One should remember that *germination* is much *retarded* by fertilizers in contact with the seed.

Cultivation. With a more extensive and deeper rooting system than the other cereals, maize will require deeper ploughing, cultivations and seed-beds to obtain maximum growth. Autumn ploughing is advisable on stronger soils and it may be left until the early spring when textures are light. Cultivations, which follow should be to a depth of 4-5 inches. They kill the weeds after germination; *inter-row cultivation* can follow crop emergence to obtain further weed control. Chemical means are often preferred. Seed-beds should be uniform and fine to obtain a quick germination and to assist the action of herbicides in their control of weeds.

Seeding. Minimum temperatures for growth of maize are around 50°F(10°C) and thus early spring sowings are of little value except when the soils are warmer than usual. Under cool conditions seeds rot.

When the average t° is over 50 F the emergence of maize will take approximately two weeks. Late spring frosts can also be damaging to seedling maize although with the cold tolerant varieties being introduced there is every chance that this crop may now survive the first few degrees of frost.

II. What meaning have the following word combinations in the text?

Successful maize cultivation, "drying out", very light sandy soils, medium textured soils, removing excess of soil moisture, free draining, Maximum yields, moderately acid soils, deeper ploughing, to obtain maximum growth, Autumn ploughing, weed control.

III. The following sentences have mistakes. Correct them.

1. When the average t° is over 60 F the emergence of maize will take approximately two weeks.
2. Cultivations, which follow should be to a depth of 2-3 inches.
3. One should remember that germination is not much retarded by fertilizers in contact with the seed.
4. The soil should be naturally free draining to enable a full rooting system to develop in a plentiful supply of the nitrogen.
5. Successful maize cultivation is more frequently and more easily achieved on soils, which are of high texture.
6. Maximum yields are believed to be obtained between pH 2 and 6.
7. Autumn ploughing is advisable on lighter soils and it may be left until the early spring when textures are strong.
8. Under warm conditions seeds rot.

IV. Look back at the text and choose the correct words to go together.

They kill the weeds behind/after germination
it is much retarded with/by fertilizers
should be applied to/on the land
to be obtained among/between pH 4 and 9
on/in soils
without/throughout the world
to develop out/in a plentiful supply of oxygen.
over/under alkaline conditions
it would be lost with/by leaching.
it may be left to/until the early spring

V. Translate this text using the dictionary for 20 minutes.

Maize Root System

Maize root system contains no taproot, and its feathery strands spread out in all directions, mainly in the topsoil.

In most varieties the form of the root system is characteristic. The four seminal roots may perhaps persist throughout the life of the plant, but the main adventitious fibrous system, developed from the lower nodes of the stem below ground level, spreads out in a lateral direction in the upper layers of the soil, after which the roots turn vertically downwards and tap the lower levels of the soil.

The extent to which the roots penetrate to the deeper layers depends largely upon the supply of nutrients and on the drainage of the topsoil and subsoil. In soil, which is rich in nutrients, the roots are comparatively strong and branch out in all directions. In dry soil they grow longer and in damp soil weaker.

**VI. Read the following text using the dictionary and answer the question:
“Why is it so important to put fertilizer in maize seed-beds?”**

Almost without exception, wherever efforts are made to raise agricultural efficiency and production for an expanding population, more fertilizers and manures are needed. The benefits to be derived from greater use of fertilizers and manures have been demonstrated in many countries.

According to American writers, the Indian maize growers of earlier times used large quantities of fish caught ascending the streams in the spring as manure in maize cultivation. Later, ashes and slaughterhouse wastes also were applied to arable land. Farmers observed that crops made excellent growth where these wastes had been distributed. "The Complete Farmer," 2nd edition, of the year 1769, said of maize growing: "The English in North America plough the ground thoroughly before the grain is planted. They seldom, if ever, dung the whole face of the field but sometimes put a little dung in each hill of corn, if they think the ground requires it. Where fish are plenty, in the planting season, they put two or three small fish into each hill, with the grain." It is not unreasonable to suppose that the English settlers adopted this practice from the Indians as well as the maize crop itself.

GRAMMAR EXERCISES

I. Translate into Ukrainian paying attention to the different functions of the Infinitive.

1. Maize is known to originate in America. 2. In Britain even the earliest varieties of maize have been found to ripen only in the sunniest and hottest districts. 3. In the northern United States and Canada great work has been carried out to get

new strains of earlier maturity. 4. Our scientists want this crop to mature earlier in northern districts. 5. Maize is known to grow best on warm, fertile loams. 6. We know maize to grow well on land that is given about 2 cwt. of sulphate of ammonia, 3 cwt. of superphosphate, and 1 cwt. of muriate of potash per acre. 7. We know this farm to have drilled the seed in rows from 18 to 24 in. apart, at a depth of about 2,5 in. 8. We know the minimum temperature for germination of maize to be higher than that required for other crops.

II. Translate into Ukrainian paying attention to the word-substitutes that (those); one (ones)

1. Maize is a crop, which originated in America and one, which soon spread throughout the world. 2. In Britain even the earliest varieties are those, which ripen their seed only in the warmest years and in the sunniest and hottest districts. 3. Maize grows successfully on warm, fertile loams but it does well on well-manured light soils if those are of fair depth. 4. The minimum temperature for germination of the seed is higher than that required for the general crop plants. 5. The adaptability to row-crop cultivation and yields of maize are larger than those of barley. 6. Greater attention is paid to the maize varieties of earlier maturity than to those of later maturity. 7. Maize does better on well-manured lands than on those, which received a poor dressing of farmyard manure.

UNIT 8

Wordlist

potato	картопля	картофель
loam	суглинок	суглинок
alluvium	алювій	аллювий
black-top peaty land	торф'яник з перегноєм у верхньому пласті	торфяник с перегноем в верхнем слое
incidence of blight	ступінь зараження хворобами	степень зараженности болезнями
fairly dry	дуже сухий	довольно сухой

I. Read the text and find out what weather and soil conditions are suitable for potatoes yield.

THE TUBERS

Potato

The *potato* (*Solanum tuberosum*) was introduced from South America in the sixteenth 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,¹ but the yield suffers where there is an extreme deficiency of calcium.²

Potatoes do badly³ on heavy soils and under wet conditions. The most favourable seasons are those of moderate rainfall: in rainy seasons the temperature is too low for optimum growth, and the *incidence of blight* is high; in dry summers the yield is often limited by the water supply. The best eating quality is generally obtained when the last phase of the growing season is *fairly dry*, as it is then that the tubers are formed with the lowest moisture content.⁴

As the potato crop usually receives a dressing of manure, the management of the cultivations will depend very largely on the time of the year when the manure is applied. It is usually most economical of labour to apply the manure during the winter, when other work is not pressing, and plough it in as soon as possible. The time of planting depends upon the district and the variety that is being grown.

It is a matter of prime importance that the land should be sufficiently dry and in good working order⁶ at planting time, as a crop put in cold wet soil seldom develops satisfactorily.

Notes

1. **that tolerate a rather highly acid condition of the soil** — які витримують дуже високу кислотність ґрунту
2. **the yield suffers where there is an extreme deficiency of calcium** — велика недостатність кальція негативно впливає на врожай
3. **potatoes do badly** — картопля погано росте
4. **as it is then that the tubers are formed with the lowest moisture content** — саме тоді формуються бульби з низьким процентом вмісту вологи (або з великим вмістом сухої речовини)
5. **in good working order** — в гарному робочому стані для обробки

II. What meaning have the following word combinations in the text?

To be introduced from South America, the most valuable crop, the most suitable soil, heavy soils, under wet conditions, the most favourable seasons, moderate rainfall, the growing season, a dressing of manure, the management of the cultivations, a matter of prime importance, planting time.

III. Put these questions into the correct order and answer them.

1. introduced, Where, the potato, from, was?
2. kind, potatoes, suitable, What, soil, of, the, is, most, for?
3. suffer, What, potato, the, does, yield?
4. potatoes, most, What, seasons, the, favourable, are, for?
5. obtained, quality, When, the, is, eating, best, of, potatoes, generally?
6. potatoes, apply, economical, When, usually, manure, it, labour, most, is, of, to, the, for?
7. planting, very, What, for, it, important, is, potatoes, time?

IV. The following sentences have mistakes. Correct them.

1. It is usually most economical of labour to apply the manure during the summer.
2. In wet summers the yield is often limited by the water supply.
3. Potatoes do badly on light soils and under dry conditions.
4. As a producer on human food the potato is the most valuable crop grown in Great Britain.
5. The potato (*Solanum tuberosum*) was introduced from North America in the sixteenth century.
6. The most suitable soil for potatoes is a heavy deep loam or alluvium, but the crop does badly on black-top or peaty land.
7. The most favourable seasons are those of heavy rainfall.

8. The best eating quality is generally obtained when the last phase of the growing season is fairly wet.

V. Look back at the text and choose the correct words to go together.

At/in planting time,
yield is often limited with/by the water supply,
above/under wet conditions,
in/at Great Britain,
was introduced off/from South America,
crop does well on/in black-top or peaty land,
at/in dry summers,
will depend very largely of/on the time of the year.

VI. Name a word or a word combination, which is not a part of the logical group.

1. A light deep loam, landlord, alluvium, black-top land, peaty land;
2. Moderate rainfall, waterfall, dry summers, the growing season;

VII. Translate into English.

1. Картопля вимоглива до вологи, особливо у період інтенсивного росту й розвитку бадилля, бутонізації та цвітіння. 2. Оптимальна вологість ґрунту для росту бульб — 80 %, а під час достигання — 60—70%. 3. Це означає, що в період бульбоутворення необхідно не менш як 300 мм опадів. 4. При нестачі вологи у ґрунті бульби припиняють дальший ріст. 5. Тому одним із засобів підвищення врожайності картоплі є штучне зрошування, садіння на низинах, заплавах землях. 6. Разом з тим при надлишку вологи бульби погано ростуть, загнивають. 7. Культура ця світлолюбна. 8. При надмірному загущенні або затемненні бур'янами, у затінку саду бульбоутворення не відбувається, а іноді рослини навіть гинуть. 9. Картопля потребує багато добрив. 10. У період від сходів до бутонізації картопля споживає значну кількість азоту, фосфору і калію.

GRAMMAR EXERCISES

I. Translate into Ukrainian, paying attention to the obligation phrases.

1. At the time of planting potatoes the land should be sufficiently dry and in good working order, as a crop put in cold wet soil seldom develops satisfactorily. 2. The potato should not be planted in land with an extreme deficiency of calcium. 3. A farmer should apply manure during the winter and plough it in as soon as possible. 4. After ploughing in the manure the land is to be worked into a deep, loose tilth. 5. The time of planting depends upon the district and the variety that is to be grown.

6. Every student should know the difference between the root crops and tubers. 7. The potato crop is to receive a dressing of manure in good time (своевременно). 8. We had to apply manure as the soil was very poor in organic matter. 9. If we want the potato to do well, we should not plant this crop on heavy soils and under wet conditions.

II. Translate into Ukrainian, paying attention to the construction “it is ... that”.

1. It is the potato (*Solanum tuberosum*) that was introduced from South America in the sixteenth century. 2. It is from South America that the potato was introduced in the sixteenth century. 3. It is in the sixteenth century that the potato was introduced into Great Britain. 4. It is on heavy soils and under wet conditions that potatoes do badly. 5. The best eating quality is generally obtained when the last phase of the growing season is fairly dry, as it is then that the tubers are formed with the lowest moisture content. 6. It is the water supply that often limits the yields of potatoes in dry summers. 7. It is on soils with an extreme deficiency of calcium that the yield of potatoes suffers greatly.

III. Put the verbs in brackets into the appropriate form and explain the usage of that form in the sentence.

1. The potato (*Solanum tuberosum*) (*to introduce*) from South America in the sixteenth century. 2. The time of planting (*to depend*) the district and the variety that is being grown. 3. A farmer (*to apply*) manure during the winter and (*to plough*) it in as soon as possible. 4. Every student (*to know*) the difference between the root crops and tubers. 5. The management of the potato cultivations (*to depend*) very largely on the time of the year.

Wordlist

sugar beet	цукровий буряк	сахарная свекла
biennial plant	дворічна рослина	двухлетнее растение
tops	бадиля	ботва
pulp	пульпа	пульпа
liming	внесення вапна у ґрунт	известкование
withstand	протистояти	противостоять
furrow	борозна	борозда
slice	зріз	срез
endeavour	спроба	попытка

I. Read the text and answer the following questions:

1. What is the main object of the sugar beet growing?
2. How are tops and pulp used in agriculture?

3. What soil is the best for beet?
4. What types of soil are unsatisfactory for sugar beet growing?
5. What is the way to protect beet roots in the hard weather?
6. What does a full germination of the seed depend on?
7. What kind of diseases is beet attacked by?

ROOT CROPS

Sugar Beet

Sugar beet is a *biennial plant* closely related to the red beet. Sugar beets are white-coloured; their average weight is about 1 lb. They have **high dry-matter content**,¹ their sugar content alone amounting to from 13 to more than 20 per cent of their weight.

Sugar beet cultivation has now extended to every country in Europe, to America, and to many other temperate countries throughout the world. Although the main object of growing beet is the production of sugar, the by-products, *tops and pulp*, are important to many growers, especially dairy farmers. In other cases the **tops are ploughed in as manure**.²

The best soil for beet is a deep free-working loam, but the crop has been grown quite satisfactorily on well-drained soils of practically all types.

Stony soils are unsatisfactory because **they cause the roots to fork**.³ Beet cannot be grown profitably on land that requires *liming*. **With regard to**⁴ quality, it is found that the highest sugar content is obtained when the beet is grown on light land and the lowest on peaty soil. **Owing to the infrequency of hard autumn frosts in Britain**,⁵ the roots — which *withstand* of frost when lifted, and more in the ground— do not require **elaborate storage precautions**⁶ but it is necessary that the roots be protected in really hard weather.

The ploughing should be as deep as the nature of the soil will permit, and in some cases **it may be profitably accompanied by subsoiling**;⁷ it should be done early so that the *furrow slices* get the benefit of long exposure to winter frosts. A full germination of the seed depends on an adequate moisture supply, **and this is best secured by consolidating the surface soil with rollers**⁸ both before and⁹ after sowing.

The yield of the crop depends very largely on the number of beets that can be grown to the acre, and experience has shown that **on average land**¹⁰ an *endeavour* should be made to produce at least 30,000 plants on this acre.

Beet is attacked by a number of the fungoid diseases and insect pests, but their incidence is seldom serious **unless the crop is grown for several years on the same land**.¹¹

Notes

1. high dry-matter content — високий процент вмісту сухої речовини

2. **tops are ploughed in as manure** — бадилля переорюється з ґрунтом як добрива
3. **they cause the roots to fork** — з цієї причини буряк приймає форму виделки
4. **with regard to** — відносно, що стосується
5. **owing to the infrequency of hard autumn frosts in Britain** — завдяки тому, що сильні осінні заморозки в Англії бувають рідко
6. **elaborate storage precautions** — особливі застороги під час зберігання
7. **it may be profitably accompanied by subsoiling** — її (оранку) можна з успіхом комбінувати з підґрунтовою оранкою
8. **and this is best secured by consolidating the surface soil with rollers** — і цього можна досягти завдяки ущільненню верхнього пласту ґрунту котками
9. **both ... and** — як... так і
10. **on average land** — на помірно родючому ґрунті
11. **unless the crop is grown for several years on the same land** — якщо цю культуру не вирощувати на одній і тій же ділянці багато років поспіль

II. What meaning have the following word combinations in the text?

Closely related, average weight, sugar content, sugar beet cultivation, throughout the world, a deep free-working loam, well-drained soils, cannot be grown profitably, light land, the lowest on peaty soil, the nature of the soil, the benefit of long exposure to winter frosts.

III. The following sentences have mistakes. Correct them.

1. The yield of the crop does not depend very largely on the number of beets that can be grown to the hectare.
2. Beet can be grown profitably on land that requires liming.
3. The worst soil for beet is a deep free-working loam.
4. Sugar beets are red-coloured.
5. They have high wet-matter content.
6. Stony soils are satisfactory for sugar beet planting.
7. With regard to quality, it is found that the highest sugar content is obtained when the beet is grown on heavy land and the highest on peaty soil.

IV. Look back at the text and choose the correct words to go together.

Beet is attacked by/with a number of the fungoid diseases;
at/in some cases;
in/on the ground;
 owing on/to the infrequency;
at/on land;
 closely related with/to the red beet;
 has now extended on/to every country;
 with regard in/to quality;

withstand to/of frost;
in/at really hard weather.

V. Name a word or a word combination, which is not a part of the logical group.

1. Main object of growing beet, the production of sugar, bottoms, tops and pulp, manure.
2. A deep free-working loam, lightning, well-drained soils, stony soils, light land.
3. To be attacked, the fungoid diseases, pasture, insect pests.

VI. Complete each sentence with a word or phrase from the text.

1. Beet is attacked by a number of the fungoid diseases and insect pests, but their incidence is seldom serious unless
2. Beet on land that requires liming.
3. The best soil for beet is a deep free-working loam, but the crop has been grown on well-drained soils of practically all types.
4. Sugar beet is a ... plant closely related to the red beet.
5. Although the main object of growing beet is , the by-products, tops and pulp, are important to many growers, especially ... farmers.
6. Stony soils are unsatisfactory because they cause the roots ...
7. It is found that the ... sugar content is obtained when the beet is grown on ... land and the ... on peaty soil.

GRAMMAR EXERCISES

I. Translate into Ukrainian, paying attention to the functions of the Participle.

1. Sugar beet is a biennial plant growing in many countries. 2. Sugar beets are white-coloured, their average weight being about 1 lb. 3. Sugar beets have a high dry-matter content, their sugar content alone amounting to 13-20 per cent of their weight. 4. The main object of sugar-beet cultivation is the production of sugar, tops and pulp being very important by-products for dairy farms. 5. A deep free-working loam is the best soil for beets doing satisfactorily on well-drained soils of all types. 6. Owing to the infrequency of hard autumn frosts in Britain sugar beets do not require storage precautions.

II. Translate into Ukrainian, paying attention to the functions of the Gerund.

1. The main object of growing sugar beets is the production of sugar. 2. The by-products—tops and pulp—are important in dairy farming. 3. Beet cannot be

grown profitably on land that requires liming. 4. In some cases ploughing may be accompanied by subsoiling. 5. A moisture supply is best secured by consolidating the surface soil with rollers both before and after sowing. 6. It is impossible to grow crops without ploughing the land. 7. Protecting roots of sugar beets is necessary in really hard weather. 8. Ploughing must be as deep as the nature of the soil permits.

III. Put up four questions of different types (general, special, disjunctive, alternative) to each sentence.

Model: *Sugar beet is a biennial plant closely related to the red beet.*

- 1) *Is sugar beet a biennial plant closely related to the red beet?*
- 2) *What kind of plant is sugar beet?*
- 3) *Sugar beet is a biennial plant closely related to the red beet, isn't it?*
- 4) *Is sugar beet or potato a biennial plant closely related to the red beet?*

1. Sugar beet cultivation has now extended to every country in Europe.
2. The by-products, tops and pulp, are important to many growers, especially dairy farmers.
3. The best soil for beet is a deep free-working loam.
4. Beet cannot be grown profitably on land that requires liming.
5. A full germination of the seed depends on an adequate moisture supply.
6. Beet is attacked by a number of the fungoid diseases and insect pests.

VI. Put the verbs in brackets into the appropriate form and explain the usage of that form in the sentence.

1. Beet (*to attack*) by a number of the fungoid diseases and insect pests. 2. It is found that the highest sugar content (*to obtain*) when the beet (*to grow*) on light land and the lowest on peaty soil. 3. Sugar beet cultivation (*to extend*) now to every country in Europe, to America, and to many other temperate countries throughout the world. 4. The crop (*to grow*) quite satisfactorily on well-drained soils of practically all types. 5. A full germination of the seed (*to depend*) on an adequate moisture supply.

V. Make the sentences of the exercise II negative.

UNIT 9

Wordlist

pulse crops	бобові культури	бобовые культуры
bean	боб	боб
thrive	буйно розростатися	буйно разрастаться
clover	конюшина	клевер
soiling	замулення	заиление
ensilage	силосування	силосование
hay	сіно	сено
dwarf	карликовий	карликовый
pod	стручок	стручок

- I. Read the text and answer the question: “What are the best conditions for the beans growing?”

PULSE CROPS

Beans

The common *bean* is one of the most ancient of cultivated plants.

Beans are grown **to a greater or less extent**¹ in most of the **arable districts**² of Britain, but they give best results when grown on **stiff clay soils**,³ and may even fail on the lighter portions of a field. Probably the very best soils are the **chalky boulder clays**,⁽⁴⁾ as the bean does best where there is plenty of lime; but the crop will not *thrive* unless the land be well drained. On land rich in humus **the yield of grain is often disappointing**,⁵ though the weight of straw may be very great.

Beans may take the place of *clover* in a rotation, as, being legumes, they tend to increase the soil reserves of nitrogen.

- II. Before the detailed full translation of the text, first, translate the words in **ARIAL BLACK** and find out the main idea of the text.

Peas

Peas are very **similar** in composition **to beans**, i.e. they contain nearly 20 per cent of *digestible protein*⁽⁶⁾ and have a *low fibre content*.⁷ When intended for animal food, **peas may be grown** either **pure** or **in mixture with oats**, and the mixed crop may be either treated as a grain crop

or cut green for *soiling*, *ensilage*, or *hay*. **Peas** grown for human food **are dealt with in three different ways. Firstly**, any of the *dwarf* garden sorts **can be grown in the field and be picked for market** when the *pods* are still green and the seed still soft. **Secondly, the crop may be sown** and the whole material **sent to a factory**, either **to be canned** or **to be preserved** by "quick freezing". **Thirdly, the crop may be ripened and threshed**. The threshed dried peas may be cleaned, stored, and put up in packets for sale, or they may be processed in order to soften them and then canned. **The best pea soil is a medium calcareous loam**, but dry sandy or gravelly land is required for the production of early picking crops.

Experiments have shown that **the crop responds** most markedly **to potash**, and to phosphate only when the soil shows a marked deficiency.

Notes

1. **to a greater or less extent** — в тій, чи іншій мірі
2. **arable districts** — землеробні регіони
3. **stiff clay soils** — грубі глинисті ґрунти (глиноземи)
4. **chalky boulder clay** — вапняна валунна глина
5. **the yield of grain is often disappointing** — врожай зерна часто розчаровує
6. **digestible protein** — білок, що легко засвоюється
7. **a low fibre content** — низький вміст волокон

III. What meaning have the following word combinations in the text?

To be very similar, to be intended for animal food, to be grown either pure or in mixture, to be dealt with in three different ways, to be picked for market, to be canned, to be preserved, "quick freezing", to be ripened and threshed, early picking crops, to respond most markedly to potash.

IV. Put these questions into the correct order and answer them.

1. beans, similar, Why, peas, to, are?
2. oats, or, be, When, either, peas, mixture, grown, pure, in, with, may?
3. human, are, the, What, tree, different, of, ways, peas, using, for, food?
4. processed, threshed, How, the, may, peas, dried, be?
5. soil, What, best, is, the, pea?
6. markedly, to, the, Which, does, pea, fertilizer, crop, respond?

V. Translate into Ukrainian and write questions about the underlined information.

1. The common bean is one of the most ancient of cultivated plants. 2. Beans give better results on stiff clay soils. 3. On lighter clay soils this crop may even fail. 4. The best soils for growing beans are the chalky boulder clays. 5. The bean does best on soils, which are rich in lime. 6. The yield of beans is often lower on land rich in humus though the weight of straw may be very great. 7. Peas contain as much digestible protein as beans. 8. The best pea soil is a medium calcareous loam. 9. Peas respond most markedly to potash. 10. The soil where beans are grown is richer in nitrogen than other soils.

VI. Decide if these statements are true or false. Quote from the passage to support your decisions.

1. Beans give best results when grown on sandy soils, and may even fail on the heavier portions of a field.
2. The beans crop will thrive until the land is well drained.
3. Beans tend to decrease the soil reserves of nitrogen.
4. The fresh green peas may be cleaned, stored, and put up in packets for sale, or they may be processed in order to soften them and then canned.
5. Wet clay or peat land is required for the production of early picking crops.

GRAMMAR EXERCISES

I. Translate into Ukrainian paying attention to the passive infinitive.

1. Beans may be grown in most countries. 2. Beans can be grown successfully on stiff clay soils but their yields may be even lost on the lighter portions of a field. 3. Beans must be grown on lands with plenty of lime for obtaining the best results. 4. In a rotation the place of clover may be taken by beans as they tend to increase the soil reserves of nitrogen. 5. Beans may be grown either pure or in mixture with oats. 6. The mixed crop may be used as a grain crop or cut green for soiling, ensilage or hay. 7. Peas may be mown and then sent to a factory either to be canned or to be preserved by "quick freezing." 8. The threshed dried peas may be cleaned, stored, and put up in packets for sale.

II. Translate into Ukrainian paying attention to the conjunctions both ... and - как ... так и , either ... or — или ... или neither ... nor — ни ... ни

1. Both beans and peas are legumes. 2. Both chalky boulder clays and stiff clay soils are good for growing beans. 3. Both peas and beans can be used for human food and for animal feed. 4. Peas may be either treated as a grain crop, or cut green for soiling, ensilage, or hay. 5. When intended for animal food, peas may be grown either pure or in mixture with oats. 6. Our collective farm grows neither beans nor peas.

7. Garden sorts of peas can be grown in the field and be picked for market when the pods are still green and the seed still soft, otherwise (в противном случае) the grower will neither sell his pea nor get any profits.

III. Put up four questions of different types (general, special, disjunctive, alternative) to each sentence.

Model: *The common bean is one of the most ancient of cultivated plants.*

- 1) *Is the common bean one of the most ancient of cultivated plants?*
- 2) *Why is the common bean one of the most ancient of cultivated plants?*
- 3) *The common bean is one of the most ancient of cultivated plants, isn't it?*
- 4) *Is the common bean or pea one of the most ancient of cultivated plants?*

1. Probably the very best soils are the chalky boulder clays.
2. Beans may take the place of clover in a rotation.
3. Peas are very similar in composition to beans.
4. Peas may be grown either pure or in mixture with oats.
5. The best pea soil is a medium calcareous loam.

IV. Put the verbs in brackets into the appropriate form and explain the usage of that form in the sentence.

1. Experiments (*to show*) that the crop (*to respond*) most markedly to potash. 2. Dry sandy or gravelly land (*to require*) for the production of early picking crops. 3. The crop may (*to ripen and thresh*). 4. Peas grown for human food (*to deal*) with in three different ways. 5. They (*to contain*) nearly 20 per cent of digestible protein and have a low fibre content. 6. They (*to tend*) to increase the soil reserves of nitrogen.

V. Make the sentences of the exercise II negative.

Wordlist

hull	лушпиння	скорлупа, шелуха
adheres to the kernel	щільно торкається насіння	плотно касается семени
foodstuff	харчові продукти	пищевые продукты
dye	фарбувати	красить
pottery	глиняний посуд	глиняная посуда
buffalo	буйвол, бізон	буйвол, бизон
garden ornament	садова прикраса	украшение сада
edible oil	їстівна олія	съедобное масло

I. Read the text without the dictionary, try to understand its main idea and then answer the questions.

1. What two types of sunflower are grown?
2. What are the main peculiarities of the oilseed hybrids?
3. How did North American Indians use sunflower?
4. What connection between sunflower and buffalo?
5. What was the first appliance of sunflower by New World settlers?
6. Where was sunflower developed first as an important commercial oilseed crop?
7. What are the major sunflower oil producing countries in the world?
8. What country is the number one producer of sunflower nowadays?

SUNFLOWER

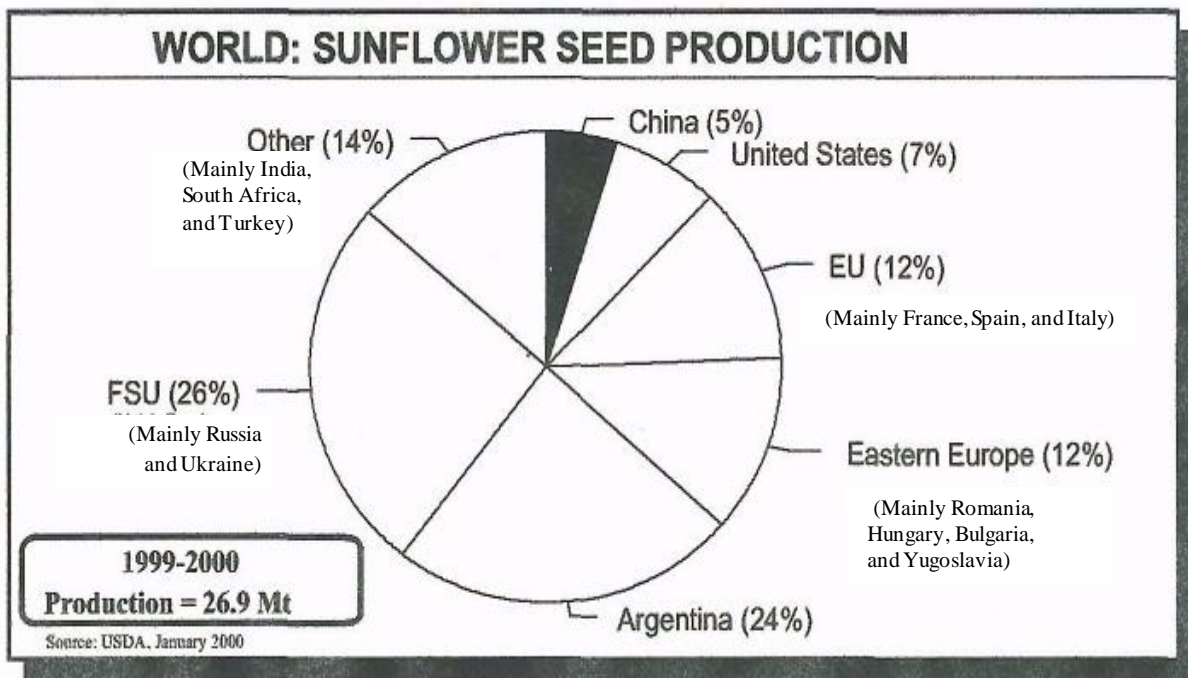
Two types of sunflower are grown: (1) those for oilseed production and (2) nonoilseed for the home and birdfood markets. The oilseed hybrids are black-seeded and have a thin *hull* that *adheres to the kernel*. Seed of the oilseed varieties contain from 38 to 50 percent oil and about 20 percent protein.

Sunflower, native to North America, has a long and varied history as an economic plant, but the time and place of its first cultivation is uncertain. Sunflower was used by North American Indians before colonization of the New World. The American Indians used sunflower as a *foodstuff* before the cultivation of corn. Sunflower also was used as a medicinal crop, source of *dye*, oil for ceremonial body painting and *pottery*, and as a hunting calendar. When sunflower was tall and in bloom, the *buffalo* were fat and the meat good.

Cultivation of sunflower was undertaken by New World settlers as a supplementary food. Spanish explorers collected sunflower in North America and by 1580 it was a common garden flower in Spain. Early English and French explorers, finding sunflower in common use by the American Indians, also introduced it to their respective lands. It spread along the trade routes to Italy, Egypt, Afghanistan, India, China, and Russia. Later, sunflower was grown primarily as a *garden ornament*. It also was grown as an ensilage crop in the late 1800s and early 1900s.

Sunflower was developed first as an important commercial oilseed crop in the Former Soviet Union (FSU). The oil has found widespread acceptance as a high quality, *edible oil* throughout much of the world. Major producing countries or areas are the FSU, Argentina, Eastern Europe, USA, China, France, and Spain. These seven countries or areas of the world produce about 84 percent of the world's production of both oilseed and nonoilseed sunflower. Historically, the FSU has been the number one producer of sunflower, producing about 27 percent of the world's production in 1991-92. Oilseed sunflower has been an economically important crop in the USA since 1966. Before 1966, sunflower acreage in the USA was devoted primarily to nonoilseed varieties. During much of the 1970s, the United States was the world's second largest producer, but in the 1980s Argentina became firmly entrenched in second place.

- II. Look at the figure and explain the distribution of the sunflower production throughout the world.



- III. Read the text using the dictionary for 5 minutes and answer the question: “Why is it so important to select high quality, uniform sunflower seed?”

High quality, uniform seed with high germination (проростання), known hybrid varietal purity, and freedom from weed seeds and disease should be selected to reduce production risks. Seed is sold on a bag weight basis or by seed count. Seed size designations are fairly uniform across companies. Most seed is now treated with a fungicide and insecticide to protect the germinating seedling (паросток).

- IV. Read the text without the dictionary trying to understand the meaning of the bold phrases with the assistance of the surrounding words.

Maturity

Sunflower in the Northern Great Plains production area usually is ready for **harvest** in late September or October, with a **growing season** of approximately 120 days. The growing season may **vary in length** depending on summer temperatures, **relative moisture distribution** and fertility levels. The sunflower plant is physiologically **mature** when the back of the head has turned from green to yellow and the **bracts** are turning brown, about 30 to 45 days after **bloom**, and seed moisture is about 35 percent.

Desiccants can be applied to the crop after physiological maturity to speed the dry-down process. The chemical compounds act much like a frost to kill the green

tissue on the plant and **accelerate** its drying. After **applications** of a desiccant, **dry-down** of the seed is not as rapid as the dry down of the plant. **Growers** often are tempted to apply desiccants too early when potential loss factors are present. Application of a desiccant before the plant reaches physiological maturity will reduce yield and **lower** oil percentage. Drying is **facilitated** in most years by a **killing frost**, but if frost occurs too early, yield and oil percentage are reduced.

Harvesting sunflower at moisture contents ranging as high as 25 percent may reduce seed **shattering loss** during harvest and loss from birds. Sunflower seed from the combine is then dried in a **grain dryer** to 9.5 percent, which is considered a **safe storage level**.

**V. Read the text using the dictionary for 5 minutes and answer the question:
“What are the best soil conditions for sunflower?”**

Sunflower is adapted to a variety of soil conditions, but grows best on well-drained, high water-holding capacity soils with a near neutral pH (pH 6.5-7.5). Production performance on high-stress soils such as those affected by droughtiness, salinity, or wetness is not exceptional but compares favorably with other commercial crops commonly grown.

**VI. Read the text using the dictionary for 5 minutes and answer the question:
“What nutrients does sunflower obtain from the soil?”**

Sunflower, like other green plants, requires at least 16 elements for growth. Some of these, such as oxygen, hydrogen and carbon, are obtained from water and the air. The other nutrients are obtained from the soil.

Nitrogen, phosphorus, and sulfur are frequently deficient in soils in any climatic zone. Potassium, calcium, and magnesium are frequently deficient in high-rainfall areas. Deficiencies of iron, manganese, zinc, copper, molybdenum, boron and chlorine are uncommon but can appear in many climatic zones.

VII. Translate the text using the dictionary for 10 minutes and then answer the questions.

1. Following what crops are the sunflower yields the greatest?
2. What problems will growers who do not rotate sunflower fields sooner or later be confronted with?

Rotations

Growers who have produced sunflower as a cash crop for several years have learned that a systematic rotation with other crops is essential. Several research studies show that sunflower yields are greater following most other crops than following sunflower (Table).

Table. Average yields of sunflower grown in monoculture and in alternation with potato, sugar beet, pinto bean, and wheat at Crookston, MN 1972-78.

Previous crop	Seed yield/acre (pounds) 4 Yr.				Ave.
	1973	1975	1977	1978	
Sunflower	852	1338	1852	1781	1456
Potato	908	1279	2348	1605	1535
Sugar beet	770	1683	2358	2168	1745
Pinto Bean	946	1410	2282	1674	1578
Wheat	1284	1549	2339	1655	1706

Growers who do not rotate sunflower fields will sooner or later be confronted with one or more of the following yield reducing problems:

- Disease and disease-infested fields.
- Increased insect risk.
- Increasing populations of certain types of weeds.
- Increased populations of volunteer sunflower.
- Soil moisture depletion.

Therefore, there are many valid reasons for rotating sunflower fields.

GRAMMAR EXERCISES

I. Put up four questions of different types (general, special, disjunctive, alternative) to each sentence.

Model: *Two types of sunflower are grown.*

- 1) *Are two types of sunflower grown?*
- 2) *How many types of sunflower are grown?*
- 3) *Two types of sunflower are grown, aren't they?*
- 4) *Are two or three types of sunflower grown?*

1. Sunflower was used by North American Indians before colonization of the New World.
2. The American Indians used sunflower as a foodstuff before the cultivation of corn.
3. Sunflower was developed first as an important commercial oilseed crop in the Former Soviet Union (FSU).
4. Oilseed sunflower has been an economically important crop in the USA since 1966.
5. In the 1980s Argentina became firmly entrenched in second place.

II. Put the verbs in brackets into the appropriate form and explain the usage of that form in the sentence.

1. Nitrogen, phosphorus, and sulfur (*to be*) frequently deficient in soils in any climatic zone. 2. Sunflower (*to adapt*) to a variety of soil conditions 3. Before 1966, sunflower acreage in the USA (*to devote*) primarily to nonoilseed varieties. 4. Oilseed sunflower (*to be*) an economically important crop in the USA since 1966. 5. It also (*to grow*) as an ensilage crop in the late 1800s and early 1900s. 6. Cultivation of sunflower (*to undertake*) by New World settlers as a supplementary food.

III. Make the sentences of the exercise II negative.

UNIT 10

Wordlist

environment	навколишнє середовище	окружающая среда
nutrient	поживна речовина	питательное вещество
dispersal	розсіювання	рассеивание
recruitment	поповнення	пополнение
habitat	середовище існування	среда обитания
carbon	вуглець	углерод
fitness	пристосування	приспособленность
phenotype	фенотип	фенотип
heritable	спадковий	наследственный
trait	ознака, риса	признак, черта
earlier onset of flowering	раніший початок цвітіння	более раннее начало цветения
allele	алель	аллель
myriad	незліченна кількість	несметное число
clone	клонувати	клонировать
gene	ген	ген

I. Read the text and answer the following questions:

1. What is plant ecology?
2. What four sections can plant ecology be divided?
3. Give the definition to each of four plant ecology sections.
4. What does evolution often result from?
5. What connection between plant phenotype and plant genotype?
6. What is phenotypic variation?
7. What three main factors can the variation in phenotype be attributed to?
8. How can environment affect plant phenotype?

PLANT ECOLOGY

Plant ecology is the study of organisms in relation to their environment at the hierarchical levels of organism, population, community, and ecosystem. Plant ecology can be divided in the following four sections: (1) plant and its *environment*; (2) plant population ecology; (3) plant community ecology; and (4) ecosystem ecology. The first section will describe environmental factors (e.g., radiation, water, temperature, and *nutrients*) and their effects on plant processes. The second section will focus on biological processes regulating population dynamics, including growth, reproduction, *dispersal*, and *recruitment*. The third section on community ecology

will study patterns of multiple species coexisting in ecological *habitats*. The last section on ecosystem ecology provides the information about the cycling of *carbon*, water, and nutrients in an ecosystem in general and the role of plants in those cycles in particular.

Evolution in plants oftentimes results from natural selection—differential *fitness* of individuals (plants). Natural selection acts on **plant phenotype**, which is the outward expression of **plant** genotypes (i.e. its form, function, behavior, etc). In order for evolution to occur due to natural selection, **plant** phenotypes must be *heritable*. That is, they must be due to, at least in part, variation in **plant** genotype. However, **plant** genotype and environment interact to produce more variation in phenotype as described below.

Phenotypic variation is the variation in some **plant trait**. Examples include plants having more leaves, deeper red flowers, faster growth rates, more root differentiation, *earlier onset of flowering*, etc.

This variation in phenotype can be attributed to the three main factors, which interact in somewhat complex ways.

1) **Genotype**. As described above, different plants may have different *alleles* (values for genes), which therefore code for different traits. Just as you have genes that code for your eye color, plants have genes that code for flower color, leaf differentiation, growth rate etc, and plants with different alleles will often have different phenotypes.

2) **Environment**. Some of the variation that we see in **plant** phenotype is NOT due to genetic differences at all. Much of the variation in **plant** phenotype is due to the environment the **plant** grows in and the *myriad* effects that ‘environment’ can have. Quite simply, plants with the same genotype grown in different environments will look differently due to the effects of environment on their growth/development etc. you raise them apart from each other (i.e. feed one more than the other), their phenotypes will differ due to the effects of environment.

3) **Genotype-environment interaction**. Though it is simple to think of genotype and environment as independent factors that have independent effects of phenotype, more often the genotype of a **plant** and the environment that it grows in interact to influence its phenotype. Say you have a **plant** with a genotype that allows it to grow much larger in the presence of high soil water. You *clone* the **plant**, grow five clones in low soil water and five in high soil water, and then measure their growth. Not surprisingly, the plants are different sizes despite the fact that they have the same genotype. The genes for large growth in wet soil were only expressed in the plants in wet soil. How is this different from the effect of environment? The interaction is clear when you compare the clones with the special genotype for rapid growth in wet soil to those *without* these genes. The clones of a **plant** without the *genes* for rapid growth in high water do not differ between the two environments, as their genotype does not interact with this environment.

II. What meaning have the following word combinations in the text?

Plant ecology, plant population ecology, plant community ecology, ecosystem ecology, environmental factors, population dynamics, coexisting species, natural selection, plant genotypes, plant phenotypes, deeper red flowers.

III. Find from the box the correct definition.

1. *Plant and its environment ...*
2. *Plant population ecology ...*
3. *Plant community ecology ...*
4. *Ecosystem ecology ...*

- | |
|--|
| <ol style="list-style-type: none">1. ... will study patterns of multiple species coexisting in ecological habitats.2. ... will focus on biological processes regulating population dynamics, including growth, reproduction, dispersal, and recruitment.3. ... provides the information about the cycling of carbon, water, and nutrients in an ecosystem in general and the role of plants in those cycles in particular.4. ... will describe environmental factors (e.g., radiation, water, temperature, and nutrients) and their effects on plant processes. |
|--|

IV. The following sentences have mistakes. Correct them.

1. Some of the variation that we see in plant phenotype is due to genetic differences at all.
2. Phenotypic variation is the variation in some plant part.
3. Natural selection acts on plant genotypes, which is the outward expression of plant phenotype.

V. Put a word from the box in the correct place of the sentence.

1. *coexisting in ecological habitats.*
2. *environment*
3. *plant phenotypes*
4. *plant genotypes*
5. *trait*
6. *cycling*
7. *organisms*
8. *dynamics*

1. Phenotypic variation is the variation in some plant
2. Natural selection acts on plant phenotype, which is the outward expression of.....
3. Ecosystem ecology provides the information about the ... of carbon, water, and nutrients in an ecosystem in general and the role of plants in those cycles in particular.
4. In order for evolution to occur due to natural selection, ... must be heritable.
5. Plant ecology is the study of ... in relation to their environment at the hierarchical levels of organism, population, community, and ecosystem.
6. Plant and its ... will describe environmental factors (e.g., radiation, water, temperature, and nutrients) and their effects on plant processes.
7. Plant population ecology will focus on biological processes regulating population... , including growth, reproduction, dispersal, and recruitment.
8. Plant community ecology will study patterns of multiple species

VI. Look back at the text and choose the correct words to go together.

1. to interact on/with this environment;
2. to compare the clones with/in the special genotype;
3. As described on/above;
4. with/in order from/for evolution;
5. effects up/on plant processes;
6. in/on relation from/to;
7. on/at the hierarchical levels;
8. to act to/on plant phenotype;
9. to occur due on/to natural selection;
10. to think from/of genotype;
11. do not differ among/between the two environments.

VIII. Name each paragraph of the text “ Plant Ecology “.

IX. Name a word or a word combination, which is not a part of the logical group.

1. Plant and its environment, growing season, plant population ecology, plant community ecology, ecosystem ecology.
2. Population dynamics, growth, reproduction, oilseed production, dispersal, and recruitment.
3. Natural selection, plant phenotype, foodstuff, plant genotypes.
4. Phenotypic variation, plants having more leaves, deeper red flowers, faster growth rates, garden ornament, more root differentiation, earlier onset of flowering.

GRAMMAR EXERCISES

I. Put up four questions of different types (general, special, disjunctive, alternative) to each sentence.

Model: *Plant ecology is the study of organisms in relation to their environment.*

- 1) *Is plant ecology the study of organisms in relation to their environment?*
- 2) *What is plant ecology?*
- 3) *Plant ecology is the study of organisms in relation to their environment, isn't it?*
- 4) *Is plant ecology the study of organisms in relation to their environment or to each other?*

1. Plant ecology can be divided in the following four sections.
2. The first section will describe environmental factors and their effects on plant processes.
3. The second section will focus on biological processes regulating population dynamics
4. The third section on community ecology will study patterns of multiple species coexisting in ecological habitats.
5. The last section on ecosystem ecology provides the information about the cycling of carbon, water, and nutrients in an ecosystem.

II. Put the verbs in brackets into the appropriate form and explain the usage of that form in the sentence.

1. Plants (*to have*) genes that (*to code*) for flower color, leaf differentiation, growth rate etc.
2. Phenotypic variation (*to be*) the variation in some plant trait.
3. Evolution in plants oftentimes (*to result*) from natural selection—differential

fitness of individual plants. 4. Natural selection (*to act*) on plant phenotype.
5. Different plants may (*to have*) different alleles.

III. Make the sentences of the exercise II negative.

Wordlist

pest	шкідник	вредитель
disease pathogens	хвороботворні організми	болезнетворные организмы
retard	відставати	отставать
thread-like appendices	додатки у вигляді ниток	нитевидные приложения
cilia	вії (епітелію)	реснички (эпителия)
locomotion	переміщення	передвижение
fission	розщеплення	расщепление
loosen	послаблювати	ослаблять
decay	розпад, гниття	распад, гниение
water ducts	водяні протоки	водные протоки
vessel	судина	сосуд
sap flow	потік соку	поток сока
wilting	починати в'янути	завядание
cure	лікувати	лечить
destroy	знищувати	уничтожить
fungicide	фунгіцид	фунгицид
liquid	рідина	жидкость
lime	вапно	известь
copper sulphate	сульфат міді	сульфат меди
sulphur	сірка	сера
rot	гниль	гниль
blight	захворювання рослин, що характеризується в'яненням, припиненням росту	заболевание растений, характеризующееся завяданием, прекращением роста
carbon disulphide	сірниковий вуглець	сернистый углерод
germ	мікроб	микроб

I. Read the text and answer the following questions:

1. What is a decisive factor for securing yields?
2. How do pests influence the health of man?
3. What does bacteria consist of?
4. How are so-called bacterioses usually caused by?
5. What are the symptoms of "wet rot"?

6. Where does the infection of the plants with bacteria primarily take place?
7. Why do the plant pathologists concentrate their efforts on the prevention of disease rather than its cure?
8. How are fungicides often applied?

THE IMPORTANCE OF PLANT PROTECTION AND PEST CONTROL MEASURES

A decisive factor for securing yields is the protection of agricultural cultures.

Day by day¹ cultivated plants and supplies in **store rooms**² are threatened by thousands of *pests* and *disease pathogens*. Every year millions of tons of produce are lost and plants and animals *retarded* in growth and development or the products derived from these organisms affected both quantitatively and qualitatively. Control of these pests and disease pathogens must become the greatest command for all scientists, technical engineers and farmers responsible for the production of agricultural products.

What is meant by a pest or disease pathogen? They are animal or plant organisms, which damage either cultivated plants or the products derived there from. They directly or indirectly influence the health of man and domestic and useful animals.

Bacteria as Disease Pathogens. Bacteria, unlike higher organisms, consist of a single cell only. Some of the bacteria possess *thread-like appendices*, so-called *cilia*, for purpose of *locomotion*. These cilia are fixed either at one end of the cell or are arranged over the whole surface of the cell. The size of the cells is microscopic, the pathogen thus being visible with the aid of a microscope only. Bacteria multiply by simple *fission*.

Bacterial diseases, so-called bacterioses, are usually caused by the penetration of bacteria into injured plant parts.

By excreting certain chemical agents bacteria break up cell unions, *loosen* them or kill part of the cells.

This is followed by *decay* of plant parts, the infected plant tissue turning into a soft pulpy mass. Such disease symptoms are termed "**wet rot**."³

Some bacteria penetrate deeper into the tissue, reaching the *water ducts* within the plant and plant *vessels* and destroy this tissue.

This leads to blocking of the vascular system.

The exhibited disease symptoms, known as "**vessel bacteriosis**"⁴ lead to an interruption of the *sap flow* within the plant, followed by *wilting* and death. The infection of the plants with bacteria primarily takes place at plant wounds. Insects also act as carriers of bacteria.

Control of plant diseases. Plant diseases establish in such a manner that they are often well developed before they can be detected. By the time the disease is evident it is rarely possible to cure it.

The plant pathologists, therefore, **concentrate their efforts on the prevention of disease rather than its cure.**⁵ The use of disease-resistant varieties is one of the most effective means of reducing disease in cultivated plants. It is also very important to destroy the sources of infection. Fire is the most effective way in this case.

The elimination of host plants⁶ plays an important part in the control of some diseases caused by **rust fungi.**⁷ Efficient drainage of the soil helps in checking diseases which attack the tissues at ground level.

Fungicides now play a very important part in the control of plant diseases.

They are often applied in liquid or powder form. Spray mixtures are used for the control of some diseases especially those that attack orchards. Copper sulphate, lime, sulphur and Bordeaux mixture are used to control some of the rots, blights and mildew diseases. Carbon disulphide and chloropicrin are used for treating soil against nematodes. By planting at particular times some crops can be grown and mature before the disease germs become active.

Notes

1. **day by day** — щодня
2. **store rooms** — сховища
3. **"wet rot"** — мокра гниль
4. **"vessel bacteriosis"** — бактеріальний рак
5. **concentrate their efforts on the prevention of disease rather than its cure** — роблять все можливе, щоб запобігти хворобі замість того, щоб лікувати її...
6. **the elimination of host plants** — винищування рослин-хазяїв
7. **rust fungi** — грибки іржі

II. What meaning have the following word combinations in the text?

Securing yields, control of these pests and disease pathogens, domestic and useful animals, bacterial diseases, the penetration of bacteria, the infected plant tissue, a soft pulpy mass, blocking of the vascular system, plant wounds, disease-resistant varieties, ground level, spray mixtures.

III. Find from the box the correct definition.

1. *Such disease symptoms are termed "wet rot"*
2. *A pest or disease pathogen*
3. *Bacterial diseases, so-called bacterioses*
4. *The exhibited disease symptoms, known as "vessel bacteriosis"*

1. lead to an interruption of the sap flow within the plant, followed by wilting and death.
2.are usually caused by the penetration of bacteria into injured plant parts.
3. are animal or plant organisms, which damage either cultivated plants or the products derived there from.
4. This is followed by decay of plant parts, the infected plant tissue turning into a soft pulpy mass

IV. The following sentences have mistakes. Correct them.

1. Fire is the most effective way to distribute the sources of infection.
2. Bacterial diseases, so-called bacterioses, are usually caused by the penetration of bacteria into all plant parts.
3. Pest or disease pathogens directly or indirectly influence the health of plants.
4. Bacteria, unlike higher organisms, consist of two cells only.
5. By the time the disease is evident it is often possible to cure it.

V. Using the dictionary translate the text into Ukrainian.

1. The Hessian fly (Гесенська мошка) is believed to be the most destructive insect attacking wheat. 2. The most effective means of controlling the Hessian fly in the winter wheat regions are late planting. 3. The Hessian fly is known to occur in many parts of the world where wheat is grown. 4. The adult Hessian fly looks like a little dark-coloured gnat about one-tenth inch long. 5. The eggs of the Hessian fly are usually placed in irregular rows upon the upper surface of the leaves. 6. Small reddish maggots (лічинки, хробаки) of the Hessian fly soon turn white, are cylindrical and have no true head or legs. 7. The maggots absorb the plant sap thus destroying the plant tissues. 8. Being attacked by the Hessian fly the plants stool out, the leaves turn dark, the central stems are absent, at last the plants yellow and die.

VI. Using the dictionary translate the text into Ukrainian.

Ridomil 2E is registered for use on both bearing and nonbearing apple trees. Ridomil applications should be made before symptoms appear, especially in areas of the orchard favorable for disease development. Ridomil will not revitalize trees showing moderate to severe disease symptoms.

Stone fruit: For new plantings, make the first application 2 weeks after planting. Additional applications should be made at 2-3 month intervals or to coincide with periods most favorable for root, crown, or collar rot development.

For established plantings, the application should be made in spring before the plants start growth. Additional applications should be made at 2-3 month intervals or to coincide with periods most favorable for root, crown, or collar rot development.

Apply 2 gallons per treated acre (6 fl oz/1000 sq ft) in sufficient water to obtain thorough coverage of the soil under the canopy of the trees. Up to three applications can be made per year.

VII. Translate this text without the dictionary and find out the answers to the questions given below.

USING FUNGICIDES EFFICIENTLY FOR EFFECTIVE DISEASE MANAGEMENT IN ORCHARDS

Tree fruit growers are well aware of the complex of pathogens that produce disease on leaves, branches, and fruit spanning the season from bud break to postharvest. There are 10 or more major diseases of apple trees alone. Managing these pathogens at levels below economic injury requires the integration of cultural and sanitation measures with prudent use of agricultural chemicals.

In this section we focus on different fungicide-use options for efficient and effective disease management. It is assumed that acceptable pruning (обрізка), fertilization, and sanitation measures known to reduce inoculum (інокулят, посівний матеріал) levels are being used and that minimal fungicide rates to maintain low disease levels are desirable.

Types of Fungicides

Pesticides used for managing fungi-caused fruit diseases are either fungicidal (they kill fungi) or fungistatic (they inhibit fungal growth). Fungicides can be separated into two categories: protectants and systemics.

Protectant fungicides protect the plant against infection at the site of application. Their characteristics are as follows:

- They provide protection against infection.
- They do not penetrate into the plant.
- They require uniform distribution over the plant surface.
- They require repeated application to renew deposit.
- They have a multisite mode of action against fungi.

- Fungi are not likely to become resistant to protectant fungicides.

Some common protectant fungicides are Bravo, captan, copper, Dodine, Ronilan, Rovral, and sulfur.

Systemic fungicides prevent disease from developing on parts of the plant away from the site of application. Their characteristics are:

- They penetrate into the plant.
- They move within the plant.
- They often control disease by eradication.
- They often have a very specific mode of action against fungi.

Some systemic fungicides are Bayleton, Benlate, Funginex, Nova, and Rubigan.

Modes of Action

Fungicides can act on fungi by (1) inhibiting energy production (e.g., sulfur, copper, manzate, and captan), (2) interfering with cell structure (e.g., Dodine), and (3) interfering with growth (e.g., Benlate, Funginex, Bayleton, Nova, and Rubigan).

* * * * *

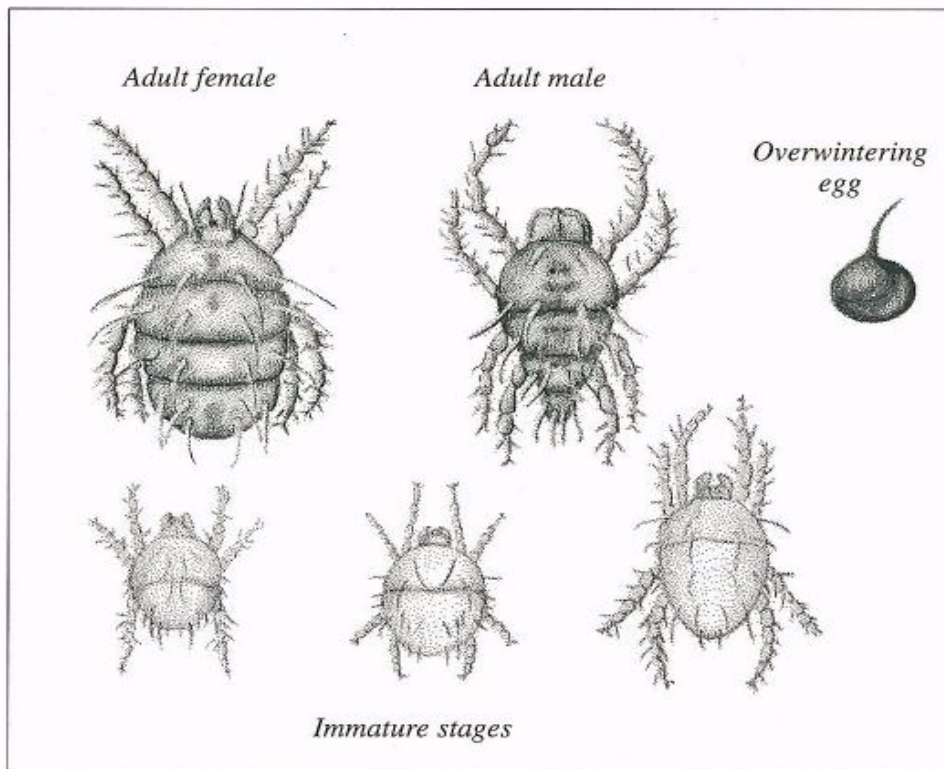
1. *Why is it so important to integrate cultural and sanitation measures with prudent use of agricultural chemicals to manage the plant pathogens?*
2. *What differences are there between Protectant fungicides and Systemic fungicides?*
3. *How can fungicides can act on fungi?*

VIII. Translate this text without the dictionary and find out the answers to the questions given below.

European Red Mite

Description and life cycle

The European red mite (кліщ червоний плодovий), *Panonychus ulmi* (Koch), a major tree-fruit pest attacking apples, stone fruits, and pears, is considered by many growers throughout Pennsylvania to be the most important apple pest. The mite was introduced into North America from Europe in the early 1900s and is now established in most fruit-growing areas.

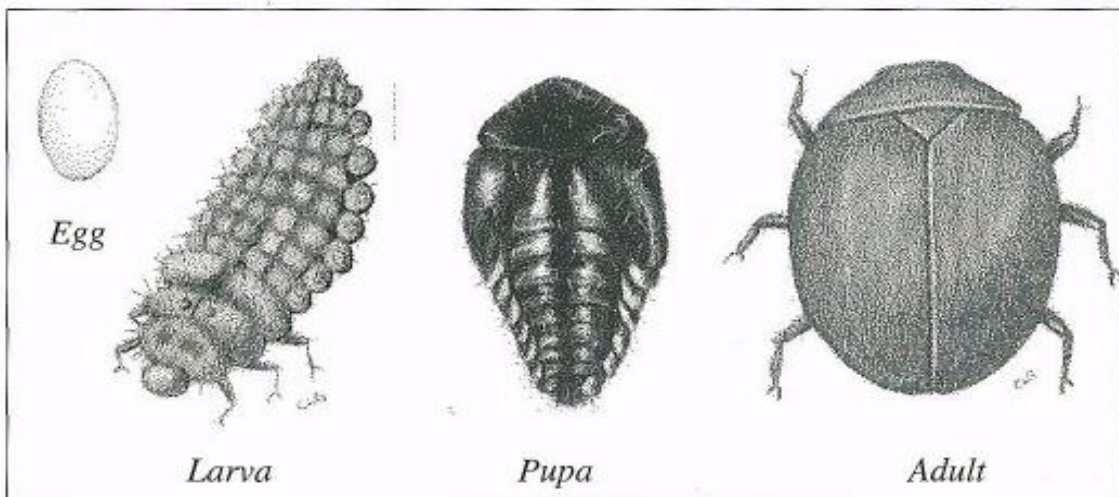


European Red Mite life stages

The rate at which mites develop is primarily temperature dependent. Hot, dry weather favors development, while cool, wet weather delays mite activities. Overwintering eggs are laid in groups on roughened bark, in crevices and cracks, and around bud scales on twigs and branches. Eggs begin to hatch at *prepink bud* (відокремлення пуп'янок) stages and continue throughout bloom. Young mites move to newly opened leaves where they feed, mature, and reproduce. The first generation requires approximately three weeks to develop; summer generations are completed in 10 to 18 days.

Each female is capable of laying 35 eggs during her average life span of 18 days. Eight to 10 generations occur during the year.

Mites feeding on leaves cause injury to the tree by removing leaf tissue. The most serious injury occurs in early summer when trees are producing fruit buds for the following season. Moderate to heavily infected trees produce fewer and less vigorous fruit buds. Mites feeding on leaves also reduce the ability of leaves to manufacture enough food for desirable sizing of fruit. Characteristic brown foliage that, in severe cases, becomes bronze, results from heavy mite feeding.



***Stethorus punctum*, black ladybird beetle life stages**

Mite predators (хижаки), such as predaceous mites and the black ladybird beetle (Сонечко), *Stethorus punctum*, are generally distributed in commercial apple orchards and contribute significantly to control of mites.

Managing mites in the apple integrated pest management program

Our integrated pest management program for apples depends largely on a miticide (акарицид) to suppress mites until the *Stethorus punctum* population reaches levels high enough to regulate the mite population below economic injury levels. This black ladybird beetle is a voracious predator of European red mites. By conserving *Stethorus* in their orchards, growers in much of Pennsylvania often can reduce the number of pesticide applications to control mites. To use this beetle, several practices must be followed:

- Pesticides that are toxic to the beetle should be avoided .
- The alternate row middle pesticide application method is recommended, but certain conditions will dictate the use of complete sprays. These conditions include extremely high mite pressure, use of a pesticide of questionable efficacy, and weather conditions conducive to a rapid increase in the mite population.
- The population densities of the mites and the beetles must be known in order to determine if the beetle population is sufficient to overcome the mite population or if the aid of a miticide is needed.

Stethorus adults emerge from overwintering sites in and around orchards between the half-inch green and petal (пелюсток) fall stages of apple development and quickly move into the trees to begin feeding on overwintered mite eggs. As foliage develops on the fruit trees and mites begin to hatch and disperse onto the leaves, the beetles follow to feed on these motile mites.

* * * * *

1. *What weather favors the European red mite activities?*
2. *When do the European red mite eggs begin to hatch?*

3. *What damage do European red mites make for orchard trees?*
4. *What is the main European red mite predator?*
5. *What practices must be followed to use the black ladybird beetle in orchards?*
6. *How do black ladybird beetles contribute to control of red mites?*

GRAMMAR EXERCISES

I. Put up four questions of different types (general, special, disjunctive, alternative) to each sentence.

Model: *A decisive factor for securing yields is the protection of agricultural cultures.*

- 1) *Is the protection of agricultural cultures a decisive factor for securing yields?*
- 2) *What is a decisive factor for securing yields?*
- 3) *A decisive factor for securing yields is the protection of agricultural cultures, isn't it?*
- 4) *Is the protection of agricultural cultures a decisive factor for securing yields or not?*

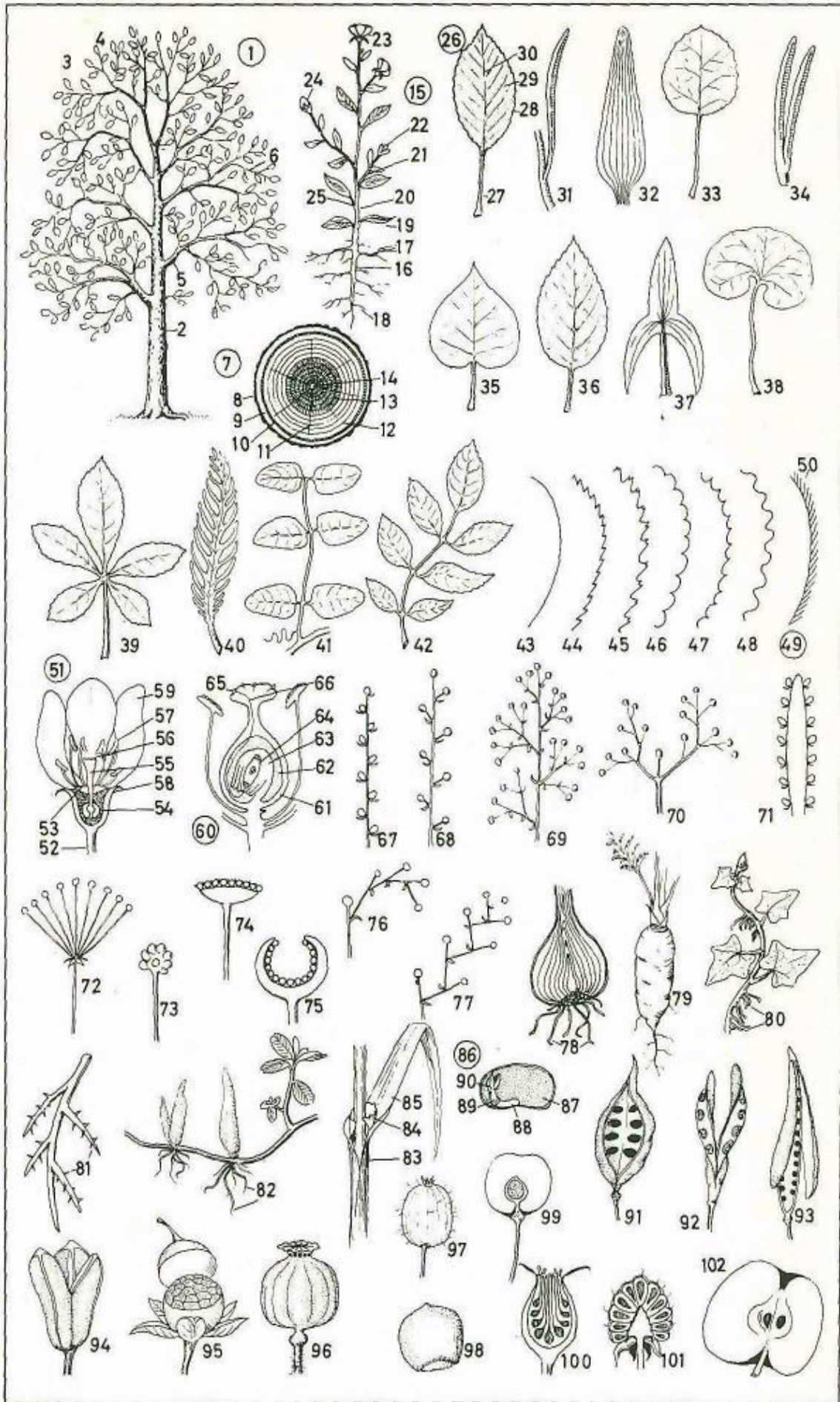
1. Every year millions of tons of produce are lost.
2. Bacteria, unlike higher organisms, consist of a single cell only.
3. Bacteria multiply by simple fission.
4. Some bacteria penetrate deeper into the tissue.
5. Insects also act as carriers of bacteria.
6. Efficient drainage of the soil helps in checking diseases.

II. Put the verbs in brackets into the appropriate form and explain the usage of that form in the sentence.

1. This black ladybird beetle (*to be*) a voracious predator of European red mites. 2. Mite predators (*to distribute*) generally in commercial apple orchards. 3. Eight to 10 generations (*to occur*) during the year. 4. The first generation (*to require*) approximately three weeks to develop. 5. Overwintering eggs (*to lay*) in groups on roughened bark. 6. Hot, dry weather (*to favor*) development, while cool, wet weather (*to delay*) mite activities. 7. The mite (*to introduce*) into North America from Europe in the early 1900s.

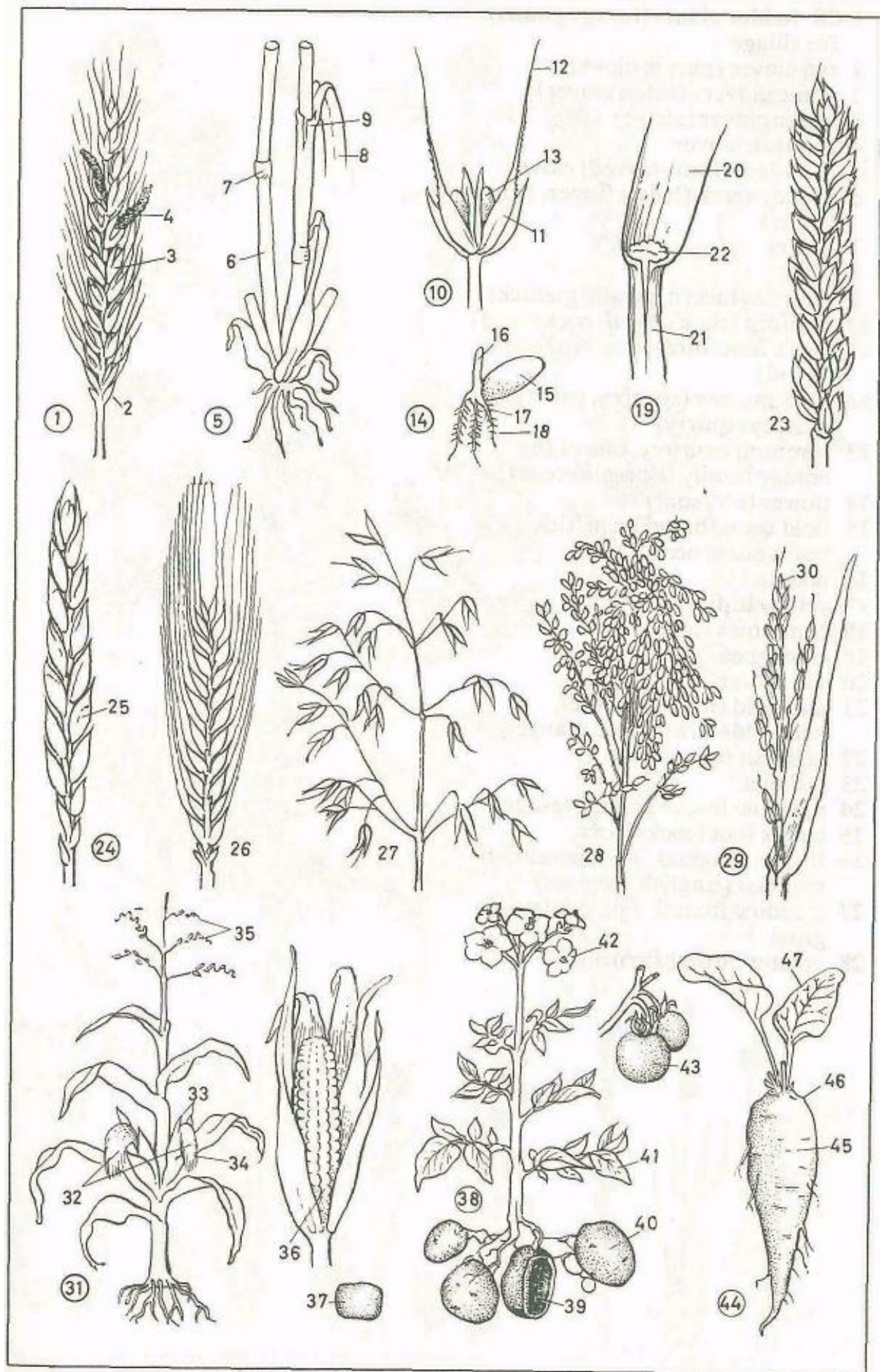
III. Make the sentences of the exercise II negative.

AGRONOMY
ENGLISH
IN PICTURES



General Botany

- 1 tree
- 2 bole (tree trunk, trunk, stem)
- 3 crown of tree (crown)
- 4 top of tree (treetop)
- 5 bough (limb, branch)
- 6 twig (branch)
- 7 bole (tree trunk) [cross section]
- 8 bark (rind)
- 9 phloem (bast sieve tissue, inner fibrous bark)
- 10 cambium (cambium ring)
- 11 medullary rays (vascular rays, pith rays)
- 12 sapwood (sap, alburnum)
- 13 heartwood (duramen)
- 14 pith
- 15 plant
- 16-18 root**
- 16 primary root
- 17 secondary root
- 18 root hair
- 19-25 shoot (sprout)**
- 19 leaf
- 20 stalk
- 21 side shoot (offshoot)
- 22 terminal bud
- 23 flower
- 24 flower bud
- 25 leaf axil with axillary bud
- 26 leaf
- 27 leaf stalk (petiole)
- 28 leaf blade (blade, lamina)
- 29 venation (veins, nervures, ribs)
- 30 midrib (nerve) 31-38 leaf shapes
- 31 linear
- 32 lanceolate
- 33 orbicular (orbiculate)
- 34 acerose (acerous, acerate, acicular, needle-shaped)
- 35 cordate
- 36 ovate
- 37 sagittate
- 38 reniform
- 39-42 compound leaves**
- 39 digitate (digitated, palmate, quinduefoliolate)
- 40 pinnatifid
- 41 abruptly pinnate
- 42 odd-pinnate
- 43-50 leaf margin shapes**
- 43 entire
- 44 serrate (serrulate, saw-toothed)
- 45 doubly toothed
- 46 crenate
- 47 dentate
- 48 sinuate
- 49 ciliate (ciliated)
- 50 cilium
- 51 flower
- 52 flower stalk (flower stem, scape)
- 53 receptacle (floral axis, thalamus, torus)
- 54 ovary
- 55 style
- 56 stigma
- 57 stamen
- 58 sepal
- 59 petal
- 60 ovary and stamen [section]
- 61 ovary wall
- 62 ovary cavity
- 63 ovule
- 64 embryo sac
- 65 pollen
- 66 pollen tube
- 67-77 inflorescences**
- 67 spike (racemose spike)
- 68 raceme (simple raceme)
- 69 panicle
- 70 cyme
- 71 spadix (fleshy spike)
- 72 umbel (simple umbel)
- 73 capitulum
- 74 composite head (discoïd flower head)
- 75 hollow flower head
- 76 bostryx (helicoïd cyme)
- 77 cincinnus (scorpioïd cyme, curled cyme) 78-82 roots
- 78 adventitious roots
- 79 tuber (tuberous root, swollen taproot)
- 80 adventitious roots (aerial roots)
- 81 root thorns
- 82 pneumatophores
- 83-85 blade of grass**
- 83 leaf sheath
- 84 ligule (ligula)
- 85 leaf blade (lamina)
- 86 embryo (seed, germ)
- 87 cotyledon (seed leaf, seed lobe)
- 88 radicle
- 89 hypocotyl
- 90 plumule (leaf bud)
- 91-102 fruits**
- 91-96 dehiscent fruits
- 91 follicle
- 92 legume (pod)
- 93 silio.ua (pod)
- 94 schizocarp
- 95 pyxidium (circumscissile seed vessel)
- 96 poricidal capsule (porose capsule)
- 97-102 indehiscent fruits**
- 97 berry
- 98 nut
- 99 drupe (stone fruit) (cherry)
- 100 aggregate fruit (compound fruit) (rose hip)
- 101 aggregate fruit (compound fruit) (raspberry)
- 102 pome (apple)



Arable Crops

1-47 arable crops (agricultural produce, farm produce)

1-37 varieties of grain (grain, cereals, farinaceous plants, bread-corn)

1 rye (*also*: corn, 'corn' often meaning the main cereal of a country or region; in Northern Germany: rye; in Southern Germany and Italy: wheat; in Sweden: barley; in Scotland: oats; in North America: maize; in China: rice)

2 ear of rye, a spike (head)

3 spikelet

4 ergot, a grain deformed by fungus [shown with mycelium]

5 corn stem after tillering

6 culm (stalk)

7 node of the culm

8 leaf (grain leaf)

9 leaf sheath (sheath)

10 spikelet

11 glume

12 awn (beard, arista)

13 seed (grain, kernel, farinaceous grain)

14 embryo plant

15 seed

16 embryo

17 root

18 root hair

19 grain leaf

20 leaf blade (blade, lamina)

21 leaf sheath

22 ligule (ligula)

23 wheat

24 spelt

25 seed;unripe:green spelt,a soup vegetable

26 barley

27 oat panicle, a panicle

28 millet

29 rice

30 rice grain

31 maize (Indian corn, *Am. corn*); *varieties*: popcorn, dent corn, flint corn (flint maize, *Am. Yankee corn*), pod corn (*Am. cow corn*, husk corn), soft corn (*Am. flour corn*, squaw corn), sweet corn

32 female inflorescence

33 husk (shuck)

34 style

35 male inflorescence (tassel)

36 maize cob (*Am. corncob*)

37 maize kernel (grain of maize) 38-45 root crops

38 potato plant (potato), a tuberous *plant*; *varieties*: round, round-oval (pear-shaped), flat-oval, long, kidney-shaped potato; *according to colour*: white (*Am. Irish*), yellow, red, purple potato

39 seed potato (seed tuber)

40 potato tuber (potato, tuber)

41 potato top (potato haulm)

42 flower

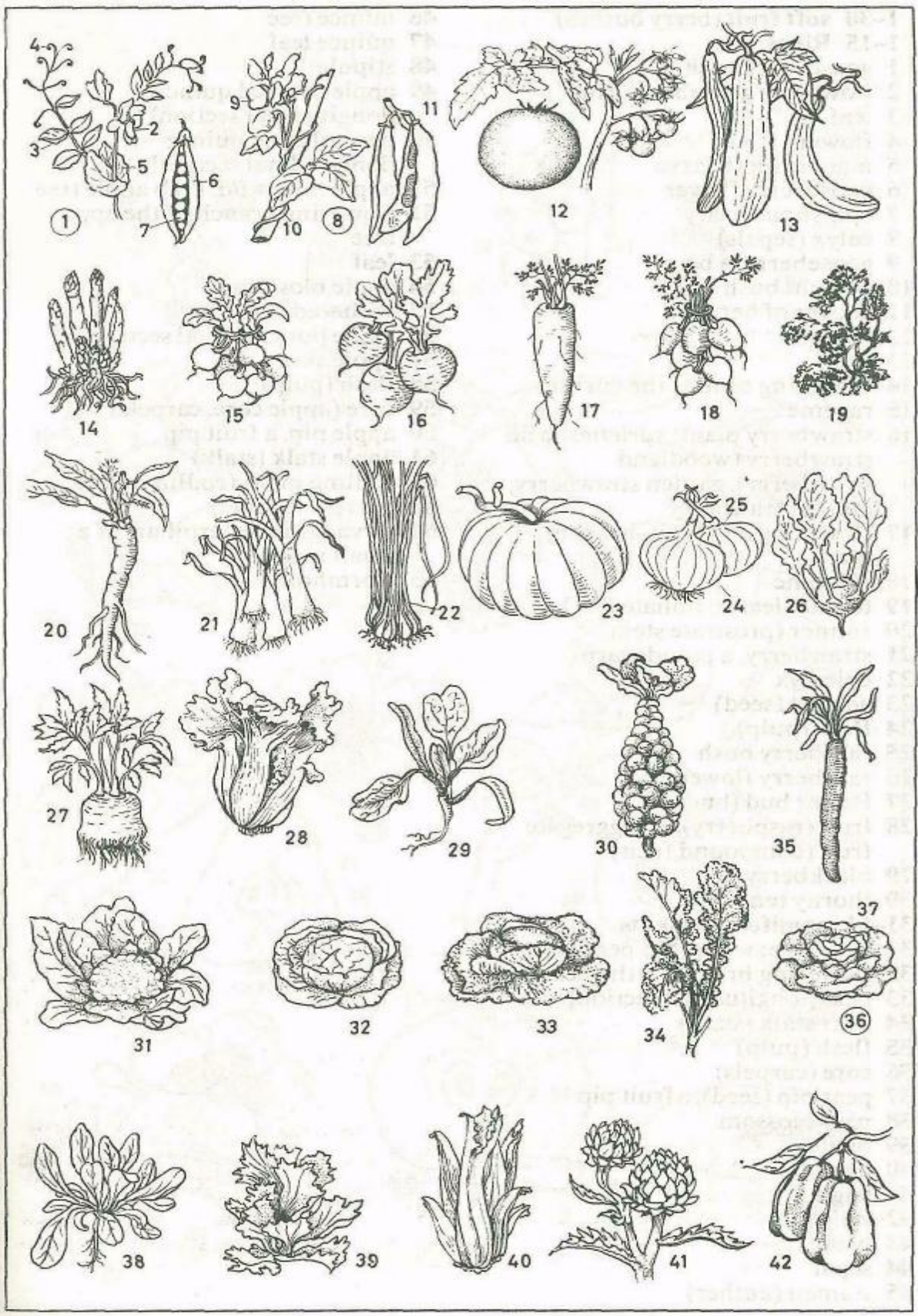
43 poisonous potato berry (potato; apple)

44 sugar beet, a beet

45 root (beet)

46 beet top

47 beet leaf



Vegetables

1-11 leguminous plants

(Leguminosae)

1 pea, a plant with a papilionaceous corolla

2 pea flower

3 pinnate leaf

4 pea tendril, a leaf tendril

5 stipule

6 legume (pod), a seed vessel (pericarp, legume)

7 pea [seed]

8 bean plant (bean), a climbing plant (climber, creeper); varieties: broad bean (runner bean, *Am.* scarlet runner), climbing bean (climber, pole bean), scarlet runner bean; *smaller*: dwarf French bean (bush bean)

9 bean flower

10 twining beanstalk

11 bean [pod with seeds]

12 tomato

13 cucumber

14 asparagus

15 radish

16 white radish

17 carrot

18 stump-rooted carrot

19 parsley

20 horse-radish

21 leeks

22 chives

23 pumpkin (*Am.* squash); *sim.*: melon

24 onion

25 onion skin

26 kohlrabi

27 celeriac

28-34 brassicas (leaf vegetables)

28 chard (Swiss chard, seakale beet)

29 spinach

30 Brussels sprouts (sprouts)

31 cauliflower

32 cabbage (round cabbage, head of cabbage), a brassica; *cultivated races (cultivars)*: green cabbage, red cabbage

33 savoy (savoy cabbage)

34 kale (curly kale, kail), a winter green

35 scorzonera (black salsify)

36-40 salad plants

36 lettuce (cabbage lettuce, head of lettuce)

37 lettuce leaf

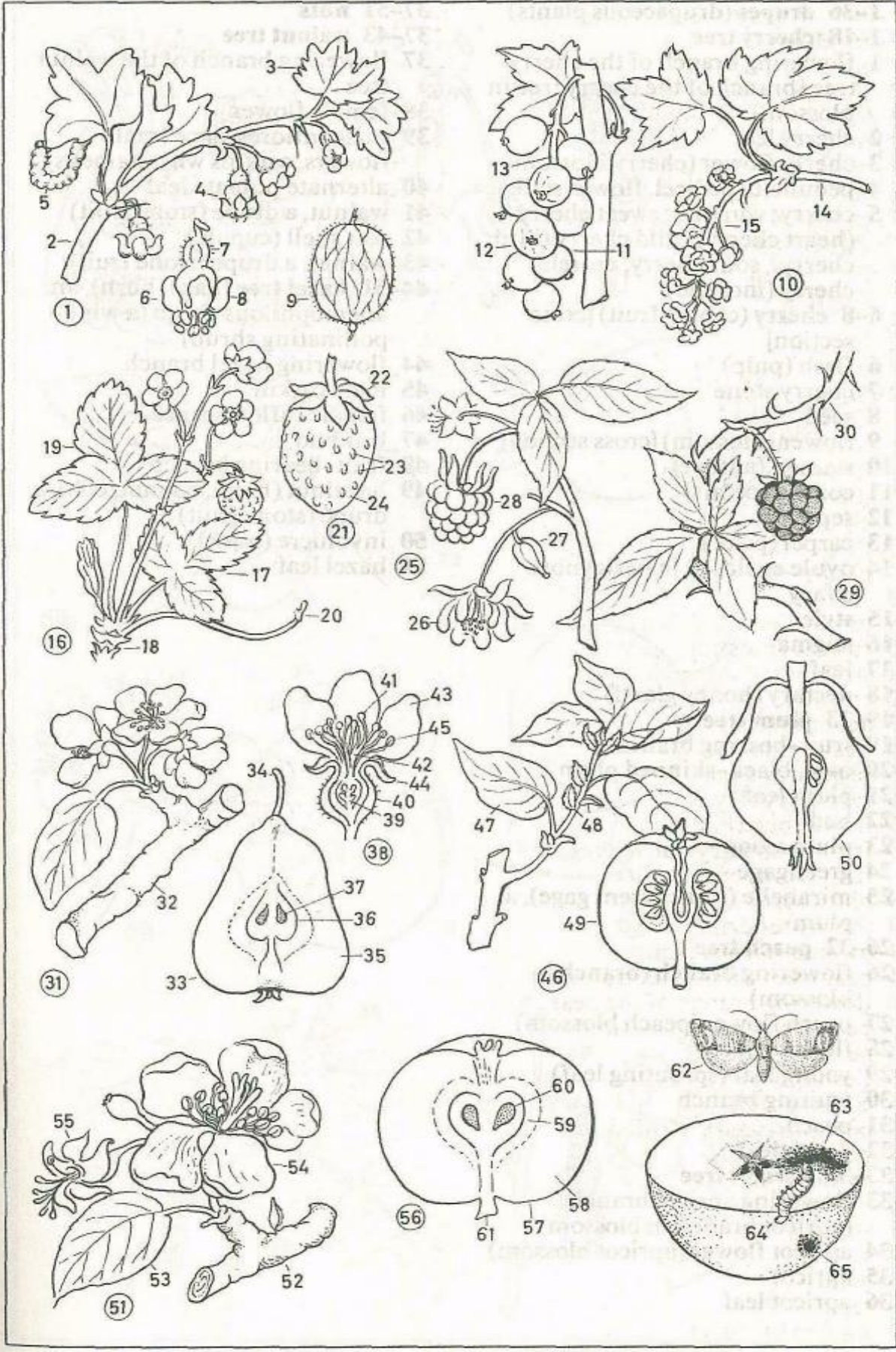
38 corn salad (lamb's lettuce)

39 endive (endive leaves)

40 chicory (succory, salad chicory)

41 globe artichoke

42 sweet pepper (Spanish paprika)



Soft Fruit and Pomes

1-30 soft fruit (berry bushes)

1-15 Ribes

- 1 gooseberry bush
- 2 flowering gooseberry cane
- 3 leaf
- 4 flower
- 5 magpie moth larva
- 6 gooseberry flower
- 7 epigynous ovary
- 8 calyx (sepals)
- 9 gooseberry, a berry
- 10 currant bush
- 11 cluster of berries
- 12 currant
- 13 stalk
- 14 flowering cane of the currant
- 15 raceme
- 16 strawberry plant; *varieties*: wild strawberry (woodland strawberry), garden strawberry, alpine strawberry
- 17 flowering and fruit-bearing plant
- 18 rhizome
- 19 ternate leaf (trifoliate leaf)
- 20 runner (prostrate stem)
- 21 strawberry, a pseudocarp
- 22 epicalyx
- 23 achene (seed)
- 24 flesh (pulp)
- 25 raspberry bush
- 26 raspberry flower
- 27 flower bud (bud)
- 28 fruit (raspberry), an aggregate fruit (compound fruit)
- 29 blackberry
- 30 thorny tendril

31-61 pomiferous plants

- 31 pear tree; *wild*: wild pear tree
- 32 flowering branch of the pear tree
- 33 pear [longitudinal section]
- 34 pear stalk (stalk)
- 35 flesh (pulp)
- 36 core (carpels)
- 37 pear pip (seed), a fruit pip
- 38 pear blossom
- 39 ovules
- 40 ovary
- 41 stigma
- 42 style
- 43 petal
- 44 sepal
- 45 stamen (anther)
- 46 quince tree
- 47 quince leaf
- 48 stipule
- 49 apple-shaped quince [longitudinal section]
- 50 pear-shaped quince [longitudinal section]
- 51 apple tree; *wild*: crab apple tree
- 52 flowering branch of the apple tree
- 53 leaf
- 54 apple blossom
- 55 withered flower
- 56 apple [longitudinal section]
- 57 apple skin
- 58 flesh (pulp)
- 59 core (apple core, carpels)
- 60 apple pip, a fruit pip
- 61 apple stalk (stalk)
- 62 codling moth (codlin moth)
- 63 burrow (tunnel)
- 64 larva (grub, caterpillar) of a small moth
- 65 wormhole

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