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ENGLISH FOR SPECIALTY STUDENTS "FORESTRY"

АНГЛІЙСЬКА МОВА ДЛЯ СТУДЕНТІВ СПЕЦІАЛЬНОСТІ «ЛІСОВЕ ГОСПОДАРСТВО» ОС «БАКАЛАВР»

Методичні рекомендації
до самостійної роботи студентів

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CONTENT

Indroduction

English for Forestry is a specialized textbook designed to equip students in the field of forestry with essential language skills. As the global demand for sustainable forest management and conservation grows, effective communication in English has become increasingly important. This textbook aims to facilitate a deeper understanding of key concepts, terminology, and practices within forestry, enabling learners to engage confidently in both academic and professional contexts.

It is critical to develop a robust vocabulary and comprehension skills to navigate technical literature, collaborate with colleagues, and contribute to discussions on relevant issues such as biodiversity conservation, climate change, and sustainable practices.

Throughout this textbook, students will familiarize yourself with the fundamental vocabulary used in forestry, from tree anatomy to forest ecosystems; develop the skills necessary for effective speaking, reading, and writing in a forestry context, including presentations, discussions, and written reports.

Students will enchance cultural awareness and understand the global implications of forestry practices and how language shapes discussions around environmental stewardship and sustainability.

Unit 1. TREES

TREES

Trees grow from seeds. A young plant that has just germinated from its seed is called a seedling. Next, a seedling grows for some time, is bigger and stronger and becomes a sapling. Such a young tree, after many years depending on species, is mature enough and ready to be cut down.

The method of tree reproduction from seeds is very common in forestry. This way of plant propagation is called sexual because it requires gamete formation and fertilisation. In contrast, asexual reproduction known also as vegetative does notrequire gamete formation because a young plant is a part of the parent plant, e.g. shoot cuttings.

GLOSSARY

• seed	• насіння
• germinate	• проростати
• is called	• називається
• seedling	• розсада
• sapling	• саджанець
• depend on	• залежати від
• species	• види
• mature	• зрілий
• cut down	• обрізати
• reproduction, propagation	• розмноження, поширення
• common	• поширений
• forestry	• лісове господарство
• sexual propagation	• статеве розмноження
• require	• вимагати
• fertilisation	• запліднення, удобрення
• vegetative	• вегетативний
• parent plant	• материнська рослина
• shoot cutting	• обрізка пагонів

1.Read the text and decide whether the following statements are trueor false.

1. A seedling is smaller than a seed.
2. Development of a young plant from the seed is called germination.
3. A sapling means the same as a young tree.
4. Seedlings produce a lot of wood and are mature enough to be cut down.
5. A sapling is younger than a mature tree.
6. Trees can be reproduced only from seeds.
7. Asexual reproduction is also known as vegetative.
8. Propagation is the same as reproduction.
9. Gamete formation means fertilisation.
10. A shoot cutting is an example of asexual reproduction.
11. Vegetative reproduction is the most popular method of tree propagation inforestry.

2. Ask the questions.

1.....?
A sapling is older than a seedling.

2. .....?
No, reproduction from seeds means the same as sexual propagation.

3. .....?
Trees can be reproduced both sexually and asexually.

4. .....?
Yes, a shoot cutting.

5. .....?
Sexual reproduction. Vegetative propagation is definitely less common.

PARTS OF A TREE

Each tree consists of a root system, a trunk and a crown. A root

system may have a different size and shape depending on tree species, soil and climate conditions. There are several types of roots forming a root system.

A taproot is the main root of a tree. It grows downwards. Lateral roots are the ones that grow from the taproot. Root hairs are the smallest parts of a root system. Pine, for example, does not usually have root hairs but their roots form a symbiotic relationship with fungi instead. Such symbiosis is known as mycorrhiza.

A trunk is the heaviest and the most valuable part of a tree. It is covered by bark. A trunk transports water and nutrients upwards (from roots to leaves) and photo- synthesis products downwards.

A crown consists of branches, twigs and leaves that take part in photosynthesis.

Other parts of a crown include: flowers, fruit and buds.

GLOSSARY

• consist of	• складається з
• root system	• коренева система
• trunk	• стовбур
• crown	• крона
• species	• види
• soil	• ґрунт
• condition	• умова
• several	• декілька
• taproot	• стрижневий корінь
• downwards	• вниз
• lateral root	• бічний корінь
• root hair	• кореневий волосок
• pine	• сосна
• relationship	• зв'язок
• fungus , fungi	• гриб , гриби
• bud	• бутон
• bark	• кора
• nutrient	• поживна речовина
• branch	• гілка
• twig	• гілочка

- covered by — вкритий

1. True or false?

1. A trunk protects bark.
2. A branch is bigger than a twig.
3. A trunk is a part of a root system.
4. A bud is covered by bark.
5. Not all trees have root hairs.
6. A crown is the uppermost part of a tree.
7. A bud is bigger than a twig.
8. A root hair is smaller than a lateral root.
9. Mycorrhiza is a kind of a lateral root.

2.Which part of a tree:

1. protects a trunk?
2. absorbs water and nutrients from the soil?
3. develops into a leaf or a flower in spring?
4. grows from a trunk?
5. is its main root?

FACTORS AFFECTING A TREE'S APPEARANCE

There are several factors which influence a tree's appearance. The most obvi- ous are: age of a tree, species, and the place where a tree grows. A tree's appearance can also be modified by weather as well as pathogens and pests.

Age and species

Tree seedlings are different from saplings and mature trees belonging to the same species because first leaves, called cotyledons, usually do not resemble typical leaves which a tree produces. Saplings do not look like older trees either. They are of different shape and their bark does not look like mature tree bark. It is thinner, more delicate, or sometimes it is even not of the same colour, e.g. birch.

A tree's appearance also depends on species. For example, spruce has thinner branches than pine. Tree crowns, bark colour, bud shape also

differ and foresters can recognise tree species easily even during winter when deciduous trees are leafless.

The place where a tree grows

If a tree grows alone its branches are compact and the crown is wider and lon- ger. When a tree grows in the middle of a stand the crown is narrower and shorter. Trees growing at a stand periphery better develop the side of the crown which gets more sunlight.

The place where a tree grows means also its habitat, e.g. soil type and nutrients,
precipitation and the like. All habitat factors modify a tree's appearance as well.

Weather, pathogens and pests

Weather conditions such as drought, rain, hail, snow, wind, lightning, as well as pathogens and pests can seriously damage the whole tree or its parts. As a result, a tree's shape is changed.

GLOSSARY

• factor	• фактор
• affect	• впливати
• appearance	• зовнішній вигляд
• influence	• вплив
• obvious	• очевидний
• seedling	• розсада
• mature	• зрілий
• belong to	• належати
• leaf. leaves	• листок. листя
• resemble	• нагадувати
• look like	• виглядає як
• shape	• форму
• spruce	• ялина
• branch	• гілка
• crown	• крона
• bud	• бутон
• recognise	• розпізнати
• leafless	• безлисті
• develop	• розвиватися
• sunshine	• сонячне світло

• habitat	• середовище проживання
• soil	• ґрунт
• nutrient	• поживна речовина
• drought	• посуха
• hail	• град
• damage	• пошкодження

1.Look at the words in bold in the text and guess their meaning fromthe context. Next, write their Ukrainian equivalents.

1. pests
2. saplings
3. cotyledons
4. bark
5. deciduous
6. stand
7. precipitation
8. lightning

2.Answer the questions.

1. Name six factors that influence a tree's appearance.
2. What are a seedling's first leaves called?
3. What is the difference between sapling bark and mature tree bark?
4. How does sunshine influence crown development?
5. What other factors can change a tree's appearance?

CONIFEROUS TREES

Coniferous trees produce cones that consist of scales and seeds. They have nar- row needle-like leaves that are usually evergreen. In Europe coniferous trees arerepresented by pine, spruce, fir, larch and Douglas fir.

Pine

The most common tree species in Europe constitute almost 70 per cent of all trees growing in our forests. Pine leaves grow in groups

called fascicles. There may be two, three or five needles in one fascicle. Scots pine (*Pinus sylvestris)* has two needles in one fascicle. Pine needs more light to grow than fir.

Spruce

A tree prone to windthrow because of its shallow root system. Spruce is oftenattacked by the European spruce bark beetles.

Fir

A shade-tolerant tree species whose cones grow upright. It grows slower thanpine, spruce, larch or Douglas fir.

Larch

A tree that sheds its leaves in autumn. It has fairly soft needles grouped in fas-cicles.

Douglas fir

A tree native to North America. It was introduced to Europe at the beginning ofthe 19th century. The tallest coniferous tree with characteristic red-brown cones.

GLOSSARY

• coniferous	• хвойні
• consist of	• складатися з
• scale	• масштаб
• needle-like	• голчасті
• evergreen	• вічнозелені
• pine	• сосна
• spruce	• ялина
• fir	• ялиця
• larch	• модрина
• Douglas fir	• Дугласія
• constitute	• становлять
• fascicle	• пучок
• Scots pine	• Сосна звичайна
• prone to	• схильні до
• windthrow	• вітровал
• shallow	• неглибокий
• European spruce	• Ялина європейська
• bark beetle	• короїд

• shade-tolerant • upright • shed	• тіньовитривалі • догори • скидати

1.True or false?

1. Pine is shade-tolerant.
2. Douglas fir sheds its leaves in autumn.
3. Fir needs less light to grow than pine.
4. Larch isn't evergreen.

2.Name coniferous tree species and their features.

DECIDUOUS TREES

Deciduous trees do not have leaves in winter. They come into leaf in spring. In autumn leaves turn yellow, red or brown and trees shed their leaves. Deciduous trees usually do not produce cones but different types of fruit. The most common deciduous species in our country include such broad-leaved trees as oak, birch, alder, beech and poplar, as well as larch – the only coniferous tree that is leafless in winter.

1.True or false?

1. Deciduous trees are evergreen.
2. All deciduous trees produce cones.
3. Fir is the most common deciduous tree species.
4. Deciduous trees shed their leaves in autumn.
5. Deciduous trees can be both broad-leaved and coniferous.

2. Read the definitions (1– 7) and match them with the tree species

alder beech poplar birch willow oak maple

a. a tree that produces acorns and whose dry leaves often remain on trees in winter
b. a tree which contains salicylic acid. It is easily propagated from shoot cuttings
c. a fast-growing species, often grown on plantations
d. a pioneering species with white bark

e. a shade-tolerant tree that comes into leaf late in spring. It has smooth, dark grey bark and characteristic long, sharp buds
f. a tree whose leaf is the symbol of Canada
g. a tree that prefers very humid soils, grows along streams or rivers. It produces woody fruit resembling small cones

GLOSSARY

• deciduous	• листяні
• come into leaf	• пустити листя
• turn yellow	• жовтіють
• cone	• шишка
• oak	• дуб
• birch	• береза
• alder	• вільха
• beech	• бук
• poplar	• тополя
• acorn	• жолудь
• contain	• містять
• shoot cutting smooth	• різання пагонів гладке
• humid	• вологий
• woody	• деревні
• resemble	• нагадувати
• willow	• верба
• maple	• клен

3.Name the broad-leaved tree species.

REVISION 1

I. Put the tree species from the box into two categories: coniferous and broad-leaved.

fir	maple	larch	birch

willow	spruce	poplar	pine
Douglas fir	alder	beech	oak

coniferous:.....
...

broad leaved:.....

True or false?

1. A trunk is a part of a root system.
2. Alder is deciduous.
3. Fir grows faster than pine.
4. Scots pine is the most common tree species in Poland.
5. Deciduous trees never produce cones.
6. Hail never changes a tree's appearance.
7. Root hairs are smaller than lateral roots.

II. What do the following definitions refer to?

A. covers a tree trunk
B. a coniferous tree that sheds its leaves in autumn
C. a small branch
D. the upper part of a tree consisting of leaves, twigs and branches
E. the main tree root
F. the part of a tree that supplies water and nutrients from the soil
G. trees with needle-like leaves
H. opposite to 'coniferous'
I. a small, green part of a tree that takes part in photosynthesis

III. Match the words from the box with the definitions in exercise

taproot	leaf	root system
broad-leaved	bark	coniferous
twig	larch	crown

IV. Choose the correct answer a, b or c.

1. A root system consists of:
   a. a taproot, trunks and root hairs
   b. a taproot, lateral roots and root hairs
   c. cones, lateral roots and root hairs.

2. Seedling first leaves are called:
   a. cots
   b. cottagers
   c. cotyledons.
3. Saplings are older than:
   a. mature trees
   b. poles
   c. seedlings.
4. Which trees shed their leaves in autumn?
   a. birch, maple, larch
   b. larch, poplar, fir
   c. willow, larch, spruce.
5. Scots pine has:
   a. 3 needles
   b. 5 needles
   c. 2 needles in a fascicle.
6. Asexual propagation means the same as:
   a. sexual
   b. vegetative
   c. seed propagation.
7. Pests are:
   a. useful insects such as bees
   b. tree fruits such as acorns
   c. animals that damage trees and other plants.
8. Precipitation means:
   a. rain, snow, hail
   b. type of asexual propagation
   c. tree damage caused by pathogens.

V. Put the following parts of a tree in the proper order: from the smallestto the largest. Use the words from the box.

crown leaf branch bud twig

TEST 1

I. **Fill in the blanks**.

Trees grow from 1. ..... . A young plant that has just germinated from its seed is called a seedling. Next, a 2. ..... grows for some time, is bigger and stronger and becomes a sapling. Such a young tree, after many years depending on species, is mature enough and ready to be 3. ..... .The described above method of tree reproduction from seeds is very common in forestry. Such a way of plant propagation is called 4. ..... because it requires gamete formation and fertilisation. In contrast, asexual reproduction known also as 5. ..... does not require gamete formation because a young plant is a part of the 6. ..... plant, e.g. shoot cuttings.

II. Fill in the blanks with the words from the box.

A. κoot hairs
B. nutrients
C. mycorrhiza
D. symbiotic
E. buds
F. root system
G. species
H. branches
I. taproot
J. trunk

Each tree consists of a 1. ....., a trunk and a crown. A root system may have different size and shape depending on tree 2. ....., soil and climate conditions. There are several types of roots forming a root system. A 3. ..... is the main root of a tree. It grows downwards. Lateral roots are the ones that grow from the taproot. 4. ..... are the smallest parts of a root system. Some species, e.g. pine does not usually have root hairs but their roots form a 5. ..... relationship with fungi instead. Such symbiosis is known as 6. ..... . A 7. ..... is the heaviest and the most valuable part of a tree. It is covered by bark. A trunk transports water and 8. ..... upwards (from roots to leaves) and photosynthesis products downwards. A crown consists of 9. ....., twigs and leaves that take part in photosynthesis. Other parts of a crown include: flowers, fruit and 10. ..... .

III. Fill in the blanks.

1. Factors which influence a tree's appearance include: ..... of a tree,

species, and the ..... where a tree grows.
2. Sapling bark is ....., more delicate, or sometimes it is even not of the same colour, e.g. ..... .
3. Spruce has thinner branches than ..... .
4. The place where a tree grows means also its ....., e.g. soil type and nutrients, precipitation and the like.

IV. Match the two parts of a sentence.

A.Cones consist of
B.In Poland coniferous trees are represented by
C.Pine leaves grow in groups
D.Spruce is often attacked by
E.Fir is a
F .Larch sheds its leaves
G.Douglas fir is a tree

1. in autumn.
2. native to North America.
3. scales and seeds.
4. pine, spruce, fir, larch and Douglas fir.
5. called fascicles.
6. shade-tolerant tree species.
7. the European spruce bark beetles.

V. Fill in the blanks.

Deciduous trees are not as numerous in Europe as 1. ..... ones. Deciduous trees do not have 2. ..... in winter. They come into leaf in pring. In utumn leaves turn yellow, red or 3. ..... and trees shed their leaves. Deciduous trees do not produce 4. ..... but different types of fruit. The most common deciduous species in our country include: 5. ....., birch, alder, beech and poplar.

Unit 2. FOREST TREE CHARACTERISTICS

BASIC FOREST TREE CHARACTERISTICS

There are several tree characteristics which are very important for foresters because they determine wood market value or provide useful information in forest management. Basic species characteristics include: longevity, growth rate, shade tolerance, soil and water requirements, and wood hardness.

Longevity

Some species are short-living, e.g. willow and poplar, others are long-living, e.g. oak or fir which can live as long as 700 years.

Growth rate

The information how fast trees grow is very useful, for instance, in establishing plantations. Fast-growing species include: poplar, larch, pine, birch and spruce.

Shade tolerance

In forest management knowledge about shade tolerance or intolerance is very important because it determines stand density and how long young trees can grow under the crowns of older ones. For instance, pine, birch or larch need more light to grow than fir or beech which are shade-tolerant.

Soil and water requirements

Soil and water requirements differ between species. For example, pine grows well on most soils, fir and beech prefer fertile ones, and spruce does not tolerate lack of water because of its shallow root system.

Type of root system

A root system is often modified by soil. However, some species have a tendency to develop a deep or shallow root system, e.g. spruce, aspen. Trees with a deep tap- root are more resistant to winds, e.g. pine, oak or elm.

Wood hardness

Some trees have very soft wood, e.g. poplar, willow, spruce, others – hard, e.g. oak, beech, hornbeam.*

GLOSSARY

• basic characteristic	• основна риса
• wood	• деревина

• market value	• ринкова вартість
• provide	• забезпечувати
• forest management	• управління лісами
• include	• включати
• longevity	• довголіття
• growth rate	• темп зростання
• shade	• тінь
• wood hardness	• твердість деревини
• establish	• встановити
• stand density	• густота насадження
• fertile	• родючі
• lack of	• відсутність
• shallow	• неглибокий
• aspen	• осика
• resistant to	• стійкий до
• hornbeam	• граб звичайний

1. Answer the questions.

2. Name basic tree characteristics.
3. Which tree lives longer: fir or willow?
4. Which species are fast-growing?
5. Which trees do not grow well in the shade?
6. Which species is tolerant to soil and water requirements?
7. Why does spruce not tolerate dry soils?
8. Which species are more resistant to winds and why?
9. Give examples of very soft and hard wood.

2. In the text find the words with the opposite meaning:

1. long-living
2. slow-growing
3. shade-intolerant
4. infertile
5. deep
6. soft

3. Fill in the blanks with the words from the box.

angiosperms	ginkgo	gymnosperms	softwoods
shade-bearing	hardwoods	conifers	

a. Shade-tolerant species are also known as ..... .
b. Trees whose seeds are naked are called ..... .
c. Typical representatives of gymnosperms are ..... .
d. Although ..... belongs to gymnosperms, it does not have needle-like leaves.
e. Trees whose seeds are protected are called ..... .
f. Broad-leaved trees are also known as ....., and conifers as ..... .

GLOSSARY

• gymnosperms • angiosperms • ginkgo	• голонасінні • покритонасінні • гінкго

TREE TYPES

There are different types of trees that grow in forests. They differ in age, shape and the role they play in forests.

The youngest trees are called seedlings, those older than them – saplings. Next, saplings enter a pole stage, which can be divided into small pole and high pole. Finally, when the trees are able to produce seeds and are old enough to be cut down they are called mature trees.

Trees can also play different roles in a stand. The tallest are known as dominant, a little shorter – codominant. Others that reach the bottom of their crowns are called intermediate. Finally, there are trees that do not have a chance to develop (suppressed trees) or the ones that are already dead (snags).

GLOSSARY

• differ in	• відрізняються
• seedling	• розсада
• sapling	• саджанець
• small pole	• мале деревце
• high pole	• високе деревце
• reach	• досягати
• intermediate	• середній

1. Answer the questions.

1. How can a pole stage be divided?
2. What trees can be described as mature?
3. What is a tree that does not get enough sunlight and does not have a chanceto grow called?

2. Match two parts of the definitions. What tree type they refer to?

1. a standing	A. has all living branches
2. a small plant that	B. dead tree
3. a young tree that	C. has germinated from its seed

3. Match the definitions withthe words from the box.

small pole	snag	seedling

4. Read the definition and match them with tree types from the box.

intermediate tree	dominant tree	suppressed tree
high pole	codominant tree	

5. a tree that has lost its vigour as a result of getting not enough sunlight

6. trunk diameter increases, natural loss of branches up to certain height
7. a tree that forms the forest canopy but is a bit shorter than the surrounding trees and therefore captures sunlight mainly from above
8. a tree whose crown extends to the bottom level of a forest canopy
9. a high tree forming the forest canopy. It gets sunlight from above and around the crown

GLOSSARY

• loss	• втрата
• germinate	• проростати
• seed	• насіння
• sunlight	• сонячне світло
• certain	• певний
• height	• висота
• surrounding	• оточуючі
• therefore	• тому
• capture	• отримувати
• extend	• розширити
• level	• рівень

5. Give the definitions.

dominant tree	intermediate tree	codominant tree	sapling
broad-leaved tree	coniferous tree	mushroom	fallen tree
Uprooted tree	broken tree	dead tree	

TREE GROUPS

1. Fill in the blanks with the words (A–H).

A. broad-leaved
B. local
C. non-productive
D. jungle

E. tropical
F. rivers
G. private
H. temperate

When a tree grows alone its description may refer to its age (e.g. young, old, ma- ture), height (e.g. tall, low, small), general appearance (e.g. leafless, broken) or the role it plays, e.g. an ornamental, forest or fruit tree. The description may also refer to a tree origin, e.g. native, exotic or **1.** ..... .When trees grow close to each other they are no longer called just trees but they have collective names such as: clump, forest, wood, **2……** or a stand.

A forest is a complex ecosystem in which plants, animals as well as other factors such as water resources, soil and **3……** **.....**climate, coexist and interact.

There are different types of forests. Their names may refer to:

- CLIMATE ZONES
  Forests that grow in our geographic zone are called **4.** ..... .
  Forests that can be found in other zones include: tropical rainforests, Medi- terranean forest and so on.
- TYPE OF DOMINANT TREE SPECIES
  Forests can be divided into: coniferous, **5.**.....or mixed. The name
  may also refer to particular species, e.g. oak-hornbeam forest.
- TERRAIN THEY OCCUPY
  For example, there are mountain forests (known also as montane) or ripar- ian forests that grow along streams or **6.** **.....**, on soils with shallow groundwater.
- ROLE THEY PLAY
  Forests can be divided into productive,**7.**.....multipurpose and so on.
- OWNERSHIP
  The majority of forests are state-owned. Only 17.4% are in **8.**.....hands.

GLOSSARY

• description	• опис
• refer to	• відноситься до
• height	• висота
• leafless	• безлисті
• ornamental	• декоративні
• origin	• походження
• native	• рідний
• clump	• грудка
• wood	• деревина
• stand	• насадження
• complex	• складні
• factor	• фактор
• exist	• існують
• interact	• взаємодіяти
• mixed	• змішаний
• oak	• дуб
• hornbeam	• граб звичайний
• terrain	• рельєф місцевості
• occupy	• займати
• temperate forest	• помірний ліс
• Mediterranean	• середземноморський
• divide into	• розділити на
• particular	• зокрема
• productive	• продуктивний
• multipurpose	• багатоцільовий
• ownership	• власність
• majority	• більшість

2. Answer the questions.

1. How can a forest be defined?
2. What are forests growing in our climate zone called?
3. What is the difference between mountain and riparian forests?
4. Name three roles forests may play.
5. Are there more state-owned or private forests in Poland?

FOREST STANDS

A forest stand is a part of a forest. It consists of a relatively uniform group oftrees that grow close together and cover a particular area. There are several waysa stand can be described. The basic characteristics include: age, species composi-tion, stratification, stand density and stand origin.

Stand age can be described in many ways. The most common is based on age classes. Twenty years is a usual period of time limiting one class so typical age class- es include trees 1–20 years old (class I), 21–40 (class II), 41–60 (class III) and so on. If trees in a stand belong to one age class, such a stand is called even-aged. When they belong to more classes – uneven-aged.

Species composition tells us if the stand is single-species or mixed. In mixedstands there are dominant tree species and admixture, which in Polish forests usu- ally constitute 10–30 per cent.

Stratification refers to the numbers of tree layers from the forest floor to treetops. Stands can be divided into single-storey and multi-storey.

Stand density depends on a number of trees per hectare, their sizes (height and diameter) as well as canopy closure which tells us how close the crowns of neigh- bouring trees are.

Stand origin tells us if the stand regenerated naturally or artificially (was planted or sown).

GLOSSARY

• stand	• насаджання
• relatively	• відносно
• cover	• покривати
• area	• область
• species composition	• видовий склад
• stratification	• розшарування
• stand density	• густота насаджання
• origin	• походження
• common	• поширений
• based on	• на основі
• belong to	• належати

• even-aged	• одновікові
• uneven-aged	• різновікові
• single-species	• одновидові
• mixed	• змішаний
• admixture	• домішка
• layer	• шар
• forest floor	• лісова підстилка
• single-storey	• одношаровий
• multi-storey	• багатошаровий
• canopy	• крони дерев
• neighbouring	• сусідні
• artificially	• штучно
• was planted	• було посаджено
• was sown	• було посіяно

3. Answer the questions.

1. What is the difference between a forest and a forest stand?
2. How can a stand be characterised?
3. Explain the term ‘age class’.
4. Which stands can be called even-aged?
5. What is the difference between single-species and mixed stands?
6. What does stratification refer to?
7. What information does canopy closure provide?

FOREST FLORA

Trees are the tallest and most important plants in the forest. Their crowns form a forest canopy that shades the plants growing below. The canopy reduces the amount of sunlight that reaches the forest floor. Only in deciduous forests in spring, when trees are still leafless, can such plants get more light.

Fortunately, not all plants need a lot of sunlight to grow. Some of them prefer moist and shady areas, e.g. ferns and mosses, which can sometimes be seen on tree trunks.

Tree bark may also be covered by lichens – organisms that are only present when air is not polluted. Lichens consist of algae and fungi

that live in a symbiotic relationship.

Fungi cannot produce their food as plants can, so they form a symbiotic rela- tionship with algae or tree roots (mycorrhiza). Other fungi that cannot do it have to find food somewhere else. As a result, some of them attack trees and cause plant diseases. Fortunately, not all fungi are harmful. They can also act as decomposers or be picked and used to cook tasty food.

Apart from the tallest trees, there are also other plants that grow in forests: younger trees, saplings, seedlings and shrubs, e.g. hazel (*Corylus avellana*), black- thorn (*Prunus spinosa*), hawthorn (*Crataegus* sp.), alder buckthorn (*Frangula al- nus*) or juniper (*Juniperus communis*).

Other well-known forest plants include those that produce tasty fruit, e.g. wild strawberry (*Fragaria vesca*), bilberry (*Vaccinium myrtillus*) or sweet-smelling flow- ers, e.g. lily of the valley (*Convallaria majalis*), violet (*Viola* sp.). There are also plants that have medicinal properties, e.g. herbs.

GLOSSARY

• shade	• тінь
• amount	• кількість
• reach	• досягати
• forest floor	• лісова підстилка
• fortunately	• на щастя
• sunlight	• сонячне світло
• moist area	• вологе місце
• fern	• папороть
• moss	• мох
• lichen	• лишайник
• polluted	• звбруднений
• fungus / fungi	• грибок / гриби
• relationship	• зв'язок
• harmful	• шкідливий
• decomposer	• декомпозитор
• pick	• вибрати
• tasty	• смачно
• shrub	• чагарник

• hazel	• ліщина
• blackthorn	• терен
• hawthorn	• глід
• alder	• вільха
• buckthorn	• обліпиха
• wild strawberry	• лісова суниця
• bilberry	• чорниця
• lily of the valley	• Конвалія
• violet	• фіалка

1. **Answer the questions.**

1. What forms a tree canopy?
2. How does the amount of light that reaches the forest floor change during the year?
3. What sometimes covers tree bark?
4. What roles do fungi play?
5. Which plants produce edible fruit?
6. Which plants have medicinal properties?

REVISION 2.

I. What do the following definitions refer to? Use the words from the box.

canopy	litter	hazel	lichens
herbs	bilberry	blackthorn	fern
stand	admixture	moss	sapling

1. a small plant growing in moist areas, often seen on rocks and walls
2. plants possessing medicinal properties. They are also used in cooking
3. a part of a forest consisting of a relatively uniform group of trees growing close together and covering a particular area
4. *Prunus spinosa* in English
5. organisms consisting of fungi living in a symbiotic relationship with algae
6. a forest plant with feather-like leaves. It does not produce flowers

7. fallen leaves, twigs etc. covering the forest soil
8. a young tree
9. trees that constitute about 10–30 per cent of a forest stand
10. a small plant possessing very tasty small black berries
11. tree crowns in a forest
12. *Corylus avellana* in English

II. Give antonyms of the following words and expressions:

1. naturally regenerated stands
2. dominant tree species
3. broad-leaved
4. soft wood
5. private forests
6. short-living
7. even-aged stands
8. fast-growing
9. poor soil
10. deep root system
11. shade tolerance
12. single-storey stands
13. single-species stands

III. True or false?

1. Larch is shade-tolerant.
2. Birch grows faster than oak.
3. Pine needs a lot of shade when it is young.
4. Spruce has a shallow root system.
5. On the average, fir lives longer than willow.
6. Hornbeam has softer wood than spruce.
7. Beech has harder wood than willow.
8. Saplings are younger than seedlings.
9. Forests that grow in our climate zone are called temperate.
10. Lichens consist of ferns and fungi.
11. Forest stratification means decomposition of fallen leaves, twigs and dead animals.
12. There are only harmful fungi in forests.

13. Fungi can form a symbiotic relationship with trees.
14. Hawthorn, buckthorn and lily of the valley are the examples of forest shrubs.
15. 20 years is a usual period of time limiting one age class in forests.
16. Mushrooms are fungi.
17. Riparian forests grow on sandy and dry soils.
18. Mosses prefer moist and shady areas.
19. Canopy closure tells us how close the crowns of neighbouring trees are.
20. Hazel produces tasty nuts.

IV. Put the following tree growth stages in the proper order. Use thewords from the box.

mature tree	sapling	seedling	pole

V. Match Latin plant names with English ones.

1. hawthorn	A. *Vaccinium myrtillus*
2. Norway spruce	B. *Fragaria vesca*
3. alder buckthorn	C. *Convallaria majalis*
4. juniper	D. *Abies alba*
5. silver fir	E. *Juniperus communis*
6. wild strawberry	F. *Picea abies*
7. bilberry	G. *Crataegus*
8.lily of the valley	H. *Frangula alnus*

TEST 2

I. Fill in the blanks.

1. Basic species characteristics include: longevity, growth rate, shade tolerance, ... and water requirements, and ..... hardness.
2. Some species are ..... , e.g. willow and poplar, others are long-living, e.g. oak or fir which can live as long as 700 years.
3. Fast-growing species include: poplar, larch, pine, ... and spruce.

4. Pine, birch or larch need more light to grow than fir or beech which are ..... .
5. Pine grows well on most soils, fir and beech prefer fertile ones, and spruce does not tolerate lack of water because of its shallow ..... system.

II. True or false?

1. Saplings are younger than small poles.
2. Poles can be divided into high poles and mature trees.
3. Codominant trees are the tallest in a stand.
4. Trees that cannot develop properly because they get not enough sunlight are called suppressed.
1. A snag is a dominant tree in a stand.

III. Fill in the blanks with 1–3 words.

A. A forest stand is a part of a forest. It consists of a relatively uniform group of
trees that grow 1. ..... together and cover a particular area. There are several ways a stand can be described.
B. The basic characteristics include: 2. ....., species composition, stratification, stand density and stand origin. Stand age can be described in many ways.
C. The most common is based on 3. ..... .
D. Twenty years is a usual period of time limiting one class so typical age classes include trees 4. ..... old, 21–40, 41–60 and so on.
E. If trees in a stand belong to one age class such a stand is called even-aged. When they belong to 5. ..... – uneven-aged.
F. Species composition tells us if the stand is single-species or mixed. In mixed stands there are dominant tree species and admixture, which in Polish forests usually constitute 6. ..... .
G. Stratification refers to the numbers of tree layers from the forest floor to tree tops. Stands can be divided into single-storey and multi-storey.
H. Stand density depends on a number of trees per hectare, their sizes (height and diameter) as well as canopy closure which tells us 7. ..... the crowns of
I. neighbouring trees are. Stand origin tells us if the stand regenerated naturally or artificially (was planted or sown).

IV. Choose the correct answer a, b or c.

1. The amount of light reaching the forest floor
a. is always the same all year round
b. is bigger in spring
c. depends on species forming a tree canopy
2. Ferns grow best
a. on sandy soils
b. in the shade
c. in the sun
3. Lichens
a. may cover tree bark
b. grow in polluted areas
c. consist of mosses and fungi
4. Fungi
a. don't form symbiotic relationships
b. are forest pests
c. can be both harmful and beneficial
5. Alder buckhorn is a
a. shrub
b. plant disease
c. type of fungi
6. Lily of the valley produces
a. tasty fruit
b. cones
c. sweet-smelling flowers

Unit 3. FOREST ANIMAL KINGDOM

FOREST ANIMAL KINGDOM

A forest is 'home' for many species of animals. Some of them are very big, others are small. They can be dangerous for people, harmful for other animals or plants or beneficial. They can play different roles in forest ecosystems. The most common and well-known animals include: spiders, ticks, insects, snails and slugs, fish, am- phibians,

reptiles, birds and mammals.

Spiders

They have eight legs. They are predators so they build webs to catch other ani- mals, usually insects, and feed on them. Spiders can be beneficial and reduce the number of insects dangerous for forests.

Ticks

They are very small arachnids that prefer wet, grassy areas or broad-leaved for- ests and shrubs. They are dangerous for people because they transmit *Borrelia burg- dorferi* – a bacterium that causes Lyme disease.

Insects

They usually have three pairs of legs and antennae on their heads. Some of them have one or two pairs of wings so they can fly. Some insects feed on blood, e.g. mosquitoes. Some insects are beneficial, e.g. bees, because they pollinate flowers; others are forest pests, e.g. aphids or the European spruce bark beetle.

Snails and slugs

The difference between snails and slugs is that snails have shells and slugs do not. They are omnivorous and clean the forest floor. They eat leaves, other dead animals, mushrooms and the like.

GLOSSARY

• kingdom	• королівство
• harmful	• шкідливий
• beneficial	• вигідно
• spider	• павук
• tick	• кліщ
• snail	• равлик
• slug	• слимак
• amphibian	• амфібія
• reptile	• рептилія
• mammal	• ссавець
• predator	• хижак
• feed on	• харчуватися
• arachnid	• павукоподібний
• transmit	• передавати
• Lyme disease	• Хвороба Лайма
• antenna / antennae	• вусики

• blood	• кров
• mosquito	• комар
• pest	• шкідник
• aphid	• попелиця
• European spruce	• ялина європейська
• bark beetle	• короїд
• shell	• оболонка
• omnivorous	• всеїдний
• forest floor	• лісова підстилка

1. Answer the questions

2. What animals are a part of the forest ecosystem?
3. How do spiders catch insects?
4. What is *Borellia burgdorferi*? How is it transmitted?
5. What roles can insects play?
6. What is the difference between a snail and a slug?

2. What do you know about the following animals.

mosquito	ant	ladybird	tick
bee	aphid	butterfly	spider

Apart from spiders, ticks, insects and snails forests are ’home‘ to such animalsas amphibians, reptiles, birds and mammals.

Amphibians

They live close to water because their skin is thin and moist and may dry outeasily. In Poland, amphibians are represented by different types of toads and frogs.

Reptiles

In contrast to amphibians, reptile skin is dry and covered by scales, which pro-tect skin from drying out. Polish reptiles include snakes and lizards.

Birds

They are very important in forest ecosystems because they can reduce the num- ber of forest pests such as rodents or insects. They also help in seed dispersal andeat other dead animals.

Mammals

They feed their young with milk. Some of them can fly, e.g. bat, others can swim,
e.g. beaver. Some of them are big, e.g. bear, deer, others are small, e.g. mouse.

GLOSSARY

• amphibian	• амфібія
• mammal	• ссавець
• skin	• шкіра
• thin	• тонкий
• moist	• вологий
• toad	• жаба
• frog	• жаба
• in contrast to	• на відміну від
• covered by	• вкритий
• scale	• луска
• snake	• змія
• lizard	• ящірка
• pest	• шкідник
• rodent	• гризун
• insect	• комаха
• seed dispersal	• розповсюдження насіння
• bat	• кажан
• beaver	• бобер
• bear	• ведмідь
• deer	• олень
• mouse /mice	• миша /миші

3.Answer the questions

1. What is the difference between amphibian and reptile skin?
2. Name typical amphibians and reptiles.
3. What roles do birds play in forest ecosystems?

4. Give examples of mammals living in Polish forests.

4.Choose the correct answer: a, b or c.

ANIMAL QUIZ

1. Marmots in North America are called:
- groundhogs
- hedgehogs
- hogs
2. Hibernating animals are represented by:
- chamois, bear, mouse
- bear, marmot, hedgehog
- hedgehog, bear, chamois
3. Bears are:
- herbivorous
- carnivorous
- omnivorous
4. Chamois is related to:
- deer
- fox
- bear
5. Deer “horns” are called:
- ants
- antennae
- antlers
6. Woodpeckers and partridges are:
- resident birds
- nocturnal birds
- migrant birds
7. Owls can move noiselessly because:
- they are fairly small
- their feet and feathers are covered by down
- they have bigger wings than other birds
8. Beavers are:
    - rodents
    - related to fish
    - active mainly during the day
9. Which animals belong to the same family (Canidae)?

- chamois, bear, lynx
- fox, wolf, dog
- wolf, marmot, fox

GLOSSARY

• marmot	• бабак
• chamois	• серна
• hedgehog	• їжак
• herbivorous	• травоїдний
• arnivorous	• хижий
• omnivorous	• всеїдний
• fox	• лисиця
• horn	• ріг
• woodpecker	• дятел
• partridge	• куріпка
• resident birds	• осілі птахи
• nocturnal	• нічний спосіб життя
• migrant birds	• перелітні птахи
• owl	• сова
• noiselessly	• безшумно
• feather	• перо
• down	• вниз
• beaver	• бобер
• rodent	• гризун
• lynx	• рись

HUNTING

Forest animals can be killed illegally (poaching) or legally (hunting). Animals that are hunted, e.g. deer, wild boar, are called game.

Hunting can be carried out only during the open season. During the closed sea- son hunting is not allowed because it is the time when animals

reproduce and take care of their young.

There are several reasons why forest animals are killed. Firstly, when animalsare weak, ill or injured. Secondly, despite protests, when hunting is treated as sport. Thirdly, when there are too many of them living in a certain area and when theycan cause damage. Their number cannot be reduced in other ways because thereare not enough natural enemies. Finally, some forest animals are hunted for their meat, fur and the like.

GLOSSARY

• illegally	• незаконно
• legally	• законно
• deer	• олень
• wild boar	• кабан
• reproduce	• відтворювати
• take care	• піклуватися
• firstly	• по-перше
• weak	• слабкий
• ranny	• рідкий

1. Find the words in the text that mean:

1. killing animals when such an action is against law
2. killing animals legally
3. animals hunted for their meat, fur
4. the time when killing animals is not forbidden
5. the time when killing animals is forbidden

2. Translate the words from exercise 1 into Ukrainian

A FOOD CHAIN

A food chain explains which part of a forest community produces food and which one eats it. The ones that produce food are called producers and those which eat food – consumers. Finally, there are those which take care of dead producers and consumers. Such organisms are known as decomposers.

Plants are producers in forest ecosystems. They get energy from the

sun, water from the soil or other source and produce glucose in the process called photosynthe- sis. The chemical reaction that takes place during photosynthesis can by explainedby the following equation:

$$6CO_2 + 6H_2O + \text{absorbed sunlight} \rightarrow C_6H_{12}O_6 + 6O_2$$

It means that plants use carbon dioxide and water to produce glucose and oxy- gen.

Consumers cannot produce their own food. There are different types of con-sumers. Primary consumers eat plants and are called herbivores. Secondary con-sumers feed on primary ones. They are called carnivores because they eat meat. Fi-nally, there are tertiary consumers that are also carnivores and kill other carnivores. When a plant or animal dies organic matter in their bodies is broken down by decomposers and nutrients are released and returned to the ecosystem for plantsto use them again. The most common decomposers are bacteria, fungi or some animals, e.g. earthworms, flies and other insects.

GLOSSARY

• food chain	• харчовий ланцюг
• explain	• пояснити
• food	• харчування
• source	• джерело
• take place	• відбуватися
• equation	• рівняння
• carbon dioxide	• вуглекислий газ
• oxygen	• кисень
• primary consumer	• первинний споживач
• herbivore	• травоїдна тварина
• secondary consumer	• вторинний споживач
• feed on	• харчуватися
• carnivore	• хижак
• tertiary consumer	• третинний споживач
• organic matter	• органічна матерія
• break down	• зламатися
• nutrient	• поживна речовина
• release	• вивільнювати

• earthworm • fly	• дощовий черв'як • муха

1.Answer the questions.

1. What is a ‘food chain’?
2. What is the difference between producers and consumers?
3. What do plants need to produce food?
4. What is produced in the process of photosynthesis?
5. What do primary consumers eat?
6. What do secondary and tertiary consumers feed on?
7. What happens to dead plants and animals?
8. What happens to nutrients that are released during decomposition?
9. What organisms break down organic matter?

A food chain is a simplified model describing relationships between plants and animals and how energy is transferred within ecosystems. What exists in real life is not a food chain but rather a food web, because animals can turn to different dietat times.

In order to describe how a food web works it is good to know some more terms connected with the topic. Important words include: a scavenger, carrion, prey,a predator.

GLOSSARY

• simplified • relationship • transfer • in order to • term • connected with	• спрощений • відносини • передача • щоб • термін • пов'язаний з

2.Read the definitions and match them with the words from the box.

scavenger	carrion	prey	predator

1. an animal that eats dead animals
2. an animal that kills other animals
3. an animal which is killed
4. a dead animal

REVISION 3

Choose the correct answer.

1. Polish reptiles include:
   a. lizards and snakes
   b. beavers and frogs
   c. toads and lizards
2. 'Game' means:
   a. controlling the number of animals in the forest
   b. animals hunted for sport or food
   c. the same as poaching
3. During the closed season animals:
   a. are hunted
   b. reproduce and take care of their young
   c. migrate
4. Ticks:
   a. are related to bees
   b. are beneficial
   c. feed on blood
5. The European spruce bark beetle:
   a. transmits *Borrelia burgdorferi*
   b. prefers wet, grassy areas
   c. is a forest pest
6. Bats and beavers:
   a. are mammals
   b. can swim
   c. can fly
7. Deer:
   a. are small reptiles
   b. hibernate

c. are game

8. Plants absorb ..... in the process of photosynthesis:
   a. oxygen
   b. carbon dioxide
   c. nutrients
9. Secondary consumers eat:
   a. herbivores
   b. carnivores
   c. plants

II. What animals:

A. have four pairs of legs and build webs?
B. cause Lyme disease?
C. are represented by snakes and lizards?
D. have antennae on their heads?
E. are omnivorous and have shells?
F. have skin that can easily dry out?
G. feed their young on milk?

III. Decide whether the following statements are true or false.

1. Hunting means illegal poaching.
2. Herbivores prefer meat in their diet.
3. Ticks are arachnids.
4. Mosquitoes are agricultural pests.
5. Amphibians have thin skin.
6. Bears hibernate.
7. Aphids are beneficial.
8. Omnivores feed only on meat.
9. Decomposers break down organic matter.
10. Lizard skin is covered by scales.
11. Frogs are reptiles.
12. Bats can fly.
13. A fly is an insect.
14. Deer is carnivorous.
15. A wild boar is smaller than a beaver.
16. Mice are small rodents.

17. Bats are mammals.
18. Fructose is produced in the process of photosynthesis.

IV. Match the words on the right with their antonyms on the left.

1. open season	A. carnivore
2. beneficial	B. poaching
3. predator	C. closed season
4. herbivore	D. harmful
5. hunting	E. prey

TEST 3

I. Fill in the blanks.

1. Spiders are ..... because they build ..... to catch insects.
2. Ticks prefer ....., ... areas.
3. ..... are beneficial insects.
4. ..... and the European spruce ..... beetle are forests pests.
5. Snails and slugs are ..... and clean the forest floor.

II. True or false?

1. Toads and frogs are amphibians.
2. Reptiles live close to water because their skin can dry out easily.
3. Lizards are reptiles.
4. Reptiles help in seed dispersal.
5. Beavers can fly.
6. The deer is a big mammal.

III. Choose the correct answer: a, b or c.

1. Poaching means:
a. taking care of forest animals
b. killing forest animals illegally
c. the same as hunting
2. Animals that are hunted are called:
a. poachers
b. game
c. the injured
3. Animals can be hunted:

a. during the open season
b. during the closed season
c. all year round
4. Animals are hunted when they are weak, ... or injured.
a. old
b. young
c. ill
5. Some animals are hunted for their ..... or fur.
a. meat
b. mates
c. meatloaf

V . Fill in the blanks with 1–2 words.
1. A food chain consists of ....., ... and ..... .
2. Plants use carbon dioxide and ..... to produce ..... and oxygen.
3. Primary consumers eat ..... and are called herbivores.
4. Secondary consumers are carnivores because they eat ..... .
5. Nutrients are released in the decomposition process and returned to the ecosystem for plants to ..... again.

II. What is the Ukrainian for ‘food chain’, ‘carbon dioxide’, ‘oxygen’, ‘herbivore’, ‘carnivore’ and ‘nutrients’?

Unit 4. FOREST PROBLEMS

WHAT DESTROYS FORESTS

The most dangerous forest enemies are people because they are responsible for air and water pollution. What is more, they cause fires and destroy forest ecosystems by improper use of forests. Finally, they

are to blame for the introduction of invasive alien species.

Air pollution damages leaves and makes trees weaker. It also changes soil qual- ity by lowering its pH. The most dangerous pollutants for trees are: sulphur diox- ide (SO_2), nitrogen dioxide (NO_2), fluorine (F_2), hydrogen fluoride (HF), ammonia (NH_3) and oxidants, e.g. ozone (O_3).

People are responsible for 90 per cent of forest fires which are caused by burning pastures, irresponsible tourist behaviour or arson.

Improper use of forests is dangerous for forest ecosystems because it includes: poaching, wood theft, artificial regeneration preferring single-species and even-aged plantation, harmful harvesting practice, e.g. clearcutting.

People are also to blame for the introduction of invasive alien species which often have no natural enemies, reduce the number of or may even replace native species, e.g. the eastern grey squirrel (*Sciurus carolinensis*) or black cherry (*Prunus serotina*).

Finally, forests around cities are treated as rubbish dumps. What is more, people visiting forests often destroy plants or drive vehicles which make noise and frighten animals.

GLOSSARY

• destroy	• знищити
• enemy	• ворог
• responsible for	• відповідальний за
• pollution	• забруднення
• what is more	• більш того
• cause	• причина
• fire	• вогонь
• improper	• неналежний
• blame for	• звинувачувати
• damage	• пошкодження
• lower	• нижче
• burn	• спалювати
• pasture	• пасовище
• irresponsible	• безвідповідальний
• behaviour	• поведінка
• arson	• підпал

• wood theft	• крадіжка деревини
• artificial	• штучні
• regeneration	• регенерація
• clearcutting	• суцільні рубки
• introduction	• вступ
• invasive alien species	• інвазивні види
• replace	• замінити
• native	• рідний
• eastern grey squirrel	• білка східна сіра
• black cherry	• Чорна вишня
• treat as	• розглядати як
• rubbish dump	• звалище
• vehicle	• транспортний засіб
• frighten	• налякати

1.Answer the questions.

1. Why is air pollution dangerous for forests?
2. What are pollutants? Name those most harmful for trees.
3. Who is responsible for the majority of forest fires?
4. What are their reasons?
5. What does improper use of forests include?
6. Why are invasive alien species dangerous for native flora and fauna?
7. What harmful practices happen in forests around cities?

2.Name factors that destroy forests.

Apart from people, forests are also damaged by unfavourable weather conditions or by different harmful living organisms.

Weather conditions such as rain, snow, hail, drought, flood, strong wind, frost, changing temperatures or lightning can damage the whole tree or its parts such as buds, leaves, twigs, branches, trunks, bark or even roots. Strong wind or avalanchecan uproot the whole tree or break it.

The most dangerous organisms for forests are bacteria and fungi because theycause numerous tree diseases, and insects which are the most common forest pests. Additionally, trees are also damaged by bigger animals such as: deer which de- stroy bark or young plants, beavers that fell trees and flood the area, or wild boars

that dig along streams and contribute to soil erosion.

GLOSSARY

• unfavourable	• несприятливий
• condition	• хвороба
• hail	• град
• drought	• посуха
• frost	• мороз
• lightning	• блискавка
• avalanche	• лавина
• uproot	• викорчувати
• numerous	• численні
• flood	• повінь
• dig	• копати
• stream	• потік
• contribute	• сприяти
• soil	• ґрунт

1.Answer the questions.

1. What weather conditions are unfavourable for trees?
2. What parts of a tree can weather conditions damage?
3. What causes tree diseases?
4. What forest pests are the most dangerous?
5. What damage may avalanche or strong wind cause?
6. Why are deer, wild boars and beavers considered forest pests?

2.In the text find the words that mean:

a. a weather condition when temperature falls below $0^{o}C$
b. a lot of snow falling quickly down the slope of a mountain
c. small ice balls falling from the sky
d. a tree illness
e. an area covered by water as a result of heavy rains
f. an animal that destroys trees or other plants
g. a period of time when there is not enough rain, the soil is dry

and plants suffer from lack of water
h. animals that are famous for building dams
i. big herbivores with antlers
j. a strong light produced by electricity which moves between clouds and the earth surface

GLOSSARY

• fall	• падіння
• slope mountain	• схил гори
• illness	• захворювання
• as a result of	• як результат
• soil	• ґрунт
• dry	• сухий
• lack of	• відсутність
• famous for	• відомий за
• dam	• дамба
• move	• рухатися
• cloud	• хмара
• surface	• поверхня
• earth	• земля

3.Find the Ukrainian equivalents.

1. sleet
2. blizzard
3. rime
4. gale
5. drizzle
6. glaze

REVISION 4

I. Fill in the blanks with the words from the box.

squirrel	clearcutting	even-aged	pollution
arson	invasive alien	wood theft	frighten
dumps	burning	pollutants	fires

The most dangerous forest enemies are people because they are responsible for air and water **1. .....**What is more, they cause **2.....** and destroy forest ecosystems by improper use of forests. Finally, they are to blame for introduc-tion of **3. .....**species.

Air pollution damages leaves and makes trees weaker. It also changes soil qualityby lowering its pH. The most dangerous **4.**for trees are: sulphur dioxide, nitrogen dioxide, fluorine, hydrogen fluoride, ammonia and oxidants, e.g. ozone.

People are responsible for 90 per cent of forest fires which are caused by **5.** ..... pastures, irresponsible tourist behaviour or **6.** ..... .

Improper use of forests is dangerous for forest ecosystems because it in- cludes: poaching, **7.** ....., artificial regeneration preferring single-species and **8.** ..... plantation, harmful harvesting practice, e.g. **9.** ..... .

People are also to blame for introduction of invasive alien species which oftenhave no natural enemies, reduce the number of or may even replace native species, e.g. the eastern grey **10.** ..... (*Sciurus carolinensis*) or black cherry(*Prunus serotina*).

Finally, forests around cities are treated as rubbish **11.....**What is more, people visiting forests often destroy plants or drive vehicles which make noise and **12.** animals.

II. Match the following chemical elements or compounds with theirsymbols or formulae from the box.

NH_3	0_3	HF	NO_2	SO_2	F_2

1. fluorine
2. nitrogen dioxide
3. ammonia
4. sulphur dioxide
5. ozone
6. hydrogen fluoride

III. Put the words from the box into different categories.

blizzard	sleet	rime	drizzle	gale	avalanche	glaze

- ice
- snow
- rain
- rain + snow
- wind

TEST 4

I Fill in the blanks.

1. Air pollution: damages ....., changes ..... quality, lowers its ..... .
2. Forest fires are caused by: burning ....., irresponsible ..... behaviour or ..... .
3. Improper use of forest includes: ....., wood theft, artificial regeneration preferring ..... and even-aged plantation, harmful harvesting practice, e.g. clearcutting.
4. Invasive alien species: often have no ..... enemies, reduce the number of or may even replace ..... species.
5. Forests around cities are treated as ..... dumps. What is more, people visiting forests often destroy plants or drive vehicles which make ..... and frighten animals.

II. Fill in the blanks.

Weather conditions such as 1. ....., snow, hail, drought, flood, strong 2. ....., frost, changing temperatures or lightning can damage the whole tree or its parts such as 3. ....., leaves, twigs, branches, trunks, 4. ..... or even roots. Strong wind or avalanche can uproot the whole tree
or 5. ..... it.
Most dangerous for forest organisms are bacteria and 6. ..... because they cause numerous tree diseases, and insects which are the most common forest 7. .....
.Apart from these, trees are also damaged by bigger animals such as: 8. ..... which destroy bark or young plants, 9. ..... that fell trees and flood the area, or wild boars that dig along streams and contribute to soil 10. ..... .

Unit 5. THE FOREST BIOLOGY

THE FOREST BIOLOGICAL CLOCK

Foresters take care of living organisms and so they observe nature carefully. Their work is planned according to biological changes in forests which are modified by weather conditions.

Phenology is the study of such changes and gives information about leaf devel- opment, plant flowering, fruition, animal breeding and migration. It also helps to choose the best time for planting, collecting seeds or logging. Observing weatherconditions and their influence on plants is also useful in predicting fire risks.

There are eight phenological seasons that can be observed in Poland. Each sea- son is characterised by different biological changes that take place in forest ecosys- tems. The seasons are as follows:

1. very early spring
   Blooming of: windflower (*Anemone nemorosa*), snowdrop (*Galanthus niva- lis*), hazel (*Corylus avellana*), Cornelian cherry (*Cornus mas*), poplar (*Popu- lus* sp.), aspen (*Populus tremula*).
2. early spring
   Beech (*Fagus sylvatica*) and bird cherry (*Padus avium*) are in flower.
3. spring
   Common hawthorn (*Crataegus oxyacantha)* and rowan (*Sorbus aucuparia)*
   bloom, after coming into leaf.
4. early summer
   Blooming of: black elder (*Sambucus nigra*), raspberry, dogwood (*Cornus san- guinea*).
5. summer
   Lindens bloom, raspberry and black elder fruits appear.
6. early autumn
   Other fruits ripen.
7. autumn
   Leaves of deciduous trees turn yellow, red or brown, ripening of acorns, beechnuts.
8. winter

Plants stay dormant.

GLOSSARY

• according to	• відповідно до
• change	• зміна
• phenology	• фенологія
• development	• розвитку
• flowering	• цвітіння
• fruition	• плодоношення
• breed	• порода
• plant	• рослина
• collect seeds	• збирати насіння
• log	• колода
• influence	• вплив
• predict	• передбачити
• season	• сезон
• bloom	• цвітіння
• windflower	• вітроцвіт
• snowdrop	• підсніжник
• hazel	• ліщина
• Cornelian cherry	• кизил
• poplar	• тополя
• beech	• бук
• bird cherry	• черемха
• be in flower	• бути в цвіту
• come into leaf	• прийти в листок
• rowan	• горобина
• black elder	• бузина чорна
• raspberry	• малина
• dogwood	• кизил
• linden/lime	• липа
• appear	• з'являтися
• ripen	• дозрівають
• larch	• модрина
• turn yellow	• жовтіти
• acorn	• жолудь
• beechnut	• буковий горіх

• dormant	• сплячий

1.Answer the questions

1. Why is observing nature so important for foresters?
2. What is phenology?
3. How many phenological seasons are there in Poland?
4. Which plants bloom earliest and which ones latest?
5. What happens in autumn and winter?

TREE DISEASES

Tree pathogens include viruses, bacteria and fungi. However, they do not have the same impact on tree health. For instance, viral and bacterial diseases are not very numerous. The most dangerous are fungi because they cause the majority of tree diseases. Diseases weaken plants and, as a result, trees grow slower or even die. What is more, commercial wood value is lowered.

Viruses, bacteria and fungi can damage all parts of a tree: leaves, shoots, bark or roots. Pathogens can attack seedlings and older trees, living or dead plant tissues and damage stored wood.

Pathogens can cause, for example, spots on leaves, their yellowing, necrosis, wilting, shoot dieback, trunk rot or deformation of different parts of a tree. Fungi are also to blame for vascular diseases. For example, *Ophiostoma ulmi*, which causes Dutch elm disease, blocks vascular tissues. As a result, plants do not get enough water so they wilt and die.

Trees can be also weakened by parasitic flowering plants, e.g. European dodder (*Cuscuta europaea*) and mistletoe (*Viscum album).*

GLOSSARY

• disease	• захворювання
• pathogen	• збудник
• however	• проте
• impact	• вплив
• viral	• вірусний
• bacterial	• бактеріальний
• numerous	• численні

• majority	• більшість
• weaken	• слабшають
• commercial value	• комерційна вартість
• lower	• нижче
• tissue	• тканина
• store	• зберігати
• spot	• пляма
• wilt	• в'яне
• dieback	• відмирання
• rot	• гниль
• are to blame for	• винні в
• vascular	• судинний
• cause	• причина
• Dutch elm disease	• голландська хвороба в'яза
• parasitic	• паразитичний
• flowering	• цвітіння
• European dodder	• Європейська повилика
• mistletoe	• омела

1.Answer the questions.

1. What organisms cause plant diseases?
2. How do pathogens affect trees?
3. What damage can they cause?
4. What are vascular diseases?
5. Name some parasitic flowering plants.

TREE PESTS

There are many animals that can damage trees but the most dangerous are insect pests because they are the most numerous.

Tree insect pests can attack healthy trees (primary pests) or ill, damaged orweakened plants (secondary pests). Some insects prefer only one species of plantthey feed on (monophages), others more than one, but closely related (oligophages). Finally, there are those which eat different plant species (polyphages).

Insect pests can damage all parts of trees. For example, defoliating insects, known also as defoliators, feed on leaves and needles. Others can

also damage inner bark, wood, roots, cones and seeds.

There are usually four developmental insect stages: eggs, larvae, pupae and adults. The most dangerous for forests are adults and larvae because they move and eat a lot.

GLOSSARY

• pest	• шкідник
• insect	• комаха
• numerous	• численні
• primary pest	• первинний шкідник
• weakened	• ослаблені
• secondary pest	• вторинний шкідник
• prefer	• віддають перевагу
• feed on	• харчуватися
• monophage	• монофаг
• oligophage	• олігофаг
• species	• видів
• polyphage needle	• поліфагова голка
• inner	• внутрішній
• cone	• шишка
• seed	• насіння
• developmental	• розвивальна
• stage	• етап
• egg	• яйце
• larva / larvae	• личинка / личинки
• pupa / pupae	• лялечка / лялечка
• adult	• дорослий

1.Answer the questions.

1. Which tree pests are the most dangerous and why?
2. What is the difference between primary and secondary pests?
3. What do oligophages eat?
4. What do defoliators damage?
5. Which insect developmental stages are the most dangerous and why?

2.What do the following insects eat? Match the insect types (1–4) withthe food they prefer (A–D).

1. rhizophage	A. cambium
2. foliophage	B. wood
3. xylophage	C. leaves
4. cambiophage	D. roots

HOW TO CONTROL FOREST PESTSAND DISEASES

Forests are constantly being weakened by anthropogenic and abiotic factors. Anthropogenic damage is caused by people whereas abiotic refers to unfavourable weather conditions. As a result, trees are not as strong as they should be to resist diseases and pest attack.

Forest management today is aimed at creating the best conditions for trees to grow and the worst for pests and diseases to develop. It means, for example, prefer- ring uneven-aged, mixed stands, conserving biological diversity, removing ill trees, choosing tree species that grow the best in the local climate and soil conditions, protecting natural enemies of forest pests (biological control).

Chemical control (pesticide application) is used in forests when other methods of fighting pests and diseases fail. Pesticides are substances that are used against harmful organisms for plants such as fungi, insects or weeds. Pesticides are not used in forests as often as in gardening because they reduce biological diversity. They fight not only pests and diseases but other organisms, e.g. beneficial ones or natural enemies that help to reduce pest population. What is more, pesticides may poison animals, edible mushrooms, fruit and herbs that are picked in forests. Thatis why their use in forests is limited.

Foresters know that using one method is not enough to control forest pests and diseases. They use as many different methods as possible because one method com- plements the other and together they are more effective. Such a way of controlling pests and diseases is called integrated pest and disease management.

GLOSSARY

• constantly	• постійно
• anthropogenic	• антропогенний
• abiotic	• абіотичний
• refer to	• відноситься до
• unfavourable	• несприятливий
• resist	• чинити опір
• forest management	• лісовпорядкування
• aimed at	• спрямовані на
• develop	• розвиватися
• conserve	• захищати
• biological diversity	• біологічне різноманіття
• remove	• видалити
• protect	• захистити
• enemy	• ворог
• application	• додаток
• fail	• провал
• pesticide	• пестицид
• against	• проти
• harmful	• шкідливий
• weed	• бур'ян
• poison	• отрута
• herb	• трава
• pick	• вибрати
• complement	• доповнюють
• integrated	• інтегрований

1.Answer the questions.

1. How do abiotic and anthropogenic factors affect tree health?
2. What is forest management based on today?
3. When is chemical control used?
4. What are pesticides?
5. Why are pesticides not often used in forestry?
6. What is integrated pest and disease management?

REVISION 5.

I.Match English names (1–8) of plants with their

Latin ones (A–H).

1. aspen	A. *Sambucus nigra*
2. rowan	B. *Tilia*
3. hazel	C. *Populus*
4. black elder	D. *Sorbus aucuparia*
5. poplar	E. *Populus tremula*
6. hawthorn	F. *Fagus sylvatica*
7. beech	G. *Corylus avellana*
8. linden	H. *Crataegus*

II. Fill in the blanks with the words from the box.

flowering	adults	pests	viruses
wood	eggs	leaves	pupae
parasitic	fungi	larvae	bacteria

1. There are four insect developmental stages: ....., ..., ... and ..... .
2. Plant pathogens include: ....., ... and ..... .
3. Xylophages eat ..... whereas foliophages ..... .
4. Insects are the most dangerous tree ..... .
5. The European dodder and mistletoe are .... plants.

III. Match the words on the left (1–5) with their antonyms on the right(A–E).

1. secondary pests	A. biotic
2. polyphage	B. biologial control
3. harmful	C. primary pests

4. abiotic	D. beneficial
5. chemical control	E. Monophage

IV. True or false?

1. Oligophages prefer only one species of plant they feed on.
2. Phenology helps to choose the best time for planting, collecting seeds or log-ging.
3. Biological control means the same as pesticide application.
4. Defoliators eat the same as foliophages.
5. Mistletoe weakens trees.
6. Phenology is the science of food chains.
7. Forest diseases are caused by insects and other animals.
8. Fungi and insects cause extensive biotic damage in forests.
9. Secondary insect pests attack healthy trees.
10. Insect developmental stages include: eggs, larvae, pupae and adults.
11. Rhizophages eat wood.
12. Pupa is a mobile insect stage.
13. Abiotic factors include, for example, frost, wind or hail.
14. Larva is a mobile insect stage.
15. Abiotic damage in forests can be caused by: weather conditions, pathogens
    and pests.
16. Natural enemies are helpful in biological control.
17. Nematicides kill weeds.
18. Pesicides are substances used against harmful organisms.
19. Forest pests do not damage cones.
20. Anthropogenic damage is caused by people.

V. Match the words on the right with the ones on the left. Translate theexpressions into Ukrainian.

1. anthropogenic	A. mushrooms
2. biological	B. application
3. edible	C. disease
4. natural	D. insects
5. pesticide	E. factors

6.	forest	F. conditions
7.	beneficial	G. enemies
8.	vascular	H. risk
9.	weather	I. diversity
10.	fire	J. Pests

TEST 5

I. True or false?

1. Phenology is the study of periodical, biological changes.
2. There are nine phenological seasons in Poland.
3. Hazel blooms in the same season as snowdrop.
4. Beech blooms in very early spring.
5. Dogwood blooms in early summer.
6. Linden blooms earlier than black elder.
7. Plants are dormant in early autumn.
8. Beechnuts ripen in autumn.

II. Fill in the blanks.

Tree pathogens include viruses, bacteria and 1. ..... However, they do not have the same impact on tree health. For instance, viral and bacterial diseases are not very numerous. The most dangerous are fungi because they cause the majority of tree 2. ..... . Diseases weaken plants and, as a result, trees grow slower or even die. What is more, commercial wood value is lowered.

Viruses, bacteria and fungi can damage all parts of a tree: leaves, shoots, bark or roots. Pathogens can attack 3. ..... and older trees, living or dead plant tissues and damage stored 4. ..... .

Pathogens can cause, for example, spots on leaves, their 5. ....., necrosis, wilting, shoot dieback, 6. ..... rot or deformation of different parts of a tree. Fungi are also to blame for vascular diseases. For example, Ophiostoma ulmi, which causes Dutch 7. ..... disease, blocks vascular tissues. As a result, plants do not get enough water so they wilt and die.

Trees can be also weakened by parasitic 8. ..... plants, e.g. European dodder (Cuscuta europaea) and mistletoe (Viscum album).

III. Choose the correct answer a, b or c.

1. Tree insect pests are:
   a. not numerous
b. the main pests attacking trees
c. less numerous than other pests
2. Oligophages:
a. eat everything
b. attack the same species as monophages
c. feed on fewer species than polyphages
3. Primary pests attack:
a. healthy trees
b. weakened or dead trees
c. healthy, weakened and ill
4. Defoliators eat:
a. inner bark
b. leaves
   c. wood
5. The most dangerous for forest trees are:
 a. pupae and adults
b. pupae and larvae
 c. larvae and adults

IV. Fill in the blanks with 1–2 words.

Forests are constantly being weakened by anthropogenic and abiotic factors. Anthropogenic damage is caused by people whereas 1. ..... refers to unfavourable weather conditions. As a result, trees are not as strong as they should be to resist diseases and pest attack.

2. ..... today is aimed at creating the best conditions for trees to grow and 3. ..... for pests and diseases to develop. It means, for example, preferring uneven-aged stands, conserving biological diversity, removing ill trees, choosing tree species that grow the best in the local climate and soil conditions, protecting 4. ..... of forest pests (biological control).

5. ..... (pesticide application) is used in forests when other methods of fighting pests and diseases fail. Pesticides are substances

that are used against 6. ..... organisms for plants such as fungi, insects, weeds.

Pesticides are not used in forests as often as in gardening because they reduce 7. ..... population. They fight not only pests and diseases but other organisms, e.g. beneficial ones or natural enemies that help to reduce

8. ..... population. What is more, pesticides may 9. .....

animals, edible mushrooms, fruit and herbs that are picked in forests. That is why

their use in forests is limited.

Foresters know that using one method is not enough to control forest pests and diseases. They use as many different methods as possible because one method complements the other and together they are more effective. Such a way of controlling pests and diseases is called 10. ..... pest and disease management.

Unit 6. FOREST REGENERATION

NATURAL AND ARTIFICIAL REGENERATION

Forest regeneration describes a process when a forest begins to grow. The pro- cess can be natural or artificial (planned and controlled by foresters).

In natural regeneration forests are left to themselves. New trees that start to grow germinate from seeds that have been carried out by wind or animals, or are the result of natural vegetative reproduction (stump sprouts or root suckers). The number of new trees and their distribution are difficult to predict. On the other hand, such a method of forest regeneration preserves ecotypes well adapted to local conditions. What is more, it is not expensive and results in mixed, uneven-aged and multi-storey stands.

Artificial regeneration is based on sowing seeds or planting seedlings. In contrast to natural regeneration, artificial can be planned and controlled. Foresters decide about species composition, arrangement of

plants, seed quality and quantity. Artifi- cial regeneration allows more plants to survive and develop (especially in the case of planting) and the process is quicker than in natural regeneration but more expen- sive because the site must be prepared carefully and the costs of planting seedlings and taking care of them afterwards are high.

GLOSSARY

• regeneration	• регенерація
• artificial	• штучні
• germinate	• проростати
• seed	• насіння
• carried out	• здійснюється
• reproduction	• відтворення
• stump sprout	• пеньовий паросток
• root sucker	• кореневий пагон
• distribution	• розподіл
• predict	• передбачити
• on the other hand	• з іншого боку
• preserve	• зберегти
• adapted	• адаптований
• mixed	• змішаний
• uneven-aged	• різновікові
• multi-storey	• багатоповерховий
• based on	• на основі
• stand	• насаджання
• sow	• сіяти
• plant	• рослина
• in contrast to	• на відміну від
• species composition	• видовий склад
• plant arrangement	• розташування рослин
• quality	• якість
• quantity	• кількість
• allow	• дозволяють
• survive	• вижити
• in the case of	• у випадку
• prepare	• підготувати

• take care of • afterwards	• піклуватися про • згодом

1.Answer the questions

1. Name two types of forest regeneration.
2. How are seeds dispersed in natural regeneration?
3. What are the pluses and minuses of natural regeneration?
4. What is the difference between natural and artificial regeneration?
5. What do foresters control in artificial regeneration?
6. Why is artificial regeneration more expensive?

REFORESTATION AND AFFORESTATION

Natural and artificial regeneration refer to the method of forest establishment whereas reforestation and afforestation to the place where a forest starts to grow. If a forest regenerates on an area where it has existed before the process is called reforestation. If it starts to grow on other non-forest land it is known as afforestation. Treeless areas in forests appear as a result of fire, strong wind, snow, pests and diseases as well as pollution. Trees can also be removed from a site by logging. Such sites are used by foresters to grow new trees because forest soils are tree-friendly. They are covered by litter, which protects soil from erosion. They are usually rich in mycorrhizal fungi, and not changed by agriculture (lack of plough pan and pesticides).

Forests are also planted on wasteland, farmland, areas degraded by industry or wetland. Such sites need careful preparation because they are not suitable for trees. They are usually too dry or too wet, covered by weeds. The soil does not have proper structure or a typical profile. It is often degraded and contaminated by heavy metals, pesticides or other chemicals. Another problem is soil salinity. Degraded soils also lack proper soil organisms and enough organic matter.

GLOSSARY

• reforestation afforestation establishment	• лесовосстановление лісонасадження
• whereas	• тоді як
• area	• область
• exist	• існують
• appear	• з'являтися
• fire	• вогонь
• pollution	• забруднення
• remove	• видалити
• site	• місце
• log	• колода
• soil	• ґрунт
• covered by	• вкритий
• litter	• підстилка
• rich in	• багатий на
• plough	• орало
• wasteland	• пустка
• degraded	• деградували
• industry	• промисловість
• suitable for	• підходить для
• dry	• сухий
• wet	• мокрий
• weed	• бур'ян
• proper	• належне
• soil profile	• ґрунтовий профіль
• contaminated	• забруднені
• salinity	• солоність
• lack	• відсутність
• organic matter	• органічна матерія

1.Answer the questions

1. Which terms refer to the method of forest regeneration and which ones to thearea where trees start to grow?
2. What is the difference between afforestation and reforestation?
3. What areas are reforested? Give examples.
4. Why do trees grow better on former forest land?
5. What areas are afforested?

6. Why are they usually not suitable for trees?

2.Put the layers of a soil profile in the proper order. Use the words fromthe box.

subsoil	parent rock	topsoil

3.Read the definitions. What do they refer to? Use the words from thebox.

organic matter	pH	soil	nutrients
subsoil	topsoil	litter	

1. covers forest soils and consists of organic matter in different stages of decom-position
2. consists of mineral material, e.g. sand, clay and organic matter. It forms poresthat are filled with air or water
3. contains minerals and organic matter (humus)
4. decomposed plants and animals
5. a layer that is above the parent rock
6. minerals that plants absorb from the soil
7. tells us if the soil is acidic, alkaline or neutral

GLOSSARY

• cover	• покривати
• consist of	• складається з
• stage	• етап
• decomposition	• розкладання
• sand	• пісок
• clay	• глина
• filled with decomposed	• заповнений розкладеним
• layer	• шар
• acidic	• кислий
• alkaline	• лужний
• neutral	

AFFORESTATION OF FARMLAND

More and more farmers in Poland plant trees on poor soils because such actions are encouraged by the government and subsidised by the European Union. Farm-ers can get money not only for trees and their planting, but also for building fences protecting young trees from animals. European afforestation subsidies pay for taking care of plants afterwards and lack of income from afforested areas as well.

Afforestation of farmland is a long process and it is not always successful be- cause soils used for agricultural production are not suitable for trees. Firstly, they have a plough pan – a hard layer of soil which results from using heavy agricultural equipment. Such a layer does not allow proper water penetration and deep develop- ment of roots.

Secondly, farmland soils have slightly higher pH than trees prefer and improper N:P ratio (too much nitrogen). What is more, the soil structure is also damaged because of constant use of agricultural equipment.

Thirdly, such soils lack typical forest soil organisms, mycorrhizal fungi included. Trees cannot form a symbiotic relationship with fungi (mycorrhiza), which makes them more resistant to diseases. As a result, trees planted on farmland often suffer from root and leaf diseases and may even die.

Finally, farmland soils are not covered by litter which protects them from ero- sion. Farmland is also an area where there is too much sunshine for many tree species. What is more, such areas lack typical forest microclimate which protects seedlings and saplings from strong winds and temperature extremes.

GLOSSARY

• plant	• рослина
• poor soil	• бідний грунт
• encourage	• сприяти
• subsidise	• допомагати
• fence	• паркан
• take care	• піклуватися
• lack of	• відсутність
• suitable for	• підходить для
• plough	• орало
• layer	• шар

• allow • proper • development • slightly • prefer • improper • nitrogen • constant • include • relationship	• дозволяти • належний • розвиток • злегка • віддають перевагу • неналежний • азот • постійний • включати • відносини

1.In the text find the words that mean:

1. people who control a country
2. money given to somebody to encourage him to do something
3. money you get for doing your job or from other source
4. machines used for preparing soil for sowing or planting
5. proportion of two things
6. does not suffer from diseases, does not fall ill
7. organic matter covering forest soils
8. a young tree

2.Answer the questions.

1. Why is afforestation of farmland popular in Poland?
2. Why do farmers build fences around afforested areas?
3. Why is afforestation of farmland not easy?
4. What is a 'plough pan'?
5. What problems can be observed when a plough pan is present?
6. What farmland chemical soil properties are not suitable for tree growth?
7. Why are mycorrhizal fungi so important for trees?
8. What is forest microclimate like?

FAST-GROWING TREE PLANTATIONS

Tree plantations have been known since ancient times. The first plantations consisted of purple/red osier (*Salix purpurea*), which provided wicker used for mak- ing baskets and shields.

Nowadays plantations are not restricted to red osier only. They may be the first step in afforestation or, very rarely, a part of reforestation. In both cases the final tree species composition in a planned forest is different from that of a plantation, which usually forms single-species and even-aged stands typical for monocultures.

Plantations consist of fast-growing tree species such as poplar, willow, birch, larch or, sometimes, black alder and spruce. The choice of species and the way they are planted depend not only on local environmental conditions but buyer require- ments as well.

Plantations produce wood in a comparatively short time. Trees in plantations grow from 2 to even 60 years and provide different types of products for commercial purposes. The longer growing plantations are a source of timber and related prod- ucts, e.g. veneer, sawnwood. The shorter growing supply wood for the paper indus- try or production of panel products such as fibreboard, particleboard. Fuelwood is usually obtained from coppicing, which is grown for 2 to 10 years. Finally, there are also Christmas tree plantations whose aim is to grow trees of a proper size and shape and which do not shed their needles fast in unfavourable indoor conditions.

GLOSSARY

• fast-growing	• швидкозростаючий
• ancient	• давній
• consist of	• складається з
• purple/red osier	• фіолетова/червона іва
• wicker	• лоза
• basket	• кошик
• shield	• щит
• restrict	• обмежувати
• depend on	• залежати від
• requirements	• вимоги
• provide	• забезпечити
• commercial	• комерційний
• purpose	• мета

• timber	• деревина
• veneer	• шпон
• sawnwood supply	• постачання пиломатеріалів
• fibreboard	• ДВП
• particleboard	• ДСП
• fuelwood	• дрова паливні
• obtain	• отримати
• coppice	• поросль
• shed	• скидати

1.Answer the questions.

1. What roles do plantations play?
2. What stands do they usually form?
3. What species are planted in fast-growing tree plantations?
4. How long do trees in plantations grow?
5. How is plantation wood used?

2.Answer the questions.

1. Wicker is mainly obtained from:
   a. one *Salix* species
   b. two *Salix* species
   c. three *Salix* species
2. The majority of wicker is obtained from:
   a. Salix americana and *Salix viminalis*
   b. Salix purpurea
   c. Salix amygdalina and *Salix purpurea*
3. Shoots that are harvested are:
   a. one year old
   b. four or five years old
   c. one, two or three years old
4. Shoots are harvested between:
   a. March and June, when they grow fast
   b. November and early March, when they are dormant
   c. July and November, when intensive growth stops
5. Wicker colour depends on:
   a. species only
   b. processing

c. the time when shoots are harvested

6. *Salix* species from which wicker is obtained:
   a. can grow on all types of soils
   b. prefer only fertile soils
   c. have different soil requirements

GLOSSARY

• obtain	• отримати
• majority	• більшість
• harvest	• урожай
• dormant	• сплячий
• fertile	• родючі
• requirements	• вимоги

REVISION 6

I. What is the difference between natural and artificial regeneration? Read the statements and fill in the table.

A. It is more expensive.
B. New trees grow from seeds that are carried out by wind or animals.
C. It is planned and controlled.
D. The method is based on sowing seeds or planting seedlings.
E. The number of new trees and their distribution are difficult to predict.
F. Foresters decide about species composition and arrangement of plants.
G. This method of forest regeneration preserves ecotypes well adapted to local conditions.
H. It is labour-intensive.
I. It is cheaper.
J. It results in mixed, uneven-aged and multi-storey stands.
K. Foresters decide about seed quality and quantity.
L. Foresters do not decide about seed quality and quantity.

natural regeneration	artificial regeneration

II. Match the beginnings of the definitions with their ends. What do they refer to?

1. a hard layer of soil
2. covers forest soils and consists of organic matter
3. a symbiotic relationship between
4. consists of fast-growing tree species
5. money paid for planting trees

A. such as poplar, willow, birch or larch
B. by the European Union
C. which results from using heavy ag-ricultural equipment
D. tree roots and fungi
E. in different stages of decomposition

III. Match the words from the box with their definitions from exercise II.

afforestation subsidies	mycorrhiza	litter
plough pan	plantation	

IV. Fill in the blanks with the words from the box.

pollution	logging	afforestation
non-forest	pests	plough pan
reforestation	litter	mycorrhizal

Natural and artificial regeneration refer to the method of forest establish- ment whereas reforestation and afforestation to the place where it starts to grow. If a forest regenerates on an area where it has existed before the process is called **1.** ..... . If it starts to grow on other **2.** ..... land it is known as **3.** ..... .

Treeless areas in forests may appear as a result of fire, strong wind, snow, **4.** ..... and diseases, as well as **5.** ..... . Trees can also be removed from a site by

6. ..... . Such sites are used by forest-ers to grow new trees because forest soils are tree-friendly. They are covered by
7. ....., which protects soil from erosion**.** They are usually rich in
8. ..... fungi, and not changed by agriculture (lack of
9. .....and pesticides).

v.Choose the correct answer a, b or c.

1. Farmland soils have:
   a. proper pH for trees but improper N:P ratio
   b. slightly higher pH than trees prefer but proper N:P ratio
   c. slightly higher pH than trees prefer and improper N:P ratio
2. Plantations usually form:
   a. single-species and uneven-aged stands
   b. single-species and even-aged stands
   c. mixed and uneven-aged stands
3. Plantation fuelwood is usually obtained from:
   a. coppicing
   b. sapling stands
   c. nurseries
4. Fibreboard and particleboard are examples of:
   a. veneer
   b. sawnwood
   c. panel products
5. Sawnwood is produced in:
   a. sawmills
   b. jigsaws
   c. hacksaws

TEST 6

I. Fill in the blanks with 1–3 words.
NATURAL REGENERATION
1. New trees start to grow from ....., ... and ..... .
2. Foresters control and plan ..... .

3. Pluses of this method: preserves .... to local conditions, ..., results in ....., uneven-aged and ..... stands.

ARTIFICIAL REGENERATION

1. New trees start to grow from ..... and ..... .
2. Foresters control and plan ...., arrangement of plants, ... quality and quantity.
3. Pluses of this method: more plants ....., ...

II. Choose the correct answer a, b or c.

1. Forest establishment on former forest land is called:
a. afforestation
b. reforestation
c. deforestation
2. Forest establishment on non-forest land is called:
a. deforestation
b. reforestation
c. afforestation
3. A plough pan:
a. stimulates the growth of trees
b. can be observed in soils in agricultural use
c. does not influence the growth of trees
4. Afforestation may take place:
a. on wasteland, farmland, areas degraded by industry or wetland
b. only on areas degraded by industry
c. is not allowed on farmland
5. Soils are contaminated :
a. by pesticides, heavy metals and other chemicals
b. by soil salinity, organic matter and soil organisms
c. only in post-industrial areas

III. True or false?

1. The European Union gives farmers money to plant trees.
2. Subsidies are given only for trees and their planting.
3. Trees grow well on farmland.
4. A plough pan is a soil characteristic that is not typical for forest soils.
5. Forest soils have a little lower pH than soils used for growing agricultural

crops.
6. Mycorrhizal fungi cause fungal diseases.

II. What is the Ukrainian for: ‘subsidy’, ‘plough pan’, ‘mycorrhizal fungi’ and ‘fungal diseases’?

IV. Fill in the blanks with 1–2 words.
1. Tree plantations have been known since ..... times.
2. They provided wicker used for making ..... and shields.
3. Plantation usually form single-species and even-aged stands typical for ..... .
4. Plantations consist of ..... tree species such as poplar, willow, birch, larch or, sometimes, ... and spruce.
5. Trees in plantations grow from ..... to even ..... years.
6. .....is usually obtained from coppicing, which is grown for 2–10 years.
ures 4 feet by 4 feet by 8 feet. A face cord or short cord is 4 feet by 8 feet by any length of wood under 4 feet.

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