Elżbieta Kloc

BASIC FOREST VOCABULARY

Centrum Informacyjne
Lasów Państwowych

Wydano na zlecenie Dyrekcji Generalnej Lasów Państwowych
Warszawa 2021

ul. Grójecka 127
02-124 Warszawa
tel.: 22-185-53-53
e-mail: cilp@cilp.lasy.gov.pl
www.lasy.gov.pl

Konsultacja merytoryczna
dr inż. Krzysztof Michalec

Recenzja
dr Ewa Bandura

Korekta językowa
Ramon Shindler

Ryciny
Bartłomiej Gaczorek

Redaktor prowadzący
Anna Wikło

Zdjęcia na okładce
Paweł Fabijański

ISBN 978-83-65659-63-7

Wydanie II

Projek graficzny i przygotowanie do druku
EDO Jakub Łoś

Druk i oprawa
Ośrodek Rozwojowo-Wdrożeniowy Lasów Państwowych w Bedoniu

OD AUTORKI

Książka, która znalazła się właśnie w Państwa rękach, przeznaczona jest dla studentów wydziałów leśnych, znających język angielski na poziomie średniozaawansowanym niższym lub trochę wyższym (A2–A2+), oraz leśników-praktyków, pragnących pogłębić swoją znajomość angielskiej terminologii leśnej.

Dobór tekstów, zadań i materiałów dodatkowych ma na celu zapoznanie z fachowym słownictwem używanym na co dzień w leśnictwie. Każda część książki składa się z ćwiczenia na rozumienie ze słuchu (pliki w formacie .mp4 można pobrać ze strony Lasów Państwowych www.lasy.gov.pl, w zakładce Informacje>Publikacje >In English), krótkiego tekstu oraz ćwiczeń sprawdzających jego zrozumienie. Na końcu książki znajdują się klucze do ćwiczeń i słownik angielsko-polski pomagający w zrozumieniu niektórych terminów. Dodatkowo można skorzystać z dwujęzycznego słownika mojego autorstwa pt. *Thematic Forest Vocabulary – Tematyczny słownik leśny*, również dostępnego na stronie internetowej Lasów Państwowych.

Podręcznik *Basic Forest Vocabulary* nie mógłby powstać bez pomocy wielu osób, które poparły ideę jego opracowania, wspierały mnie podczas pisania i zbierania materiałów oraz pomogły w jego wydaniu. W szczególności dziękuję wydawcy książki – Centrum Informacyjnemu Lasów Państwowych oraz pracownikom Wydziału Leśnego Uniwersytetu Rolniczego w Krakowie, którzy dzielili się ze mną swoją wiedzą fachową i udzielali cennych wskazówek. Szczególnie serdecznie dziękuję dr. inż. Krzysztofowi Michalcowi za ogromną życzliwość i cierpliwość w wyjaśnianiu zawiłości zagadnień leśnych oraz konsultację merytoryczną napisanych tekstów, a także Ramonowi Shindlerowi, który dokonał korekty językowej.

Elżbieta Kloc

TABLE OF CONTENTS

INTRODUCTION

SILVICULTURAL ABC

FORESTRY FOR INSIDERS

INTRODUCTION

1

THE STATE FORESTS

I. Listen and do the exercise on page 127.

The State Forests are a huge, self-financing unit that employs about 26,000 people. It governs 7,609,500 hectares of national property. Forests cover the majority of the administered area (7,316,700 hectares). The remaining part of the property consists of non-afforested areas, wastelands, farmlands and waters.

Organisation of the State Forests

Directorate-General of the State Forests
17 Regional Directorates of the State Forests
430 Forest Districts

The objectives of the State Forests

The main objective of the State Forests is an economic one (mainly timber production). However, ecological, recreational, scientific and educational aspects of forests also play an important role in forest management.

Nowadays, forest management is based on the concept of sustainable development. It means that forests are used in such a way that they are preserved for our children and grandchildren who will enjoy and use them in the future.*

* Based on: *Rocznik statystyczny leśnictwa* (*Statistical Yearbook of Forestry*), GUS, Warszawa 2020.

GLOSSARY

the State Forests – Lasy Państwowe
unit – jednostka
cover – pokrywać
majority – większość
remaining – pozostały
consist of – składać się z
area – obszar
objective – cel, zadanie
play a role – odgrywać rolę
management – *tu*: gospodarka
based on – oparty na
sustainable – zrównoważony
development – rozwój
perform – odgrywać
preserve – zachować
future – przyszłość*

* W razie problemów z wymową słówek można skorzystać ze słowników internetowych, np. www.merriam-webster.com [E.K.].

READING COMPREHENSION

I. In the text find the words that mean:

1. give somebody work and pay for it
2. the same as 'administer'
3. not private, but belonging to all people in a country
4. something that you have, something what is yours
5. not covered by forests
6. an area that is not used for agriculture, or used in any other way
7. a long, round piece of wood

Next, translate them into Polish.

II. Translate into Polish: Organisation of the State Forests.

III. Answer the questions.

1. How many hectares do the State Forests administer?
2. How many people work for the State Forests?
3. What do the State Forests govern?
4. What is the main objective of the State Forests?
5. On what concept is forest management based?

FOLLOW-UP: RELATED VOCABULARY

One of the objectives of the State Forests is ecological education. It is mainly aimed at children and young people and tries to instil in them an eco-friendly attitude not only towards forests but nature as a whole. Ecological education explains the relationship between people and the environment, what ecosystem is, how it works and what its components are. It makes them aware of such problems as man-made damage to forests, e.g. littering, fire. It teaches about forest plants and animals and nature protection.

GLOSSARY

instil – wpoić
attitude – podejście
component – składnik
litter – śmiecić

I. Learn what issues ecological education includes. Match the words on the right with the ones on the left. Translate the expressions into Polish.

1. forest	A. and fauna
2. endangered	B. destruction
3. flora	C. conservation
4. nature	D. fires
5. habitat	E. species

2

WHO TAKES CARE OF POLISH FORESTS?

I. Listen and do the exercise on page 127.

The answer is simple – foresters. They monitor forest conditions, collect data to make long-term plans because trees need many years to grow. They have a broad knowledge not only about trees, but also all forest vegetation and forest animals.

Foresters know how to plant trees, take care of them and finally, cut them down safely. Foresters calculate the proper number of trees that can be cut down a year in such a way that allows the forest to regenerate and remain for future generations.

Foresters are professionals who are experts in many fields. For instance, they know not only how to take care of forests but also how to fight fires, draw maps, build roads or even bridges. What is more, foresters have to be good managers because forests are treated like a company that produces goods and makes a profit.

The majority of Polish forests are state-owned and are administered by the State Forests. They usually grow on poor soils or those unsuitable for agriculture, e.g. mountain slopes or wet ground. The most common and numerous tree species in our forests are coniferous.

GLOSSARY

take care of – opiekować się, zajmować
forester – leśnik
condition – warunek
collect data – zbierać dane
broad – szeroki
plant trees – sadzić drzewa
cut down – ścinać
allow – pozwolić
remain – pozostawić
generation – pokolenie
field – dziedzina
fight fires – walczyć z pożarami
draw maps – rysować mapy
bridge – most
treated like – traktowane jako
goods – towary
make a profit – przynosić zysk
state-owned – państwowy
poor – *tu*: słabe
unsuitable for – nieodpowiedni dla
agriculture – rolnictwo
slope – zbocze
species – gatunek, gatunki
coniferous – iglasty

READING COMPREHENSION

I. Answer the questions.

1. Why do foresters make long-term plans?
2. How is the number of trees that are to be cut down calculated?
3. Why should foresters be good managers?
4. Where do the majority of Polish forests grow?
5. Which tree species are the most numerous?

II. Match the words on the right with the ones on the left to make collocations.

1. cut	A. profit
2. plant	B. fires
3. fight	C. animals
4. state	D. trees
5. forest	E. down trees
6. bring	F. -owned
7. poor	G. soils

III. Translate into English. Use some collocations from exercise I.

1. Jestem leśnikiem.
2. Ukończyłem Uniwersytet Rolniczy w Krakowie.
3. Lasy w Polsce są głównie państwowe i przynoszą zyski.
4. Walka z pożarami w lasach jest trudna i niebezpieczna.
5. Łatwo jest posadzić drzewo, dużo trudniej jest je ściąć.

FOLLOW-UP

I. Where are the following State Forests' units located? Use the words from the box.

Gołuchów	Warsaw	Sękocin	Bedoń	Jarocin	Miłków

1. The State Forests Information Centre
2. The State Forests Centre for Research and Implementation
3. The Forest Technology Centre
4. The State Forests IT Department
5. The Coordination Centre for Environmental Projects
6. The Kostrzyca Forest Gene Bank
7. The Forest Culture Centre

GLOSSARY

research – badania naukowe
implementation – zastosowanie w praktyce
environmental – środowiskowy
gene bank – bank genów

3

FOREST QUIZ

I. How much do you know about Polish forests? Check your knowledge and answer the quiz questions.

QUIZ

1. There is ..... of a hectare of forest per Polish citizen.
   a. 0.152
   b. 0.241
   c. 0.468
2. Percentage of area covered by forest is highest in:
   a. the Lubuskie province
   b. Małopolskie
   c. Podkarpackie
3. Percentage of area covered by forest is lowest in:
   a. the Śląskie province
   b. Dolnośląskie
   c. Łódzkie
4. Forests around cities constitute ..... of all forests.
   a. 9 per cent
   b. 15 per cent
   c. 26 per cent
5. The most common tree species in our forests are:
   a. pine and birch
   b. pine and beech
   c. pine and oak
6. The most common species in Polish mountain forests are:
   a. pine, larch, birch
   b. spruce, beech, fir
   c. larch, willow, birch
7. Private forests constitute ..... of all forests.
   a. 19.3 per cent
   b. 25.2 per cent
   c. 28.9 per cent
8. Private forests are almost non-existent:
   a. along our eastern border
   b. along our western border
   c. in the Mazowieckie province
9. The highest percentage of private forests is in:
   a. the Dolnośląskie and Śląskie provinces
   b. Świętokrzyskie and Podlaskie
   c. Małopolskie and Mazowieckie

II. How much do you know about forests in the United Kingdom? Answer these questions.*

1. The percentage of the UK covered by forests is:
   a. approximately the same as in Poland
   b. much lower than in Poland
   c. a little higher than in Poland
2. Forests in the UK cover …… of the country's area.
   a. 8% b. 13% c. 18% d. 34%
3. ……. is the most wooded region in the UK.
   a. England b. Wales c. Scotland d. Northern Ireland
4. The least wooded is:
   a. Scotland b. England c. Wales d. Northern Ireland

* Based on: *Woodland area and planting 2020/1*. www.forestresearch.gov.uk.

GLOSSARY

citizen – obywatel
area – obszar, teren, powierzchnia
covered by – pokryty przez
province – województwo
majority – większość
constitute – stanowić
species – gatunek, gatunki
pine – sosna
birch – brzoza
beech – buk
larch – modrzew
spruce – świerk
fir – jodła
willow – wierzba
non-existent – nieistniejący
border – granica
percentage – odsetek, procent
the UK – Zjednoczone Królestwo
the least – najmniej
a little – trochę, odrobinę
wooded – zalesione
approximately – około

III. Listen and check your answers to exercises I and II.

IV. Translate into English.

1. Najbardziej zalesionym województwem w Polsce jest lubuskie.
2. Sosna jest najbardziej pospolitym gatunkiem w polskich lasach.
3. Odsetek obszaru pokrytego lasami jest najniższy w województwie łódzkim.
4. Lasy w Finlandii zajmują więcej niż 70% powierzchni kraju.
5. Lasy na Malcie prawie nie istnieją. Stanowią one tylko 1% powierzchni kraju.
6. Najbardziej popularnymi gatunkami drzew w polskich lasach są sosna i dąb.
7. Świerk, buk i jodła to typowe gatunki występujące w polskich lasach górskich.
8. Większość polskich lasów nie jest prywatna.

4

THE ROLES FORESTS PLAY

I. Listen and do the exercise on page 128.

Although wood production is still the most profitable forestry sector, its methods have changed a lot over the years. Nowadays, not only the productive aspect is important because forests are no longer seen as a source of wood only, but complex ecosystems playing different roles.

Forests prevent soil erosion and landslides, reduce air pollution, protect wildlife habitats, promote biodiversity or recreation. They have also positive effects on local climate and water cycle. They prevent floods, protect water resources, reduce temperature extremes, act as effective noise, dust and wind barriers. Forests are a source of non-timber products as well, such as venison, fruit, medicinal plants or mushrooms.

GLOSSARY

wood – drewno
profitable – dochodowy
forestry – leśnictwo
source – źródło
complex – złożony
prevent – zapobiegać
soil – gleba
landslide – osuwisko
pollution – zanieczyszczenie
protect – chronić
wildlife – fauna i flora
habitat – siedlisko
biodiversity – różnorodność biologiczna
flood – powódź
water resources – zasoby wodne
dust – kurz, pył
non-timber products – użytki uboczne
venison – dziczyzna
medicinal plants – rośliny lecznicze
mushroom – grzyb

READING COMPREHENSION

I. Read the text and answer the questions.

1. Which forest product is the most profitable?
2. Name four basic forest functions.
3. Do forests promote biodiversity?
4. What effect do they have on local climate?
5. Name some non-timber forest products.

II. True or false?

1. The most important forest function is its recreational one.
2. Forests form a system of relations between plants and animals living in an area as well as weather, soil and so on.
3. Forests promote landslides.
4. They reduce biodiversity.
5. Venison is the meat of a wild animal.

III. Match the words on the right (1–10) with the ones on the left (A–J). In some cases there is more than one possibility.

1. ecological	A. production
2. wildlife	B. wildlife
3. medicinal	C. barrier
4. wood	D. pollution
5. soil	E. plants
6. protect	F. resources
7. water	G. floods
8. noise	H. function
9. prevent	I. habitat
10. air	J. erosion

IV. Do you know

1. why forest air does not contain many pathogens?
2. how much wind speed can be reduced by a forest?

If not, read the information below.

DID YOU KNOW?

- The temperature in the city is 5–8°C higher than the temperature in the forest just outside its city limits.
- Forest atmosphere is almost free of pathogens because trees and other forest plants produce phytoncides which kill bacteria, fungi and protozoa.
- Forests can lower the speed of wind by 70–90%.
- Forest environment stimulates anti-cancer proteins in the human body. The effect lasts up to seven days after visiting the forest.
- Seven to eight trees produce enough oxygen to satisfy the needs of one person for a year.

GLOSSARY

contain – zawierać
city limit – granica miasta
phytoncide – fitoncyd
bacterium *l.mn.* bacteria – bakteria
fungus *l.mn.* fungi – grzyb
protozoan *l.mn.* protozoa – pierwotniak
speed – szybkość
environment – środowisko
anti-cancer – przeciwrakowy
protein – białko
mature – dojrzałe
oxygen – tlen

REVISION I (TEXTS 1–4)

I. True or false?

1. Foresters monitor forest conditions.
2. Foresters cut down the same amount of trees every year.
3. Forests in Poland make a profit.
4. The majority of forests in Poland are private.
5. The Forest Culture Centre is in Miłków.
6. Forests are a source of timber and non-timber products.
7. The Directorate-General of the State Forests is in Warsaw.
8. There are 21 Regional Directorates of the State Forests in Poland.
9. There are three forest gene banks in Poland: in Miłków, Jarocin and Bedoń.
10. Forests in Poland occupy two thirds of the country's area.
11. Pine is the most common tree species in our forests.
12. There are more state-owned forests in Poland than private ones.
13. Forest fires are easy to fight.
14. Forest management in Poland is multifunctional.
15. Forests reduce noise and wind speed.

II. Answer these questions.

1. What university did you graduate from?
2. What's your job?
3. Where do you work?
4. Are there many private forests in Poland?
5. Do trees produce oxygen?

III. Think about forest functions and decide what forests promote or protect and what they prevent. Use the words from the box.

landslides	biodiversity	floods	water resources
recreation	soil erosion	wildlife habitat	

forests promote	forests prevent	forests protect

IV. Match the Polish words with their English equivalents.

1. rośliny lecznicze	A. the State Forests
2. użytki uboczne	B. forest district
3. siedlisko	C. non-timber forest products
4. nadleśnictwo	D. medicinal plants
5. Lasy Państwowe	E. habitat

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

mushrooms	wood production	floods	venison
playing different roles	pollution	protect	resources
erosion	wind		

1. ..... is still the most profitable forestry sector.
2. Forests are complex ecosystems ..... .
3. Forests prevent soil ..... and landslides, reduce air ....., ... wildlife habitat, promote biodiversity or recreation.
4. They have also positive effects on local climate and water cycle. They prevent ....., protect water ....., reduce temperature extremes, act as effective noise, dust and ..... barriers.
5. Forests are a source of non-timber products as well, such as ....., fruit, medicinal plants or ..... .

VI. Translate into English. The words from the box may help you. Change the form of the verb when necessary.

the least	the most	be covered by	per cent
area	wooded	occupy	the UK
Wales	Scotland	Northern Ireland	only

1. W Zjednoczonym Królestwie tylko 13 procent kraju jest pokryte lasami.
2. Najbardziej zalesioną częścią Zjednoczonego Królestwa jest Szkocja, gdzie 19 procent jej powierzchni jest pokryte lasami.
3. Najmniej zalesiona jest Północna Irlandia (9 procent).
4. Lasy w Walii zajmują 15 procent, a w Anglii tylko 10 procent.*

* Based on: *Woodland area and planting 2020/1*. www.forestresearch.gov.uk.

SILVICULTURAL ABC

1

WHERE TREES COME FROM

I. Listen and do the exercise on page 128.

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 not require gamete formation because a young plant is a part of the parent plant, e.g. shoot cuttings.

GLOSSARY

seed – nasiono
germinate – kiełkować
is called – jest nazywany
seedling – siewka
become – stawać się
sapling – młode drzewko
depend on – zależeć od
species – gatunek, gatunki
mature – dojrzały
cut down – ściąć
reproduction, propagation – rozmnażanie
common – popularna, powszechna
forestry – leśnictwo
sexual propagation – rozmnażanie generatywne
require – wymagać
fertilisation – zapłodnienie
vegetative – wegetatywne
parent plant – roślina macierzysta
shoot cutting – zrzez

READING COMPREHENSION

I. Read the text and decide whether the following statements are true or 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 in forestry.

II. 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.

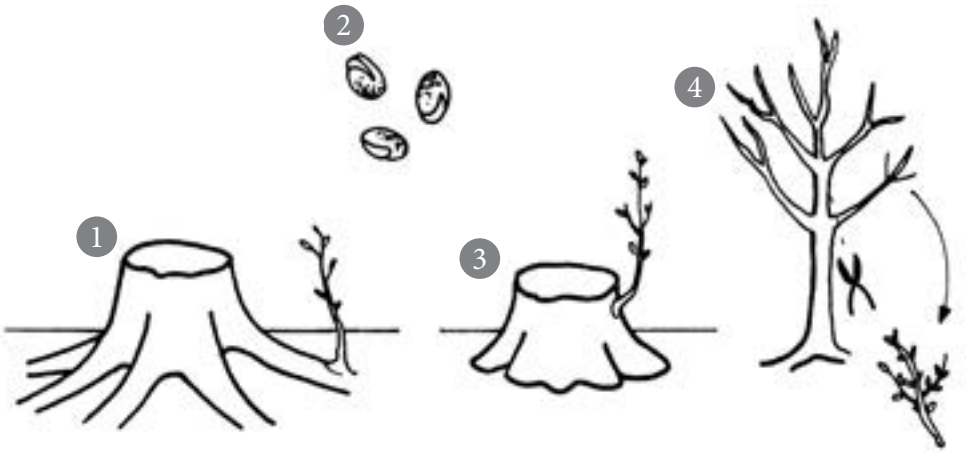
4. .....?
   Yes, a shoot cutting.

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

FOLLOW-UP: PROPAGATION METHODS

I. Look at the pictures and name the propagation methods. Use the words from the box.

shoot cutting	seed	stump sprout	root sucker



2
PARTS OF A TREE

I. Listen and do the exercise on page 128.

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 photosynthesis 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 – składać się z
root system – system korzeniowy
trunk – pień
crown – korona
shape – kształt
species *l.mn.* species – gatunek
soil – gleba
condition – warunek
several – wiele
taproot – korzeń palowy, główny
downwards – w dół
lateral root – korzeń boczny
root hair – włośnik
pine – sosna
relationship – związek
fungus *l.mn.* fungi – grzyb
valuable – cenny
bud – pączek
bark – kora
nutrient – składnik odżywczy
upwards – w górę
branch – gałąź
twig – gałązka
covered by – pokryty

READING COMPREHENSION

I. True or false?

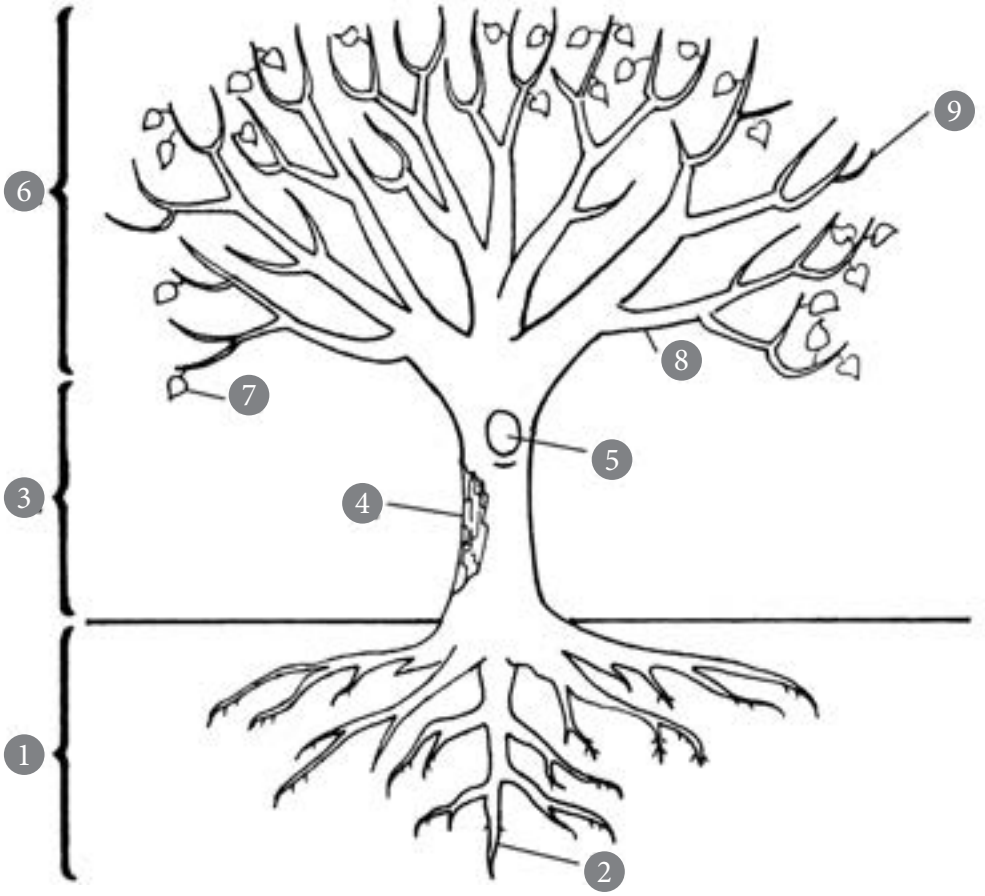
1. A trunk protects bark.
2. A branch is bigger than a twig.
3. A trunk is a part of a root system.
4. A bud is covered by bark.
5. Not all trees have root hairs.
6. A crown is the uppermost part of a tree.
7. A bud is bigger than a twig.
8. A root hair is smaller than a lateral root.
9. Mycorrhiza is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

II. 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?

III. Look at the picture and name the tree parts. Use the words from the box.

trunk	leaf	root system	twig	hollow
crown	bark	branch	taproot	



3

FACTORS AFFECTING A TREE'S APPEARANCE

I. Listen and do the exercise on page 129.

There are several factors which influence a tree's appearance. The most obvious 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 longer. 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 – czynnik
affect – mieć wpływ na
appearance – wygląd
influence – mieć wpływ
obvious – oczywisty
seedling – siewka
mature – dorosły, dojrzały
belong to – należeć do
leaf *l.mn.* leaves – liść
resemble – przypominać
look like – wyglądać jak
shape – kształt
spruce – świerk
branch – gałąź
crown – korona
bud – pączek
recognise – rozpoznać
leafless – bezlistny
develop – rozwijać
sunshine – światło słoneczne
habitat – siedlisko
soil – gleba
nutrient – składnik odżywczy
drought – susza
hail – grad
damage – uszkodzić

READING COMPREHENSION

I. Look at the words in bold in the text and guess their meaning from the context. Next, match the words (1–8) with their Polish equivalents (A–H).

1. pests	A. opady
2. saplings	B. kora
3. cotyledons	C. piorun
4. bark	D. drzewostan
5. deciduous	E. liścienie
6. stand	F. szkodniki
7. precipitation	G. zrzucające liście
8. lightning	H. młode drzewka

II. 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?

DID YOU KNOW?

- There are 80,000 tree species that grow on our planet.
- 10 per cent of them are in danger of extinction.
- The first tree, known as *Archaeopteris*, appeared on the Earth 370 million years ago.
- Trees differ in height. For example, the tallest giant redwood (*Sequoia sempervirens*) is 113 metres tall whereas snow willow (*Salix nivalis*) is rarely taller than 20 centimetres.
- Snow willow leaves are merely 5 millimetres long.
- Giant redwood bark is resistant to fire, pests and diseases due to tannin content.*

* Based on: *Ilustrowana Encyklopedia. Drzewa świata*.

GLOSSARY

be in danger of – być zagrożonym
extinction – wymarcie
appear – pojawić się
differ in – różnić się
giant redwood – sekwoja wiecznie zielona
snow willow – wierzba arktyczna
merely – zaledwie
resistant to – odporny na
disease – choroba
due to – dzięki
content – zawartość

FOLLOW-UP: A TREE'S APPEARANCE

I. Look at the pictures and study a tree's appearance. Match the pictures with the expressions from the box.

broken tree	fir seedling	uprooted tree
tree growing in the stand	beech seedling	broad-leaved tree
tree growing alone	tree attacked by pests	sapling
birch	fir	oak

1

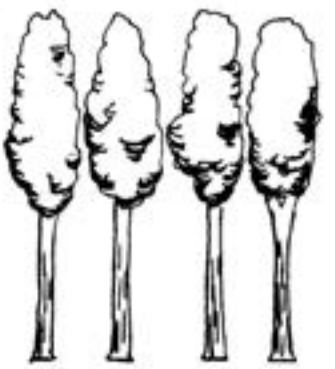
2

3

4

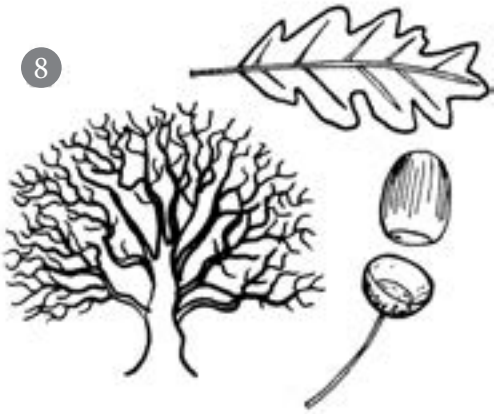
5

6



7

8



9

10

11

12

4

CONIFEROUS TREES

I. Listen and do the exercise on page 129.

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

Pine

The most common tree species in Poland 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 often attacked by the European spruce bark beetles.

Fir

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

Larch

A tree that sheds its leaves in autumn. It has fairly soft needles grouped in fascicles.

Douglas fir

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

GLOSSARY

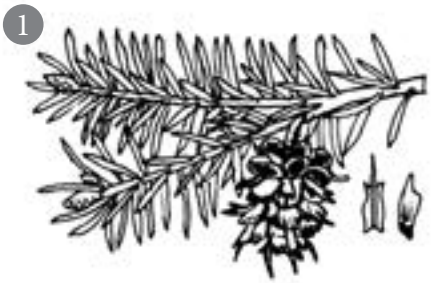
coniferous – szpilkowe
cone – szyszka
consist of – składać się z
scale – łuska
needle-like – podobne do igieł
evergreen – wiecznie zielony
pine – sosna
spruce – świerk
fir – jodła
larch – modrzew
Douglas fir – jedlica, daglezja
constitute – stanowić
fascicle – pęczek
Scots pine – sosna zwyczajna
prone to – podatny na
windthrow – wiatrował
shallow – płytki
European spruce bark beetle – kornik drukarz
shade-tolerant – cieniożnośny
upright – rosnący do góry
shed – zrzucać
introduce – wprowadzić

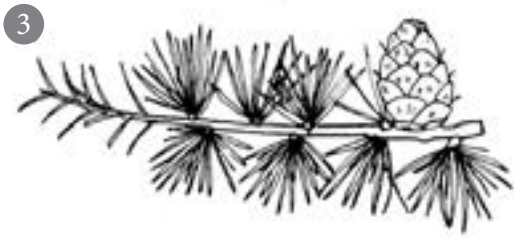
READING COMPREHENSION

I. 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.

II. Name the following coniferous tree species.





5

DECIDUOUS TREES

I. Listen and do the exercise on page 129.

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 in Poland that is leafless in winter.

READING COMPREHENSION

I. 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.

II. Next, read the definitions (1–7) and match them with the tree species (A–G).

1. a tree that produces acorns and whose dry leaves often remain on trees in winter	A. alder
2. a tree which contains salicylic acid. It is easily propagated from shoot cuttings	B. birch
3. a fast-growing species, often grown on plantations	C. beech
4. a pioneering species with white bark	D. willow
5. a shade-tolerant tree that comes into leaf late in spring. It has smooth, dark grey bark and characteristic long, sharp buds	E. oak
6. a tree whose leaf is the symbol of Canada	F. poplar
7. a tree that prefers very humid soils, grows along streams or rivers. It produces woody fruit resembling small cones	G. maple

GLOSSARY

deciduous – zrzucający liście
come into leaf – wypuszczać liście
turn yellow – żółknąć
cone – szyszka
oak – dąb
birch – brzoza
alder – olsza
beech – buk
poplar – topola
acorn – żołądź
contain – zawierać
shoot cutting – zrzez
smooth – gładki
humid – wilgotny
woody – zdrewniały
resemble – przypominać
willow – wierzba
maple – klon

III. Name the following broad-leaved tree species.

REVISION II (TEXTS 1–5)

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:.....

II. 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.

III. 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

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

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

V. 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.

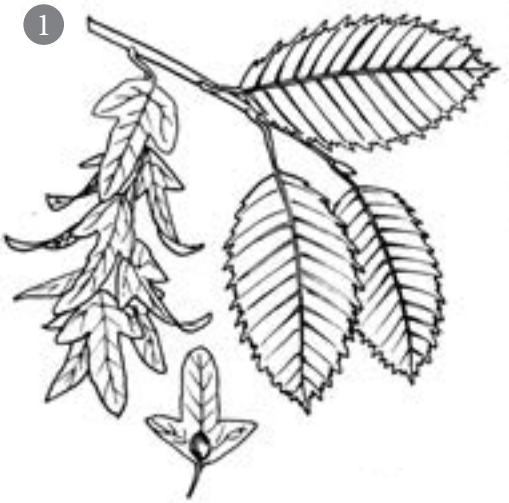
VI. Put the following parts of a tree in the proper order: from the smallest to the largest. Use the words from the box.

crown	leaf	branch	bud	twig

VII. Look at the pictures and name the species. Use the words from the box.

black locust (*Robinia pseudoacacia*)	rowan (*Sorbus aucuparia*)
sycamore (*Acer pseudoplatanus*)	aspen (*Populus tremula*)
hornbeam (*Carpinus betulus*)	ash (*Fraxinus excelsior*)
birch (*Betula pendula*)	ginkgo (*Ginkgo biloba*)

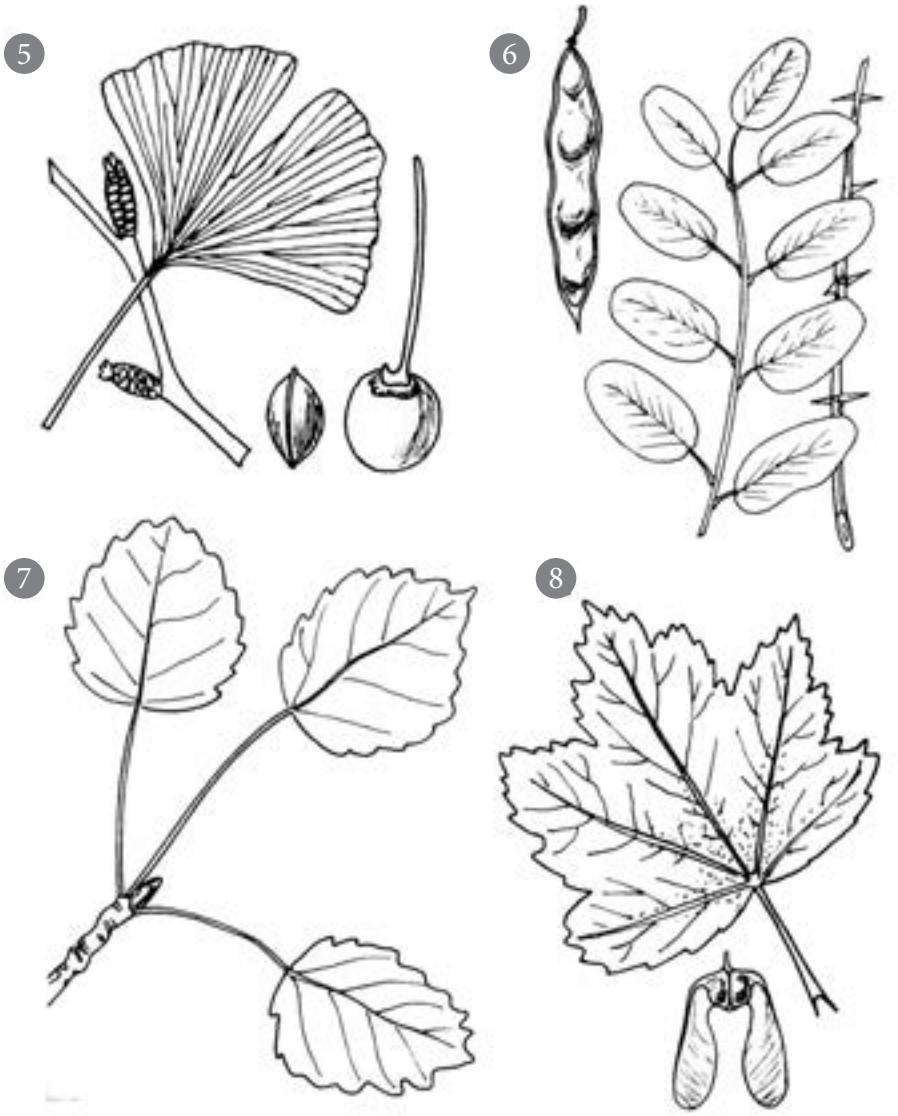
1



2

3

4



GLOSSARY

black locust – robinia, grochodrzew
sycamore – jawor, klon jawor
hornbeam – grab pospolity
birch – brzoza
rowan – jarząb pospolity
ash – jesion wyniosły
aspen – osika, topola osika
ginkgo – miłorząb dwuklapowy

6

BASIC FOREST TREE CHARACTERISTICS

I. Listen and do the exercise on page 130.

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 taproot 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.*

* According to Mörath's classification based on Brinell's hardness.

GLOSSARY

basic – podstawowe
characteristic – cecha
wood – drewno
market value – wartość rynkowa
provide – dostarczać
forest management – gospodarka leśna
include – zawierać
longevity – długowieczność
growth rate – tempo wzrostu
shade – cień
requirements – wymagania
wood hardness – twardość drewna
establish – założyć
stand density – zwarcie
fertile – żyzny
lack of – brak
shallow – płytki
aspen – osika
resistant to – odporny na
hornbeam – grab

READING COMPREHENSION

I. Answer the questions.

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

II. 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

FOLLOW-UP: RELATED VOCABULARY

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

angiosperms	ginkgo	gymnosperms	softwoods
shade-bearing	hardwoods	conifers	

1. Shade-tolerant species are also known as ..... .
2. Trees whose seeds are naked are called ..... .
3. Typical representatives of gymnosperms are ..... .
4. Although ..... belongs to gymnosperms, it does not have needle-like leaves.
5. Trees whose seeds are protected (usually by a mature ovary) are called ..... .
6. Broad-leaved trees are also known as ....., and conifers as ..... .

GLOSSARY
gymnosperms – nagozalążkowe
angiosperms – okrytozalążkowe
ginkgo – miłorząb dwuklapowy
ovary – zalążnia

7
TREE TYPES

I. Listen and do the exercise on page 130.

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 – różnić się
seedling – siewka
sapling – młode drzewko
small pole – tyczkowina
high pole – drągowina
dominant – panujący
codominant – współpanujący
reach – dosięgać
intermediate – opanowany
suppressed – przygłuszony

READING COMPREHENSION

I. 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 chance to grow called?

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

1. a standing	A. lower branches begins
2. a small plant that	B. has all living branches
3. natural loss of	C. dead tree
4. a young tree that	D. has germinated from its seed

III. If the previous exercise was too difficult match the definitions with the words from the box.

sapling	small pole	snag	seedling

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

intermediate tree	dominant tree	suppressed tree
high pole	codominant tree	

1. a tree that has lost its vigour as a result of getting not enough sunlight
2. trunk diameter increases, natural loss of branches up to certain height
3. a tree that forms the forest canopy but is a bit shorter than the surrounding trees and therefore captures sunlight mainly from above
4. a tree whose crown extends to the bottom level of a forest canopy
5. a high tree forming the forest canopy. It gets sunlight from above and around the crown

GLOSSARY

loss – utrata
germinate – kiełkować
seed – nasiono
sunlight – światło słoneczne
certain – pewny
height – wysokość
canopy – okap
surrounding – otaczające
therefore – dlatego
capture – chwytać
extend – rozciągać się
level – poziom

DID YOU KNOW?

- The bark of cork oak (*Quercus suber*) is used to produce stoppers that close wine bottles.
- A famous city in Italy, Venice, is built on black alder (*Alnus glutinosa*) poles.
- Mass-produced aspirin contains salicylic acid, which can also be found in white willow (*Salix alba*) bark.
- In Old English the word 'hornbeam' meant 'hard wood'.
- Even 1 million seeds can be produced a year by a mature birch.
- A trunk constitutes 60% of the total tree weight.*

* Based on: *Drzewa. Kieszonkowy przewodnik* by J. Linford and *Ilustrowana encyklopedia. Drzewa świata*.

GLOSSARY

cork oak – dąb korkowy
wine – wino
bottle – butelka
Venice – Wenecja
black alder – olsza czarna
pole – pal
contain – zawierać
salicylic acid – kwas salicylowy
hornbeam – grab
constitute – stanowić

FOLLOW-UP

I. Name tree types and other plants. Use the words from the box.

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


6
10
8
7
9
11

8

TREE GROUPS

I. 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, mature), 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, Mediterranean 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 riparian 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
  In Poland the majority of forests are state-owned. Only 17.4% are in **8.** ..... hands.

II. Listen and check your answers.

GLOSSARY

description – opis
refer to – odnosić się do
height – wysokość
leafless – bezlistny
ornamental – ozdobny
origin – pochodzenie
native – rodzimy, miejscowy
clump – kępa
wood – las
stand – drzewostan
complex – złożony
factor – czynnik
coexist – współistnieć
interact – wzajemnie oddziaływać
mixed – mieszane
oak-hornbeam forest – grąd
terrain – teren
occupy – zajmować
riparian – łęgowy
zone – strefa
temperate forest – las strefy umiarkowanej
Mediterranean – śródziemnomorski
divide into – podzielić na
particular – poszczególny
productive – gospodarczy, użytkowy
multipurpose – wielofunkcyjny
ownership – stan posiadania
majority – większość

READING COMPREHENSION

I. 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?

DID YOU KNOW?

Tree names are often used in book, film or song titles or even company names. For example:

- a classic children's novel *The Wind in the Willows* written by Kenneth Grahame in 1908 or *The Cherry Orchard* – a play by Anton Chekhov.
- such songs as*: Lime Tree* by Bright Eyes, *Little Willow* by Paul McCartney, *The Cherry Tree* by Sting.
- films: *Nightmare on Elm Street*, *Joshua Tree*, *The Tree of Life*.
- publishing companies' names such as Beech River Books, Oak Tree Press.

GLOSSARY

The Wind in the Willows – O czym szumią wierzby
The Cherry Orchard – Wiśniowy sad
Nightmare on Elm Street – Koszmar z ulicy wiązów
Joshua Tree – Drzewo Jozuego
The Tree of Life – Drzewo życia

9
FOREST STANDS

I. Listen and do the exercise on page 130.

A forest stand is a part of a forest. It consists of a relatively uniform group of trees that grow close together and cover a particular area. There are several ways a stand can be described. The basic characteristics include: age, species composition, 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 classes 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 mixed stands there are dominant tree species and admixture, which in Polish forests usually constitute 10–30 per cent.

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.

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 neighbouring trees are.

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

GLOSSARY

stand – drzewostan
relatively – stosunkowo
uniform – jednolity
cover – pokrywać
area – obszar
species composition – skład gatunkowy
stratification – budowa piętrowa
stand density – zagęszczenie drzewostanu
origin – pochodzenie
common – powszechny
based on – oparty na
period – okres
belong to – należeć do
even-aged – jednowiekowy
uneven-aged – wielo-/różnowiekowy
single-species – jednogatunkowy
mixed – wielogatunkowy/mieszany
admixture – domieszka
layer – warstwa
forest floor – dno lasu
single-storey – jednopiętrowy
multi-storey – wielopiętrowy
diameter – średnica
canopy – okap
neighbouring – sąsiadujący
artificially – sztucznie
was planted – został posadzony
was sown – został zasiany

READING COMPREHENSION

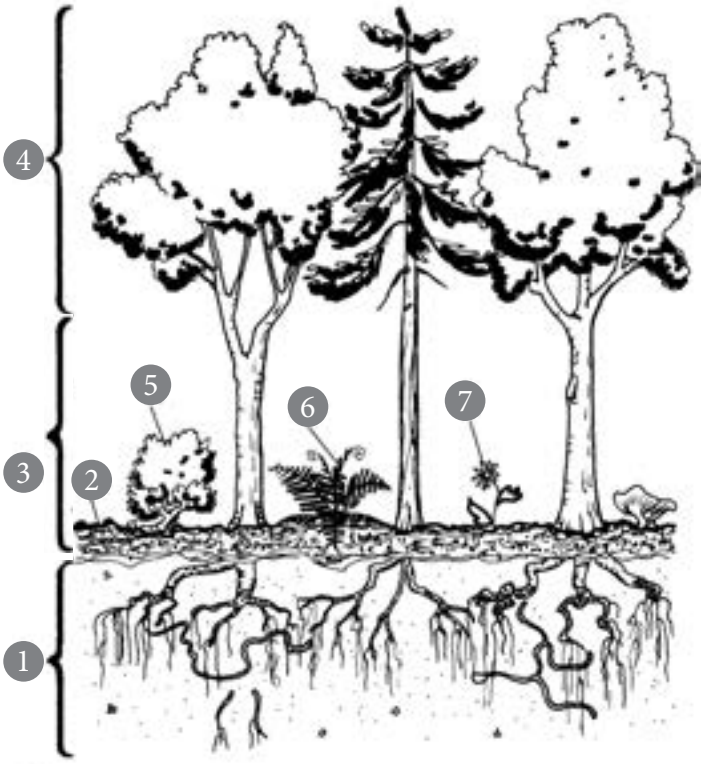
I. Answer the questions.

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?

FOLLOW-UP: FOREST STRATIFICATION

I. Study the drawing and match the words from the box with the numbers (1–7) in the picture.

litter	understory	fern	canopy	bush	soil	herbaceous plant



GLOSSARY

litter – ściółka
soil – gleba
canopy – okap
herbaceous plant – roślina zielna

10
FOREST FLORA

I. Listen and do the exercise on page 131.

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 relationship 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*), blackthorn (*Prunus spinosa*), hawthorn (*Crataegus* sp.), alder buckthorn (*Frangula alnus*) 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 flowers, e.g. lily of the valley (*Convallaria majalis*), violet (*Viola* sp.). There are also plants that have medicinal properties, e.g. herbs.

GLOSSARY

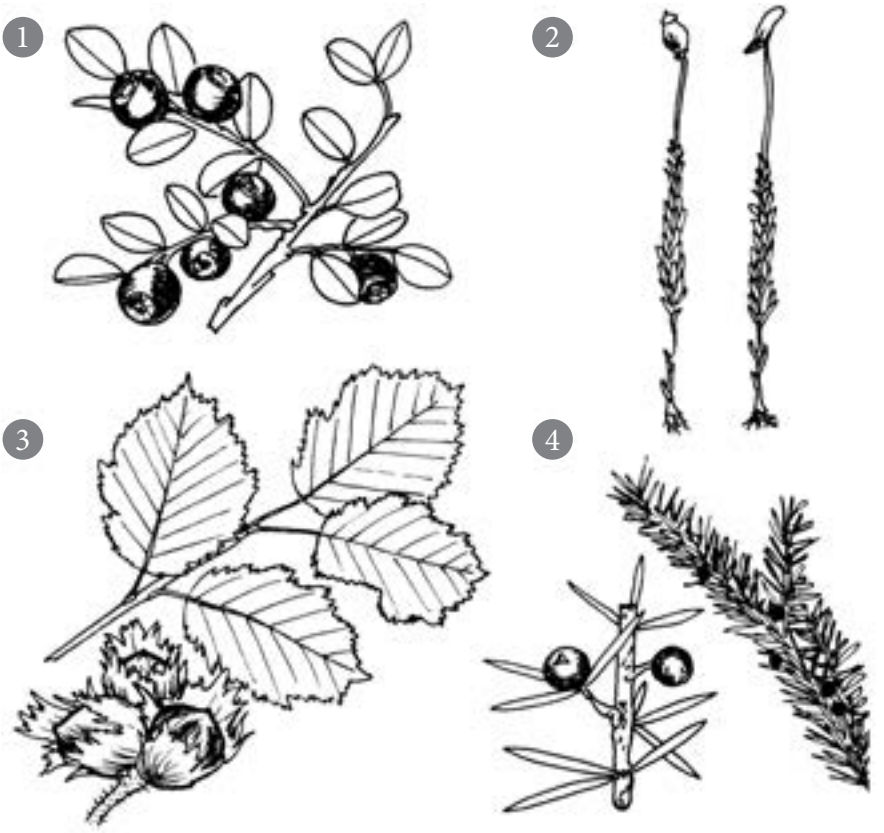
shade – ocieniać, cień
amount – ilość
reach – docierać do
forest floor – dno lasu
fortunately – na szczęście
sunlight – światło słoneczne
moist area – teren, obszar wilgotny
fern – paproć
moss – mech
lichen – porost
polluted – zanieczyszczony
fungus *l.mn.* fungi – grzyb
relationship – związek
disease – choroba
harmful – szkodliwe
decomposer – destruent
pick – zbierać
tasty – smaczny
shrub – krzak
hazel – leszczyna
blackthorn – śliwa tarnina
hawthorn – głóg
alder buckthorn – kruszyna pospolita
juniper – jałowiec
wild strawberry – poziomka
bilberry – borówka czarna
lily of the valley – konwalia
violet – fiołek
property – właściwość
herbs – zioła

READING COMPREHENSION

I. 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?

II. Look at the pictures (1–12) and name the plants.



5

6

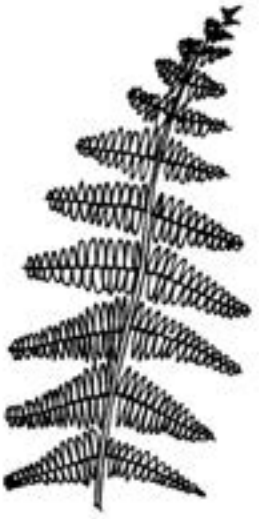
7

8

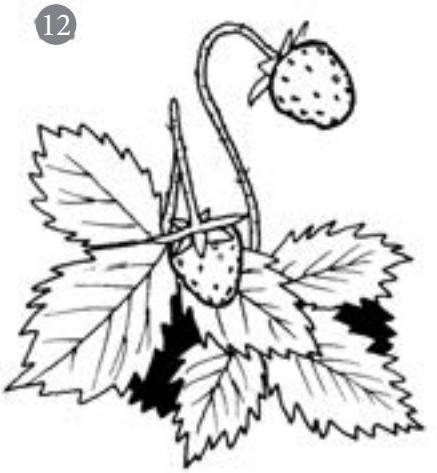
9

10

11



12



REVISION III (TEXTS 6–10)

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 the words 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*

11

FOREST ANIMAL KINGDOM PART I

I. Listen and do the exercise on page 131.

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, amphibians, reptiles, birds and mammals.

Spiders

They have eight legs. They are predators so they build webs to catch other animals, 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 forests and shrubs. They are dangerous for people because they transmit *Borrelia burgdorferi* – 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 – królestwo
harmful – szkodliwy
beneficial – pożyteczny
spider – pająk
tick – kleszcz
snail – ślimak
slug – ślimak nie wytwarzający muszli; ślimak nagi
amphibian – płaz
reptile – gad
mammal – ssak
predator – drapieżnik
web – sieć
feed on – żywić się
arachnid – pajęczak
transmit – przenosić
Lyme disease – borelioza
antenna *l.mn.* antennae – czułek
blood – krew
mosquito – komar
pollinate – zapylać
pest – szkodnik
aphid – mszyca
European spruce bark beetle – kornik drukarz
shell – muszla
omnivorous – wszystkożerny
forest floor – dno lasu

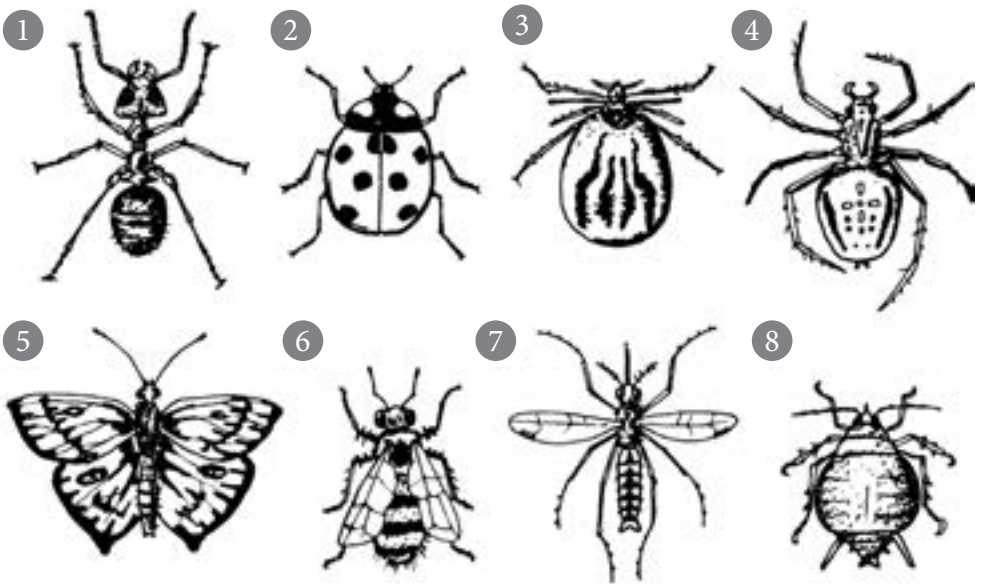
READING COMPREHENSION

I. Answer the questions.

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

II. Look at the pictures and name the animals. Use the words from the box.

mosquito	ant	ladybird	tick
bee	aphid	butterfly	spider



12

FOREST ANIMAL KINGDOM PART II

I. Listen and do the exercise on page 132.

Apart from spiders, ticks, insects and snails forests are 'home' to such animals as amphibians, reptiles, birds and mammals.

Amphibians

They live close to water because their skin is thin and moist and may dry out easily. 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 protect skin from drying out. Polish reptiles include snakes and lizards.

Birds

They are very important in forest ecosystems because they can reduce the number of forest pests such as rodents or insects. They also help in seed dispersal and eat 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 – płaz
reptile – gad
mammal – ssak
skin – skóra
thin – cienka
moist – wilgotna
toad – ropucha
frog – żaba
in contrast to – w przeciwieństwie do
covered by – pokryty
scale – łuska
protect – chronić
dry out – wysychać
snake – wąż
lizard – jaszczurka
pest – szkodnik
rodent – gryzoń
insect – owad
seed dispersal – rozsiewanie nasion
bat – nietoperz
beaver – bóbr
bear – niedźwiedź
deer – jeleń
mouse *l.mn.* mice – mysz

READING COMPREHENSION

I. Answer the questions.

1. What is the difference between amphibian and reptile skin?
2. Name typical Polish amphibians and reptiles.
3. What roles do birds play in forest ecosystems?
4. Give examples of mammals living in Polish forests.

II. Look at the pictures and name the animals.

FOLLOW-UP: RELATED VOCABULARY

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

ANIMAL QUIZ

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

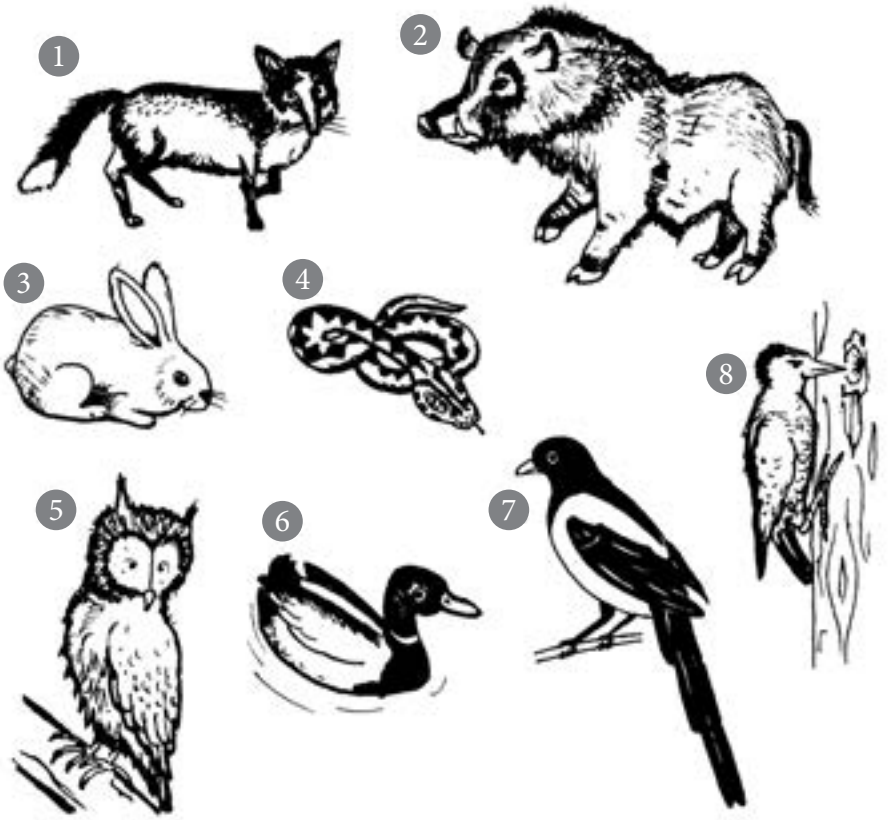
GLOSSARY

marmot – świstak
chamois – kozica
hedgehog – jeż
herbivorous – roślinożerny
carnivorous – mięsożerny
omnivorous – wszystkożerny
fox – lis
horn – róg
woodpecker – dzięcioł
partridge – kuropatwa
resident birds – ptaki osiadłe
nocturnal – nocny
migrant birds – ptaki wędrowne
owl – sowa
noiselessly – bezszelestnie
feather – pióro
down – puch
beaver – bóbr
rodent – gryzoń
lynx – ryś

II. What do antlers and *Canidae* mean in Polish?

III. Look at the pictures and name the animals. Use the words from the box. Next, translate the words into Polish.

magpie	rabbit	woodpecker	fox
owl	wild boar	adder	duck



13
HUNTING

I. Listen and do the exercise on page 132.

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 season 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 animals are 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 they can cause damage. Their number cannot be reduced in other ways because there are not enough natural enemies. Finally, some forest animals are hunted for their meat, fur and the like.

GLOSSARY

illegally – nielegalnie
legally – legalnie, zgodnie z prawem
deer – jeleń
wild boar – dzik
allow – pozwalać
reproduce – rozmnażać się
take care – opiekować się
firstly – po pierwsze
weak – słaby
injured – ranny
secondly – po drugie
despite – pomimo
be treated as – być traktowanym jako
thirdly – po trzecie
area – teren
cause damage – powodować szkody
number – liczba
enemy – wróg
meat – mięso
fur – futro

READING COMPREHENSION

I. 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

II. Translate the words from exercise I into Polish.

III. Translate into English.

1. Można polować na zwierzynę łowną w sezonie łowieckim, a nie można w ochronnym.
2. Kłusownictwo jest nielegalne.

FOLLOW-UP: RELATED VOCABULARY

I. Look at the pictures and name the animals. Use the words from the box.

partridge	pheasant	hare	goose	roe deer	moose

1

2

3

4

5

6

14
A FOOD CHAIN

I. Listen and do the exercise on page 132.

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 photosynthesis. The chemical reaction that takes place during photosynthesis can by explained by 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 oxygen.

Consumers cannot produce their own food. There are different types of consumers. Primary consumers eat plants and are called herbivores. Secondary consumers feed on primary ones. They are called carnivores because they eat meat. Finally, 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 plants to use them again. The most common decomposers are bacteria, fungi or some animals, e.g. earthworms, flies and other insects.

GLOSSARY

food chain – łańcuch pokarmowy
explain – wyjaśniać
food – jedzenie, pożywienie
decomposer – destruent
source – źródło
take place – mieć miejsce
equation – równanie
carbon dioxide – dwutlenek węgla
oxygen – tlen
primary consumer – konsument pierwszego rzędu
herbivore – roślinożerca
secondary consumer – konsument drugiego rzędu
feed on – odżywiać się, jeść
carnivore – mięsożerca
tertiary consumer – konsument trzeciego rzędu
organic matter – materia organiczna
break down – rozłożyć
nutrient – składnik odżywczy
release – uwolnić
earthworm – dżdżownica
fly – mucha

READING COMPREHENSION

I. 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?

FOLLOW-UP: RELATED VOCABULARY

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 diet at 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 – uproszczony	in order to – w celu
relationship – związek	term – termin
transfer – przekazywać, przenosić	connected with – związane z

I. 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

II. Now, match the English words with their Polish equivalents.

1. scavenger	A. drapieżca
2. carrion	B. padlinożerca
3. prey	C. padlina
4. predator	D. ofiara

REVISION IV (TEXTS 11–14)

I. 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

15

WHAT DESTROYS POLISH FORESTS? PART I

I. Listen and do the exercise on page 133.

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 quality by lowering its pH. The most dangerous pollutants for trees are: sulphur dioxide (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

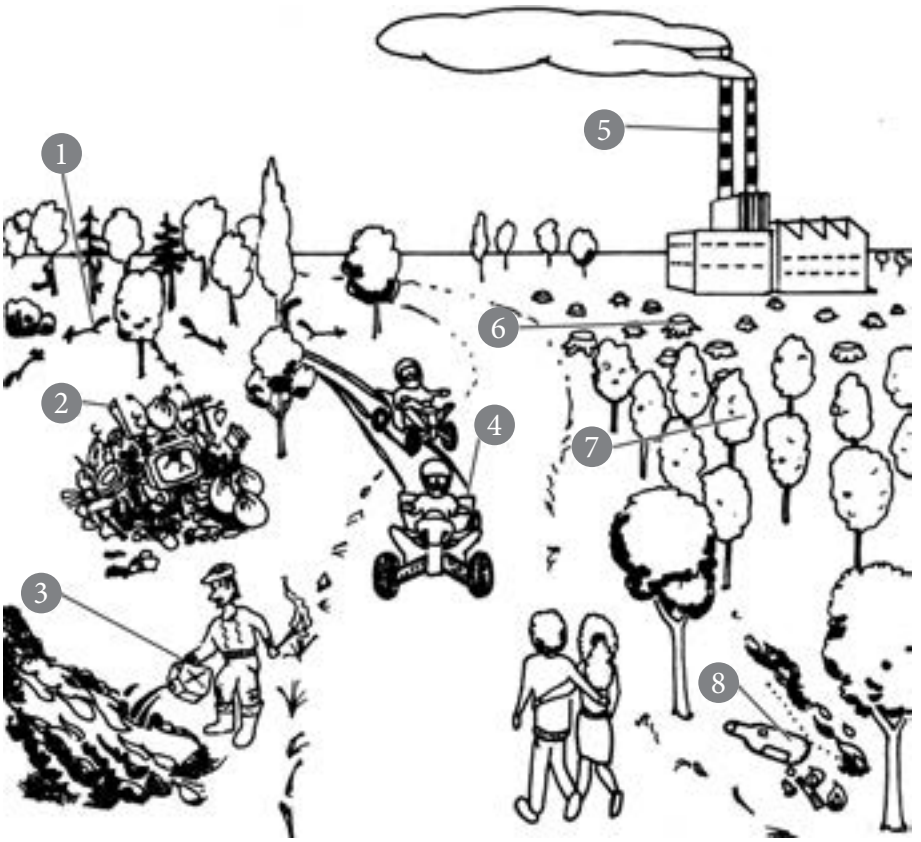
destroy – niszczyć
enemy – wróg
responsible for – odpowiedzialny za
pollution – zanieczyszczenie
what is more – co więcej
cause – powodować
fire – pożar
improper – niewłaściwy
blame for – winić za
damage – uszkadzać, niszczyć
lower – obniżać
burn – palić, wypalać
pasture – pastwisko
irresponsible – nieodpowiedzialny
behaviour – zachowanie
arson – podpalenie
wood theft – kradzież drewna
artificial – sztuczne
regeneration – odnowienie
clearcutting – rębnia zupełna, całkowita, zręb zupełny
introduction – wprowadzenie
invasive alien species – inwazyjny gatunek obcy
replace – zastąpić
native – rodzimy
eastern grey squirrel – wiewiórka szara
black cherry – czeremcha amerykańska
treat as – traktować jako
rubbish dump – wysypisko śmieci
vehicle – pojazd
frighten – przestraszyć

READING COMPREHENSION

I. 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?

II. Look at the pictures and name factors that destroy forests.



16

WHAT DESTROYS POLISH FORESTS? PART II

I. Listen and do the exercise on page 133.

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 avalanche can uproot the whole tree or break it.

The most dangerous organisms for forests are bacteria and fungi because they cause numerous tree diseases, and insects which are the most common forest pests.

Additionally, trees are also damaged by bigger animals such as: deer which destroy 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 – niekorzystne
condition – warunek
hail – grad
drought – susza
frost – mróz
lightning – piorun
avalanche – lawina
uproot – wyrwać z korzeniami
numerous – liczne
flood – zatapiać, powódź
dig – kopać
stream – strumień
contribute – przyczyniać się do
soil – gleba

READING COMPREHENSION

I. 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?

II. In the text find the words that mean:

1. a weather condition when temperature falls below 0°C
2. a lot of snow falling quickly down the slope of a mountain
3. small ice balls falling from the sky
4. a tree illness
5. an area covered by water as a result of heavy rains
6. an animal that destroys trees or other plants
7. a period of time when there is not enough rain, the soil is dry and plants suffer from lack of water
8. animals that are famous for building dams
9. big herbivores with antlers
10. a strong light produced by electricity which moves between clouds and the earth surface

GLOSSARY

fall – spadać
slope – zbocze
mountain – góra
ice – lód
ball – kulka
illness – choroba
as a result of – w wyniku, z powodu
soil – gleba
dry – suchy
lack of – brak
famous for – znane z
dam – tama
move – poruszać się
cloud – chmura
surface – powierzchnia
earth – ziemia

FOLLOW-UP: RELATED VOCABULARY

I. Match the English words with their Polish equivalents.

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

A. wichura
B. gołoledź
C. deszcz ze śniegiem
D. mżawka
E. śnieżyca
F. szadź

REVISION V (TEXTS 15–16)

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 introduction of **3.** ..... species.

Air pollution damages leaves and makes trees weaker. It also changes soil quality by 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 includes: 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 often have 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 their symbols 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. Look at the pictures and name abiotic factors that can damage trees.

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

blizzard	sleet	rime	drizzle	gale	avalanche	glaze

ice	snow	rain	rain + snow	wind

FORESTRY FOR INSIDERS

1

THE FOREST BIOLOGICAL CLOCK

I. Listen and do the exercise on page 134.

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 development, plant flowering, fruition, animal breeding and migration. It also helps to choose the best time for planting, collecting seeds or logging. Observing weather conditions and their influence on plants is also useful in predicting fire risks.

There are eight phenological seasons that can be observed in Poland. Each season is characterised by different biological changes that take place in forest ecosystems. The seasons are as follows:

1. very early spring
   Blooming of: windflower (*Anemone nemorosa*), snowdrop (*Galanthus nivalis*), hazel (*Corylus avellana*), Cornelian cherry (*Cornus mas*), poplar (*Populus* 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 sanguinea*).
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 – według
change – zmiana
phenology – fenologia
development – rozwój
flowering – kwitnięcie
fruition – owocowanie
breed – hodować, rozmnażać się
plant – sadzić

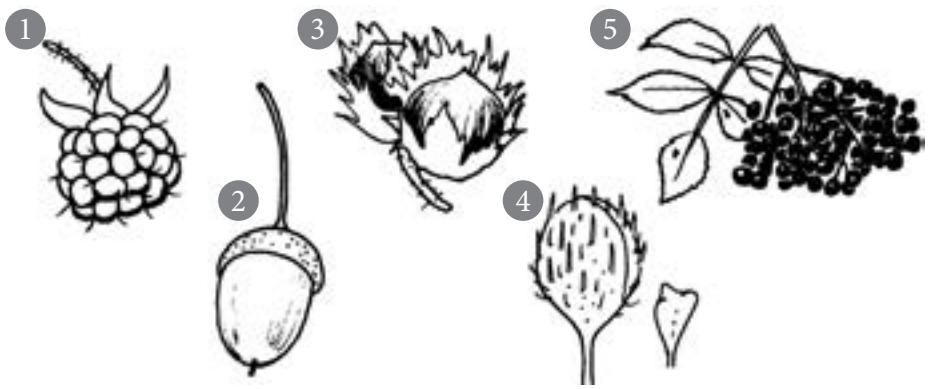
collect seeds – zbierać nasiona
log – ścinać drzewa
influence – wpływ
predict – przewidywać
season – pora roku
bloom – kwitnąć
windflower – zawilec gajowy
snowdrop – śnieżyczka przebiśnieg
hazel – leszczyna
Cornelian cherry – dereń właściwy
poplar – topola
aspen – osika
beech – buk
bird cherry – czeremcha zwyczajna
be in flower – kwitnąć
come into leaf – rozwinąć liście
common hawthorn – głóg dwuszyjkowy
rowan – jarząb pospolity
black elder – bez czarny
raspberry – malina
dogwood – dereń świdwa
linden/lime – lipa
appear – pojawiać się
ripen – dojrzewać
larch – modrzew
turn yellow – żółknąć
acorn – żołądź
beechnut – bukiew
dormant – w stanie spoczynku

READING COMPREHENSION

I. 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?

II. Look at the drawings and name the fruits.



III. Look at the drawings and name the plants.

1

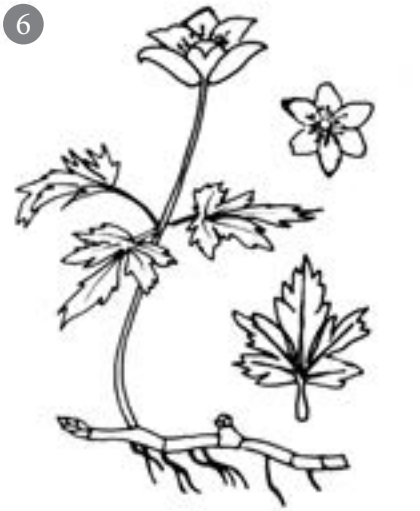
2

3

4

5

6



7

8

2

TREE DISEASES

I. Listen and do the exercise on page 134.

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 – choroba
pathogen – patogen
however – jednakże
impact – wpływ
viral – wirusowy
bacterial – bakteryjny
numerous – liczny
majority – większość
weaken – osłabiać
commercial – handlowa, rynkowa
value – wartość
lower – zmniejszyć
tissue – tkanka
store – składować, przechowywać
spot – plama
yellow – żółknąć
wilt – więdnąć
dieback – zamieranie
rot – zgnilizna
are to blame for – są przyczyną
vascular – naczyniowy
cause – powodować
Dutch elm disease – holenderska choroba wiązów
parasitic – pasożytniczy
flowering – kwiatowe
European dodder – kanianka pospolita
mistletoe – jemioła

READING COMPREHENSION

I. 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.

II. Translate into English.

1. Grzyby są patogenami drzew.
2. Choroby drzew są również powodowane przez wirusy i bakterie.
3. Zamieranie pędów i zgnilizna pnia są przykładami objawów chorobowych roślin.
4. Holenderska choroba wiązów jest przykładem choroby naczyniowej.
5. Kanianka jest pasożytniczą rośliną kwiatową.

FACTS ABOUT MISTLETOE

- Mistletoe attaches itself to a tree and takes water and nutrients from the host plant.
- The plant can be seen in the crowns of poplars, alders, willows, firs and other trees.
- Its leaves have some chlorophyll so mistletoe photosynthesises some of its food.
- Mistletoe seeds are dispersed by birds.
- The plant has medicinal properties. It lowers blood pressure, improves blood circulation and stops bleeding.
- Mistletoe is a symbol of peace, joy and Christmas.
- Mistletoe was believed to protect houses from ghosts and bring good luck.
- In the past, when a woman stood under a mistletoe she could not refuse to be kissed.
- When a man kissed a woman under a mistletoe it meant that he wanted to marry her.

GLOSSARY

attach – przytwierdzać, przyczepiać
host – gospodarz
disperse – rozsiewać
medicinal properties – właściwości lecznicze
blood pressure – ciśnienie krwi
improve – polepszać
circulation – krążenie
bleeding – krwawienie
joy – radość
was believed – wierzono, że
protect – chronić
ghost – duch
good luck – szczęście
refuse – odmówić

3
TREE PESTS

I. Listen and do the exercise on page 134.

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 or weakened plants (secondary pests). Some insects prefer only one species of plant they 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 – szkodnik
insect – owad
numerous – liczny
primary pest – szkodnik pierwotny
weakened – osłabiony
secondary pest – szkodnik wtórny
prefer – woleć
feed on – żywić się
monophage – monofag
oligophage – oligofag
species – gatunek, gatunki
polyphage – polifag
needle – igła
inner – wewnętrzny
cone – szyszka
seed – nasiono
developmental – rozwojowy
stage – stadium
egg – jajo
larva *l.mn.* larvae – larwa
pupa *l.mn.* pupae – poczwarka
adult – dorosły

READING COMPREHENSION

I. 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?

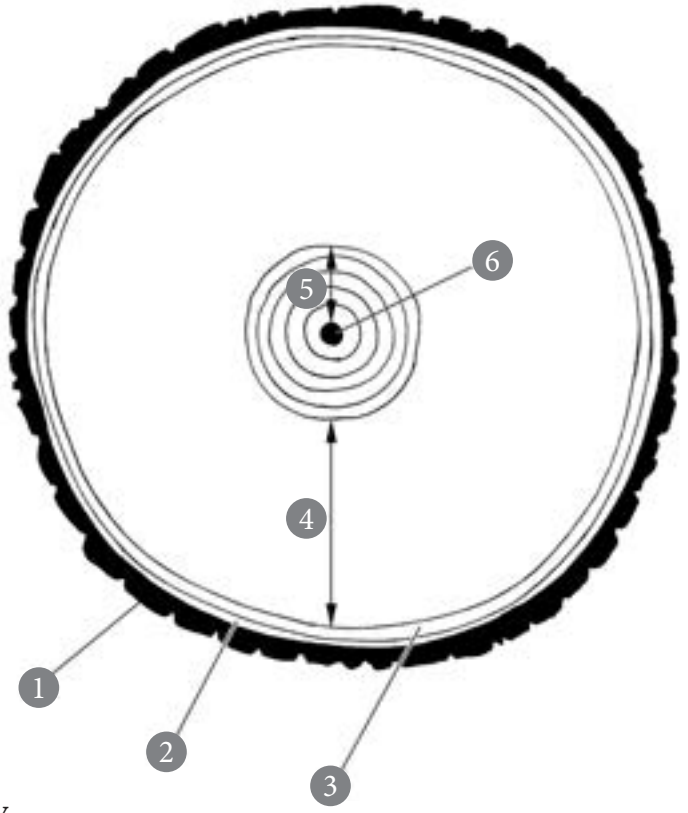
FOLLOW-UP: RELATED VOCABULARY

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

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

II. Look at the trunk cross-section. Name its parts. Use the words from the box.

cambium	heartwood	inner bark (phloem)
sapwood	outer bark	pith



GLOSSARY

trunk – pień
cross-section – przekrój
cambium – kambium
heartwood – twardziel
phloem – floem, łyko
sapwood – biel
outer – zewnętrzny
pith – rdzeń

4

HOW TO CONTROL FOREST PESTS AND DISEASES

I. Listen and do the exercise on page 135.

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, preferring 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. 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 integrated pest and disease management.

GLOSSARY

constantly – ciągle
anthropogenic – antropogeniczny
abiotic – abiotyczny
refer to – odnosić się do
unfavourable – niekorzystny
resist – opierać się, być odpornym na
forest management – gospodarka leśna
aimed at – skierowany na
create – tworzyć
develop – rozwijać się
conserve – chronić
biological diversity – różnorodność biologiczna
remove – usuwać
protect – chronić
enemy – wróg
application – zastosowanie
fail – zawodzić
pesticide – pestycyd
against – przeciwko
harmful – szkodliwy
weed – chwast
poison – zatruwać
edible – jadalny
herb – zioło
pick – zbierać
complement – uzupełniać
integrated – zintegrowany
effective – skuteczny

READING COMPREHENSION

I. 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?

FACTS ABOUT PESTICIDES

- Some plants are able to produce natural insecticides e.g.
  – pyrethrum – obtained from *Chrysanthemum cinerariaefolium*
  – rotenone – extracted *Derris* roots
  – nicotine – derived from tobacco
  – sabadilla – from *Schoenocaulon officinale (Liliaceae)*.
- Pesticides started to be used on a massive scale after the Second World War.
- Pesticides can be divided into: herbicides (against weeds), fungicides (against fungi), insecticides (against insects), rodenticides (against rodents) and nematicides (against nematodes).
- The era of manufactured pesticides started with the production of DDT.
- DDT was invented in 1939. It killed insects, was very cheap and effective. It was used against lice and malaria during the Second World War.
- DDT was banned in the USA in 1972 because it was persistent, non-selective, accumulated in food chains and transported for long distances which means it is present nowadays where it was not used in the past, e.g. in Antarctica.

GLOSSARY

obtain – otrzymać
extract – ekstrahować
derive from – otrzymać z
on a massive scale – na masową skalę
nematode – nicień
manufacture – produkować
louse *l.mn.* lice – wesz
discover – odkryć
ban – zakazać
persistent – trwały
distance – odległość
nowadays – obecnie

REVISION VI (TEXTS 1–4)

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 logging.
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 the expressions into Polish.

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

5

NATURAL AND ARTIFICIAL REGENERATION

I. Listen and do the exercise on page 136.

Forest regeneration describes a process when a forest begins to grow. The process 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. Artificial 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 expensive because the site must be prepared carefully and the costs of planting seedlings and taking care of them afterwards are high.

GLOSSARY

regeneration – odnowienie
artificial – sztuczny
germinate – kiełkować
seed – nasiono
carried out – przenoszony
reproduction – rozmnażanie
stump sprout – odrost pniakowy
root sucker – odrost korzeniowy
distribution – rozmieszczenie
predict – przewidywać
on the other hand – z drugiej strony
preserve – zachowywać
adapted – przystosowany
mixed – mieszany
uneven-aged – różnowiekowy
multi-storey – wielopiętrowy
based on – oparty na
stand – drzewostan
sow – siać
plant – sadzić
in contrast to – w przeciwieństwie
species composition – skład gatunkowy
plant arrangement – rozmieszczenie roślin
quality – jakość
quantity – ilość
allow – pozwalać
survive – przetrwać
in the case of – w przypadku
site – miejsce
prepare – przygotować
take care of – opiekować się
afterwards – potem

READING COMPREHENSION

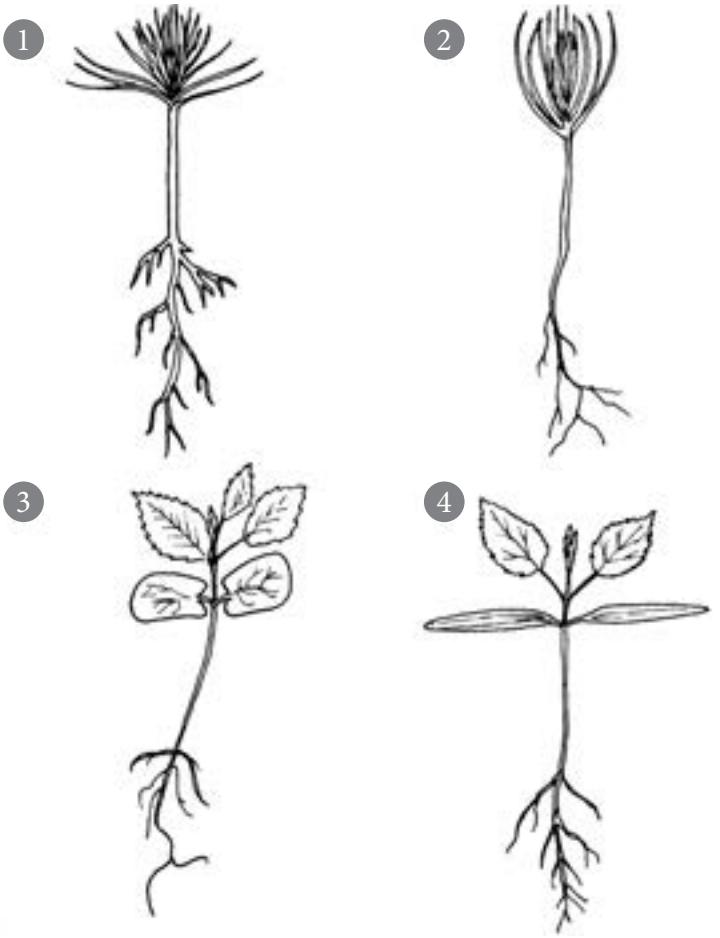
I. Answer the questions.

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?

FOLLOW-UP: SEEDLINGS

I. Look at the seedlings. Name the species. Use the words from the box.

hornbeam	pine	sycamore	spruce



6

REFORESTATION AND AFFORESTATION

I. Listen and do the exercise on page 136.

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 – odnowienie
afforestation – zalesienie
establishment – założenie
whereas – podczas gdy
area – teren, obszar
exist – istnieć
appear – pojawiać się
fire – pożar
pollution – zanieczyszczenie
remove – usunąć
site – miejsce, teren
log – ścinać drzewa
soil – gleba
covered by – pokryty
litter – ściółka
protect – chronić
rich in – bogate w
agriculture – rolnictwo
plough pan – podeszwa płużna
wasteland – nieużytek
degraded – zdegradowany
industry – przemysł
suitable for – odpowiedni dla
dry – suchy
wet – mokry
weed – chwast
proper – właściwy
soil profile – profil glebowy
contaminated – skażony
salinity – zasolenie
lack – brakować
organic matter – materia organiczna

READING COMPREHENSION

I. Answer the questions.

1. Which terms refer to the method of forest regeneration and which ones to the area 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?

FOLLOW-UP: SOILS

I. Put the layers of a soil profile in the proper order. Use the words from the box.

subsoil	parent rock	topsoil

II. Read the definitions. What do they refer to? Use the words from the box.

organic matter	pH	soil	nutrients
subsoil	topsoil	litter	

1. covers forest soils and consists of organic matter in different stages of decomposition
2. consists of mineral material, e.g. sand, clay and organic matter. It forms pores that 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 – pokrywać
consist of – składać się z
stage – stadium
decomposition – rozkład
sand – piasek
clay – glina
filled with – wypełniony
decomposed – rozłożone
layer – warstwa
acidic – kwaśny
alkaline – zasadowy
neutral – obojętny

7

AFFORESTATION OF FARMLAND

I. Listen and do the exercise on page 137.

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. Farmers 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 because 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 development 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 erosion. 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 – sadzić
poor soil – gleba słaba
encourage – zachęcać
subsidise – dotować
fence – ogrodzenie
take care – opiekować się
afterwards – potem
lack of – brak
agricultural – rolniczy
suitable for – odpowiedni dla
plough pan – podeszwa płużna
layer – warstwa
allow – pozwalać
proper – właściwy
development – rozwój
slightly – trochę, lekko
prefer – woleć
improper – niewłaściwy
nitrogen – azot
constant – ciągły
lack – brak, brakować
include – zawierać *tu:* łącznie z
relationship – związek
covered by – pokryty
protect – chronić
area – teren, obszar

READING COMPREHENSION

I. 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

II. Match the words from exercise I with their Polish equivalents. Use the words from the box.

odporny	sprzęt rolniczy	ściółka	rząd
dotacja	młode drzewko	dochód	stosunek

III. 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?

IV. Translate into English.

1. Mykoryza jest symbiotycznym związkiem korzeni drzew z grzybami.
2. Dzięki grzybom mykoryzowym drzewa są bardziej odporne na choroby.
3. Nie jest trudno dostać dotację na zalesianie w Polsce.
4. Sprzęt rolniczy niszczy strukturę gleby.
5. Zalesianie to sadzenie drzew na terenach nieleśnych.
6. Gleby leśne są pokryte ściółką.
7. Siewki i młode drzewka są często atakowane przez choroby grzybowe.

GLOSSARY
owing to – dzięki
it is not difficult – nie jest trudno

8

FAST-GROWING TREE PLANTATIONS

I. Listen and do the exercise on page 137.

Tree plantations have been known since ancient times. The first plantations consisted of purple/red osier (*Salix purpurea*), which provided wicker used for making 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 requirements 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 products, e.g. veneer, sawnwood. The shorter growing supply wood for the paper industry 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 – szybko rosnący
since – od
ancient – starożytny
consist of – składać się z
purple/red osier – wierzba purpurowa
wicker – wiklina
basket – kosz
shield – tarcza
restrict – ograniczać
depend on – zależeć od
requirements – wymagania
comparatively – stosunkowo
provide – dostarczać
commercial – handlowy
purpose – cel
timber – surowiec drzewny, drewno
veneer – fornir
sawnwood – tarcica
supply – dostarczać
fibreboard – płyta pilśniowa
particleboard – płyta wiórowa
fuelwood – drewno opałowe
obtain – uzyskiwać
coppice – las odroślowy
aim – cel
shed – tracić, gubić

READING COMPREHENSION

I. 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?

FOLLOW-UP: WICKER QUIZ

I. Answer the questions.

1. Wicker in Poland 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 – otrzymywać
majority – większość
Salix americana – wierzba amerykanka
Salix viminalis – wierzba konopianka
Salix purpurea – wierzba purpurowa
Salix amygdalina – wierzba migdałowa
shoot – pęd
harvest – zbiór, żniwa
dormant – w stanie spoczynku
process – przetwarzać, obrabiać
fertile – żyzny
requirements – wymagania

REVISION VII (TEXTS 5–8)

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 agricultural 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 establishment 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 foresters 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

9

DIRECT SEEDING VERSUS PLANTING

I. Listen and do the exercise on page 137.

Sowing seeds and planting seedlings are two methods used in artificial regeneration. Each method has its pluses and minuses which will be discussed briefly in this text.

Direct seeding is not often used in Poland because the result of such regeneration is difficult to predict. What is more, many forests in Poland grow on soils which do not guarantee germination success, e.g. sandy soils or those which are too wet or too heavy.

Sowing seeds needs careful site preparation which means removing weeds or other vegetation and exposing mineral soil mainly by ploughing. Next, seeds are sown and the amount that is needed per hectare is much higher than in other regeneration methods. Another disadvantage is the fact that seeds are often damaged or eaten by birds, mice or other animals.

Direct seeding is usually used for trees that produce a lot of seeds every year. It is also important for species whose seeds are difficult to store or those which lose their viability quickly. Species that are regenerated by sowing seeds include: pine, spruce, fir, oak and beech.

In comparison to planting seedlings sowing seeds is cheaper and less labour- and time-consuming. What is more, seedlings have a well-developed root system and do not suffer from transplant shock.

Planting seedlings is the most common forest regeneration method in Poland. It also requires careful site preparation. It is more expensive, more labour- and time-consuming but more reliable and therefore more often used.

GLOSSARY

versus – w porównaniu z
briefly – krótko, zwięźle
direct seeding – siew bezpośredni
predict – przewidzieć
guarantee – gwarantować
germination – kiełkowanie
too wet – zbyt wilgotne
too heavy – zbyt ciężkie
sow seeds – siać nasiona
site – miejsce, teren
remove – usuwać
weed – chwast
expose – odsłaniać
mainly – głównie
plough – orka, pług
amount – ilość
disadvantage – wada, minus
mouse *l.mn.* mice – mysz
store – przechowywać
viability – żywotność, zdolność kiełkowania
in comparison to – w porównaniu do
labour – praca
time-consuming – czasochłonny
transplant – przesadzać
common – powszechny, popularny
require – wymagać
reliable – pewny

READING COMPREHENSION

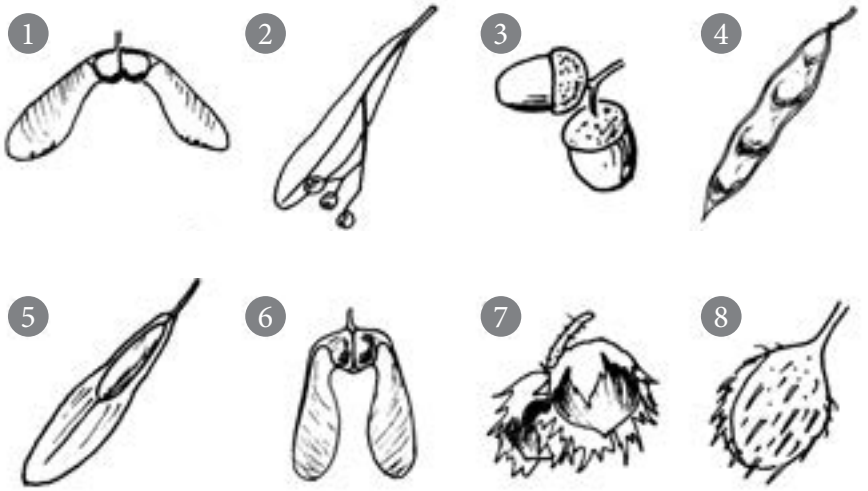
I. Answer the questions.

1. Why is sowing seeds not often used in forest regeneration in Poland?
2. How is the site prepared for sowing ?
3. Why do foresters need a lot of seeds in direct sowing?
4. When is direct seeding used?
5. What are the advantages of sowing seeds?
6. Why is planting seedlings more often used in forest regeneration?

FOLLOW-UP: FRUIT TYPES

I. Look at the forest fruit and name the species. Use the words from the box.

black locust	ash	hazel	linden
beech	oak	maple	sycamore



II. Match the species from exercise I with the fruit names and translate them into Polish. Use the words from the box.

samara 3×	hazelnut	beechnut/beechmast
acorn	pod/legume	nutlet

10
PLANTING SEEDLINGS

I. Listen and do the exercise on page 138.

Choice of species

Only those species which are best adapted to local conditions are planted. Properly chosen tree species grow best in a regenerated area. What is more, they may prevent soil degradation, help to reduce air pollution and promote water conservation and biodiversity.

Seedling types

Seedlings produced in nurseries are either bare-root or containerised. Bare-root ones are cheaper but their survival rate is lower. Seedlings in containers are more expensive but they can be planted all year round except winter. They are recommended when the growing season is short, e.g. in the mountains or for the areas that do not create favourable conditions for trees to grow, e.g. poor or degraded soils.

Age

As a planting material one-year-old seedlings can be used, e.g. pine, oak, beech, larch. Species like fir, spruce or ash need longer to produce seedlings proper for planting.

Time

Early spring, when seedlings are still dormant or autumn after they have shed their leaves, is the best time for planting. However, when at that time the temperature is too high, the soil is still frozen or too dry, the day is windy or sunny it is not a good idea to plant seedlings. Seedlings should be planted as soon as possible after they have been transported from a nursery. It prevents a seedling drying out, which may be the reason of regeneration failure.

Planting time depends not only on weather but also on local conditions as well as species characteristics. For example, not all tree species break their dormancy at the same time. The ones that do it first, e.g. birch, larch, aspen, should be planted earliest.

GLOSSARY

choice – wybór
properly – właściwie
prevent – zapobiegać
conservation – ochrona
biodiversity – różnorodność biologiczna
nursery – szkółka
growing season – okres wegetacyjny
bare-root – z nagim korzeniem
container – pojemnik
all year round – przez cały rok
survival – przeżycie
dormant – w stanie spoczynku
shed – zgubić, stracić
dry out – wysychać

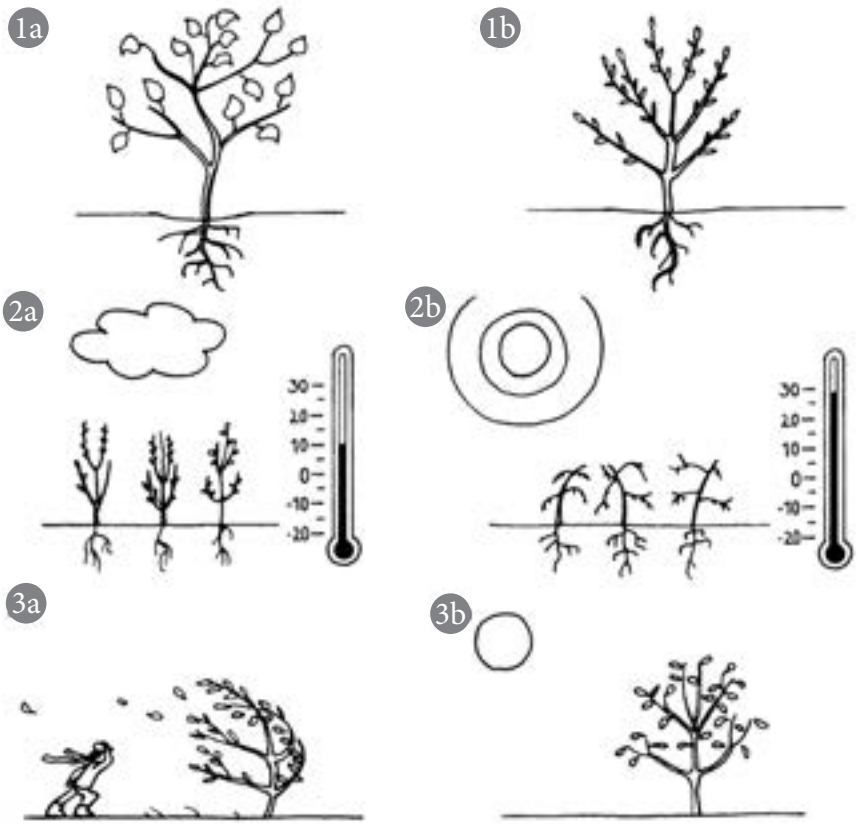
READING COMPREHENSION

I. Answer the questions.

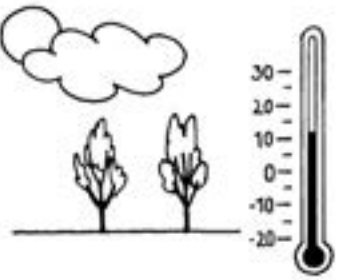
1. What tree species are planted in a given area?
2. What types of seedlings are produced in nurseries?
3. When is planting containerised seedlings recommended?
4. How old is planting material?
5. When should seedlings be planted?
6. Which species are planted first in spring and why?

FOLLOW-UP: HOW TO PLANT A TREE

I. Look at the pictures. Which planting methods are correct and which conditions are favourable for planting? Which ones are not and why?

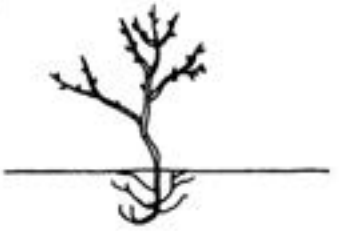


4a



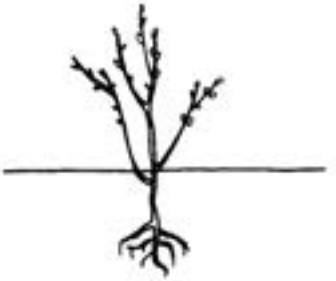
4b

5a

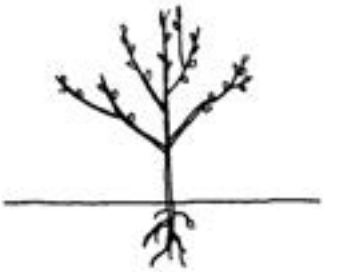


5b

6a

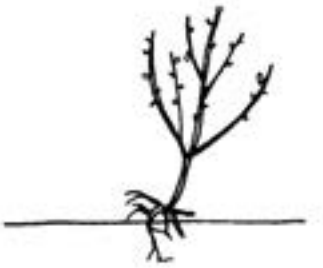


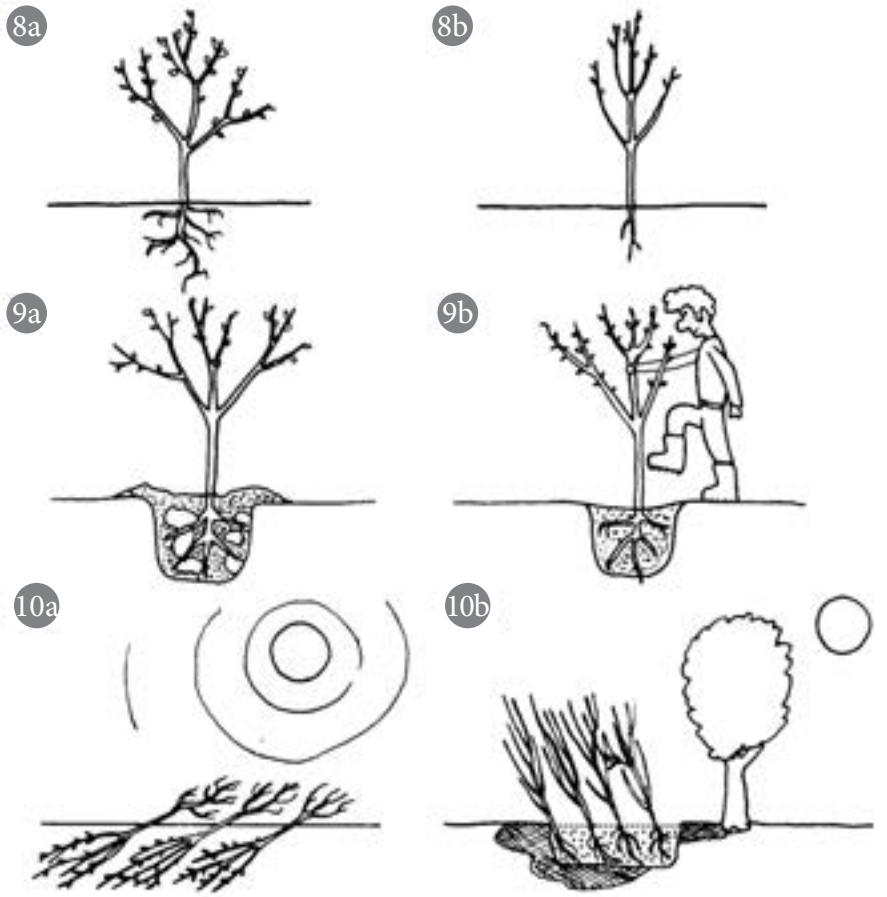
6b



7a

7b





II. Look at the problems and match them with the picture in exercise I.

A. Roots are not protected from drying out.
B. It's too hot for planting.
C. Roots are bent upwards.
D. Air pockets are present.
E. It's too cold for planting.
F. Seedlings are not dormant.
G. Seedling are planted too shallow.
H. It's too windy for planting.
I. Lack of a well developed root system.
J. Seedlings are planted too deep.

11

SEEDLING PRODUCTION

I. Listen and do the exercise on page 138.

Seedling production takes place in nurseries. Young plants are either grown from seeds or reproduced asexually, e.g. rooted shoot cuttings. Seedling production may take place outdoors or indoors in a plastic tunnel or greenhouse. Growing plants under cover allows for modification and control of light, temperature and moisture and lengthening the growing season. As a result, seedlings produced this way are larger and stronger than those produced outdoors.

Seeds are sown in spring or in autumn. Spring sowing should take place as early as possible because then seedlings have more time to grow before winter. Seeds should be sown when the soil is not frozen but still moist after winter. In contrast to the spring sowing, the autumn one should take place as late as possible to avoid germination because young, delicate plants are easily damaged by frost and may not survive winter.

When seeds are sown outdoors they are often covered with different types of material, e.g. branches, in order to protect them from birds and unfavourable weather conditions. Covering seedbeds also reduces evaporation and cooling off of the soil. After germination the cover is removed.

Taking care of young seedlings involves: protecting them from seed predators, pests, diseases, very strong wind, frost and sunshine, keeping soil moist and free of weeds, providing nutrients in the form of fertilisers.

GLOSSARY

take place – mieć miejsce
nursery – szkółka
reproduce – rozmnażać
asexually – wegetatywnie
rooted – ukorzeniony
shoot cutting – zrzez
outdoors – na polu, na zewnątrz
indoors – pod osłoną, wewnątrz
tunnel – tunel
greenhouse – szklarnia
cover – przykrycie, przykryć
allow – pozwalać
moisture – wilgotność
lengthen – wydłużyć
growing season – sezon wegetacyjny
sow – siać
then – wtedy
avoid – unikać
germination – kiełkowanie
survive – przetrwać
in order to – w celu
evaporation – parowanie
cool off – schładzać
remove – usuwać
involve – obejmować
protect – chronić
frost – mróz
moist – wilgotny
weed – chwast
provide – zapewnić, dostarczyć
nutrient – składnik odżywczy
fertiliser – nawóz

READING COMPREHENSION

I. Answer the questions.

1. What is grown in forest nurseries?
2. Where can seedlings be produced?
3. What is the difference between seedlings at the same age produced outdoors and indoors?
4. Where can seedlings be sown?
5. Why should seedlings be sown as late as possible in autumn?
6. Why are seeds sown outdoors covered?
7. What does taking care of seedlings involve?

II. In the text find the words that mean:

1. a place where seedlings are produced (paragraph 1)
2. opposite of outdoors (paragraph 1)
3. a construction in a garden or in a nursery that is covered by plastic. It protects young plants from unfavourable weather conditions (paragraph 1)
4. a glass building where plants are produced (paragraph 1)
5. time when plants are not dormant (paragraph 1)
6. to put seeds in soil (paragraph 2)
7. opposite of dry (paragraph 2)
8. development of a plant from a seed (paragraph 2)
9. animals that damage seeds (paragraph 4)
10. plants that grow in gardens and compete with cultivated plants for light, nutrients and the like. They are removed or destroyed
11. N, P, K are examples of plant ……
12. substances added to soil that provide nutrients

FACTS ABOUT GERMINATION

- Temperature, oxygen, water and, in some cases, light are factors which influence germination. Water dissolves nutrients in endosperm making them available to the embryo. Oxygen is needed in metabolic processes.
- Optimal germination temperatures differ depending on individual species requirements.
- Some trees such as alder, hornbeam, ash and yew germinate better in lower temperatures whereas pine or spruce prefer higher ones. There are also such species that tolerate a wide range of temperature during germination, e.g. elm, larch.

12

SEEDLING LIFTING AND OUTPLANTING

I. Listen and do the exercise on page 138.

Seedlings are grown in nurseries either outdoors or indoors. Those grown indoors need some time to adapt to unfavourable outdoor conditions. The process, called hardening off, usually takes two weeks during which plants are exposed to lower temperatures and moisture as well as wind and direct sunshine. At the beginning the time spent in such conditions is short but later it is slowly lengthened. At the end of the second week seedlings are prepared for outdoor conditions and are ready to be outplanted.

Lifting takes place in autumn or spring when the soil is not frozen but seedlings are still dormant. Seedlings should be lifted with care to avoid mechanical damage of young plants, and especially, their roots. Roots must be also kept moist during lifting and transporting. If planting does not follow lifting immediately seedlings should be stored in such a way that protects roots from drying out.

Inoculation with mycorrhizal fungi also helps seedlings to adapt to unfavourable conditions outside nurseries. It can take place either in nurseries (before or during sowing seeds or sometimes after germination) or be applied to seedling roots before outplanting.

As far as planting seedlings is concerned, the topic has already been dealt with on page 96 (for details see the text *Planting Seedlings*).

GLOSSARY

lifting – wyjmowanie sadzonek
outplanting – wysadzanie
nursery – szkółka
adapt – przystosować się
hardening off – hartowanie
expose to – wystawić na
moisture – wilgotność
direct – bezpośredni
lengthen – wydłużyć
dormant – w stanie spoczynku
avoid – unikać
moist – wilgotny
follow – następować po
immediately – natychmiast
store – przechowywać
protect – chronić
dry out – wysychać
inoculation – mykoryzowanie, szczepienie
apply – stosować
concern – dotyczyć

READING COMPREHENSION

I. Answer the questions.

1. Where are seedlings grown?
2. Why do seedlings grown indoors have to be hardened off?
3. When are seedlings lifted?
4. Why should seedlings be lifted with care?
5. Why should roots be kept moist?
6. Why is inoculation with mycorrhizal fungi beneficial for seedlings?

FOLLOW-UP: SEEDLING STORAGE

I. Match the words and expression with their Polish equivalents.

1. short-term storage	A. dołowanie
2. long-term storage	B. przechowywanie krótkookresowe
3. heeling-in	C. przechowywanie w chłodniach
4. refrigerated storage	D. przechowywanie długookresowe

II. Match the beginnings of the definitions (1–4) with their ends (A–D). What storage methods from exercise I do they refer to?

1. Storing seedlings in controlled
2. Storing seedlings when they are lifted but not planted
3. This type of storage takes place when lifting and
4. Seedlings are placed in the shade, in the field

A. where their roots are covered with soil.
B. planting take place in the same season.
C. in the same season, e.g. they are lifted in autumn and are stored till spring planting.
D. temperature and moisture.

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

controlled	long-term	shaded	dormant
lifting	refrigerated	Short-term	heeling-in

1. ..... storage takes place when **2.** ..... and planting take place in the same season. Seedlings are usually placed in a **3.** ..... area outdoors in moist containers or in the field where their roots are covered with soil. This type of storing is called **4.** ..... . It can be both short or **5.** ..... .

When seedlings are lifted in autumn they are stored till spring planting. During storage seedlings must remain **6.** ..... until planting time. Long-term storage includes the previously mentioned heeling-in as well as **7.** ..... storage where temperature is **8.** ..... .

REVISION VIII (TEXTS 9–12)

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

1. Direct seeding in artificial regeneration is used:
   a. mainly on sandy soils
   b. for species that produce a lot of seeds every year
   c. for trees whose seeds are not eaten by birds
2. In comparison to planting seedlings, sowing seeds is:
   a. more common in forest regeneration
   b. less time-consuming and labour-intensive
   c. more reliable but more expensive
3. Planted seedlings in Poland are mainly:
   a. bare-root
   b. containerised
   c. produced in greenhouses
4. Bare-root seedlings:
   a. can be planted all year long
   b. have a lower survival rate than containerised ones
   c. should be planted mainly in mountains
5. Bare-root seedlings are planted:
   a. in summer
   b. when they are dormant
   c. two weeks after they have been lifted
6. Planted seedlings are:
   a. at different ages depending on tree species
   b. always one-year old
   c. always two-year old no matter what species they belong to
7. Which tree species should be planted first in spring?
   a. those that break their dormancy the earliest
   b. it does not matter because planting time does not depend on species
   c. beech, oak and hornbeam
8. The best time for planting is:
   a. in summer when the temperature is about 25°C or more
   b. when it is not too hot but it is windy and the soil is still frozen
   c. when it is cloudy, not too hot and the soil is moist
9. Indoor seedling production:
   a. is called heeling in
   b. is called hardening off
   c. takes place in greenhouses or plastic tunnels

10. Seedlings produced indoors are:
    a. larger and stronger than those produced outdoors
    b. are smaller because they grow in unfavourable weather conditions
    c. are not used in forestry
11. Seed predators are:
    a. chemicals protecting seeds from birds
    b. branches covering seedbeds and protecting seeds from birds
    c. animals that damage and eat seeds
12. Hardening off means:
    a. storing seeds for a long time
    b. adaptation of seedlings grown indoors to outdoor conditions
    c. growing seedlings in greenhouses
13. Inoculation with mycorrhizal fungi:
    a. is a part of hardening off
    b. provides fungi that form a symbiotic relationship with tree roots
    c. can be harmful for trees and cause diseases

II. Match the beginnings (1–10) of the expressions with their endings (A–J).

1. hardening	A. storage
2. heeling-	B. mycorrhizal fungi
3. containerised	C. seedlings
4. long-term	D. outdoor conditions
5. moist	E. seedlings
6. inoculation with	F. seeds
7. adapt to	G. sowing
8. planting	H. off
9. spring	I. soil
10. sowing	J. in

III. Give the words of the opposite meaning.

1. outdoor
2. containerised seedlings
3. natural regeneration
4. long-term storage
5. moist soil

13

FROM SEEDLINGS TO MATURE TREES

I. Listen and do the exercise on page 139.

Between a seedling stage and mature trees plants are carefully monitored by foresters who try to improve the quality of the stand as a whole and create the best conditions for trees to grow. All practices taking place during that time are known as forest stand improvement, tending the forest or intermediate treatments. They usually include: planting additional seedlings in the areas when they have not survived, creating favourable conditions for seedling growth and later on for desirable trees, improving species composition, fighting pests, diseases and the like.

When trees start to grow gradual reduction of stand density is observed. It is a natural process which results in production of healthy, straight, tall, mature trees and is caused by tree competition for light, water and nutrients. Only the strongest trees survive.

Foresters also contribute to gradual reduction of stand density by removing from the stand trees damaged by biotic and abiotic factors, plants of improper form, representing undesirable species or those which hinder the growth of the desirable ones. Removal of damaged trees from a stand is called sanitation cutting. It prevents the spread of pests and diseases.

After many years seedlings become mature trees. There are different types of tree maturity. The term can refer either to the tree's ability to produce seeds or the moment when a process of natural death starts. It may also mean the time when trees produce wood of adequate quality and are of proper size or age for logging. Foresters usually do not let mature trees grow longer because the older they get the more often they are attacked by pests and diseases and damaged by abiotic factors such as wind, snow and the like.

GLOSSARY

mature – dojrzały
improve – polepszyć
quality – jakość
stand – drzewostan
create – tworzyć
forest stand improvement / tending the forest / intermediate treatments – pielęgnowanie drzewostanu
survive – przeżyć
desirable – pożądany
species composition – skład gatunkowy
gradual – stopniowy
straight – prosty
competition – współzawodnictwo
contribute to – mieć wkład w
improper – niewłaściwy
undesirable – niepożądany
hinder – utrudniać
removal – usuwanie
sanitation cutting – cięcia sanitarne
spread – rozprzestrzenianie się
maturity – dojrzałość
log – ścinać drzewa

READING COMPREHENSION

I. Answer the questions.

1. How are practices between a seedling stage and mature trees called?
2. What do they include?
3. How does stand density change when trees grow?
4. What is it caused by?
5. What is 'sanitation cutting'?
6. How can the term 'tree maturity' be understood?

FOLLOW-UP: TREE DESCRIPTION

I. The word 'mature' is one of many words that can describe a tree. Look at other words in the box and put them into the following categories that refer to tree height, size, origin, function, parts, leaves, old trees and trees in winter.

evergreen	huge	hollow	native	stump	tall
ornamental	trunk	massive	branch	exotic	bark
Christmas	low	tropical	canopy	small	bare
deciduous	high	gnarled	leafless	large	fruit

tree height	tree size	tree origin	tree function
tree parts	**tree leaves**	**old trees**	**trees in winter**

14

TIMBER HARVESTING SYSTEMS

I. Listen and do the exercise on page 140.

The way in which a forest regenerates influences harvesting methods which consist of stages such as: cutting down trees, removing branches and tree tops, transferring logs to the roadside landing, wood classification, short-term storing and transporting them to sawmills or other processing factories. Branches and tree tops are usually left in the forest in order to decompose.

While planning harvesting operations foresters take into account the number of trees that are logged at the same time and the interval between felling called the cutting interval. The choice of a harvesting method depends not only on the way a forest regenerates but also its influence on local habitat, tree health included. Environmental, ecological and other multifunctional roles forests play are taken into account as well. There are many harvesting systems and their modifications. Basic ones include: clearcutting, shelterwood system and selection system.

Clearcutting

Clearcutting is the most radical. It means felling all trees in a certain area. It is often used when stands are seriously damaged by wind, fire, insects or diseases. It may create favourable conditions for artificial regeneration of light-demanding species such as pine or birch and results in even-aged stands.

Selection system

It promotes biodiversity and growth of uneven-aged stands because it is based on felling single trees or their small groups over the whole forest area. The process is gradual and lasts for many years.

The selection method is not often used in forest management because it is more complicated, time-consuming and expensive than other systems. It also means using small equipment and manual labour.

Shelterwood system

Shelterwood system is a method that can be placed between the harvesting systems mentioned above. Mature trees of desirable qualities are left on the site to produce seeds and the young trees grow under the canopy of older ones. The system is used for regeneration of shadebearing species.

GLOSSARY

timber harvesting – pozyskiwanie drewna
cut down /log/fell – ścinać
remove – usuwać
log – kłoda
roadside landing – składnica
store – przechowywać
sawmill – tartak
process – przetwarzać
decompose – rozkładać się
interval – przerwa
cutting interval – nawroty cięć
clearcutting – rębnia zupełna
shelterwood system – rębnia częściowa
selection system – rębnia przerębowa
light demanding – światłożądne
gradual – stopniowy
equipment – sprzęt
manual labour – praca ręczna
desirable qualities – pożądane cechy
canopy – korona, okap
shadebearing – cienioznośne

READING COMPREHENSION

I. Answer the questions.

1. What stages does felling trees include?
2. Name three basic harvesting methods.
3. What is 'cutting interval'?
4. What is clearcutting based on?
5. When is it recommended?
6. Why is selection system not often used?
7. What is shelterwood system based on?
8. When is it recommended?

II. In the text find the words that mean:

1. the process of gathering timber or any other crop
2. a cut down tree trunk, without branches and the top
3. putting things into different categories, groups or classes
4. a place where wood is sawn into planks
5. to rot or break down
6. cutting down all trees in a certain area
7. the same as logging trees
8. an adjective describing plants that do not grow well in the shade
9. an adjective describing something that takes a lot of time
10. an adjective describing plants that tolerate growing in the shade

FOLLOW-UP: RELATED VOCABULARY

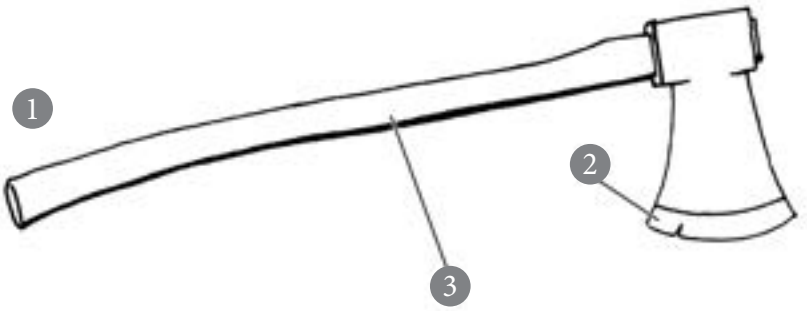
A. HARVESTING EQUIPMENT AND OPERATIONS

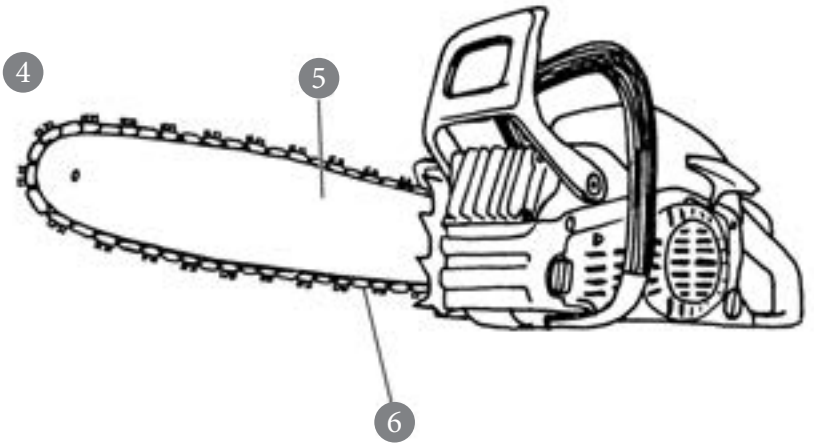
I. Match the following terms (A–F) with their definitions (1–6).

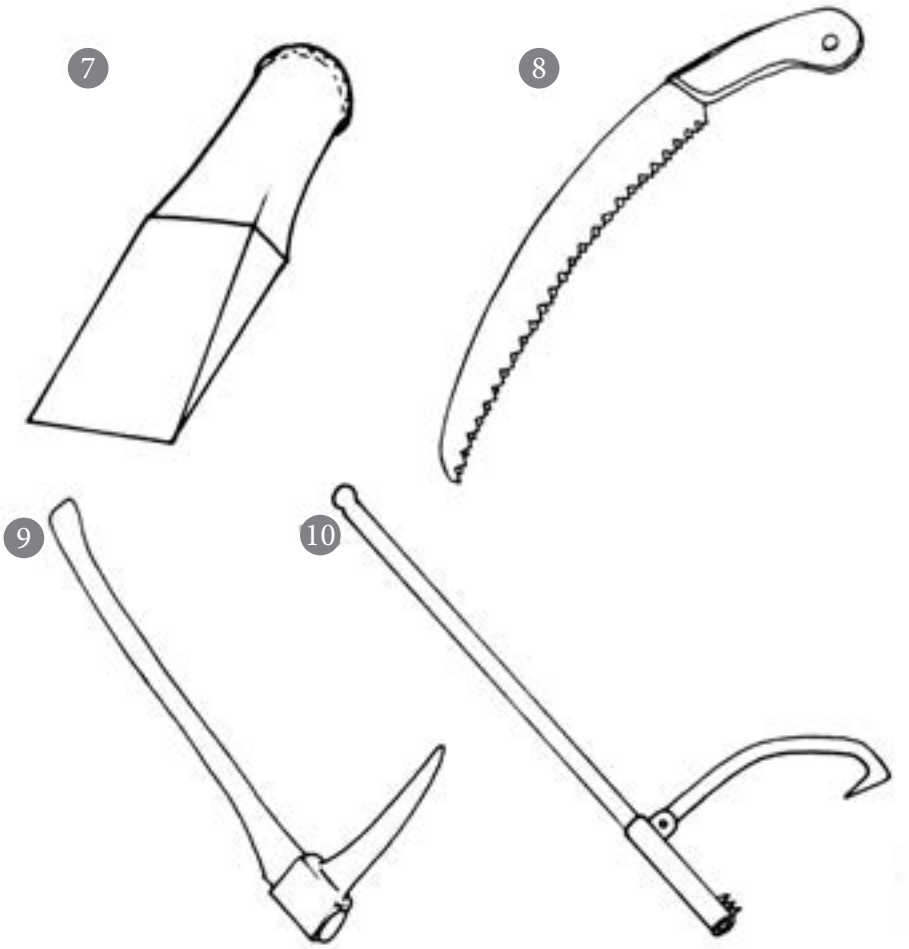
A. bucking	1. removing branches from a log
B. skidder	2. a machine that lifts trees from the ground and transfers them into another area
C. forwarder	3. removing tree tops
D. harvester	4. cutting felled trees into shorter parts
E. delimbing	5. a machine that transports trees by dragging
F. topping	6. a machine that cuts down trees, delimbs and bucks them

II. Look at the pictures and name logging tools and equipment. Use the words from the box.

axe	saw	wedge	chainsaw	hookeroon
chain	handle	cutting edge	saw guide	cant hook







III. Translate the English words from exercise II into Polish.

.....
.....
.....
.....
.....
.....
.....

B. PROTECTIVE CLOTHING

I. Look at the pictures and match them with the words from the box.

high visibility safety vest	ear muffs	protective gloves	visor
Wellington boots	hard hat	work boots	

1 

2 

3

4 

5 

6 

7 

C. FOREST MEASURING EQUIPMENT AND TOOLS

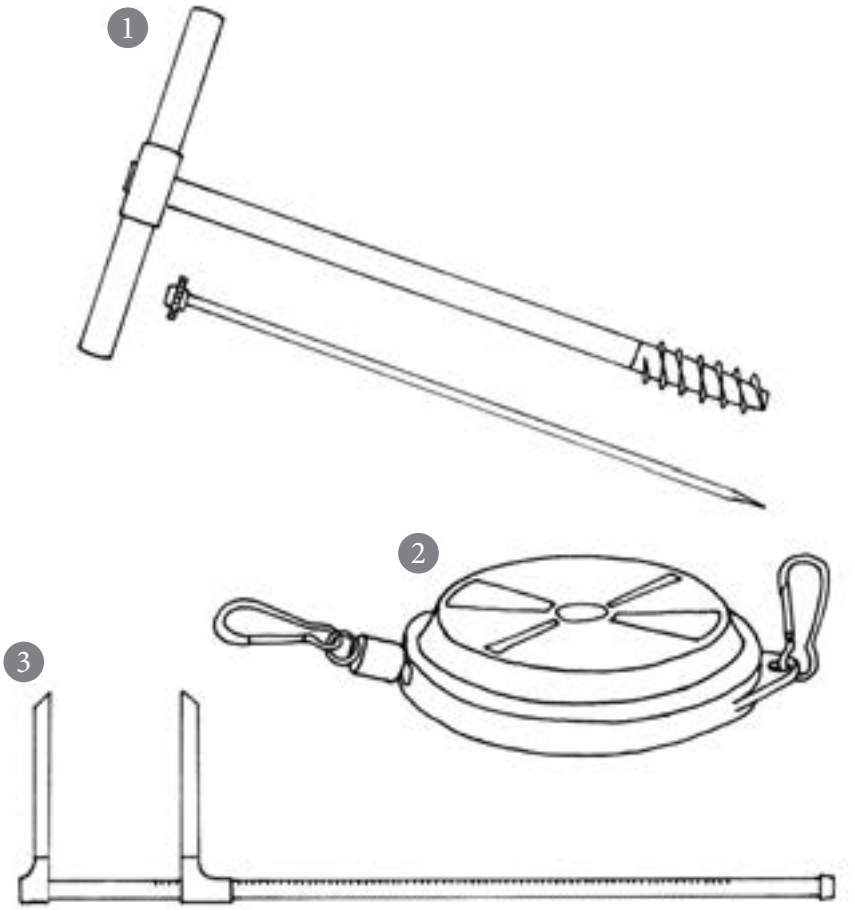
I. Match measuring tools and equipment with their functions.

1. caliper	A. measures tree growth and age
2. clinometer	B. measures length of cut down trees
3. increment borer	C. measures tree moisture
4. moisture meter	D. measures tree height
5. tape	E. measures tree diameter

II. Match English words with their Polish equivalents.

1. caliper	A. przyrostomierz/ świder Presslera
2. clinometer	B. wilgotnościomierz
3. increment borer	C. klupa/średnicomierz
4. moisture meter	D. taśma
5. tape	E. wysokościomierz

III. Which tools are shown in the pictures?



D. OTHER FOREST TOOLS AND ACCESSORIES

I. Look at the pictures and name forest tools and accessories. Use the words from the box.

extension ladder	climbing line	tool belt	tree guard	lumber crayon
steel spurs	mesh fence	hoe	shovel	planting bar

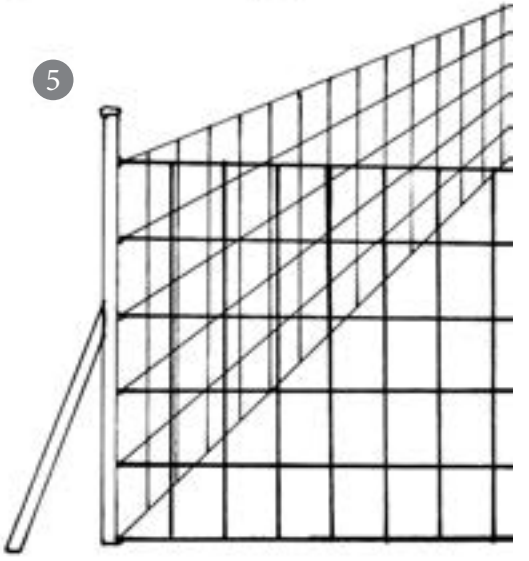
1

2

3

4

5



II. Translate the English words from exercise I into Polish.

.....

.....

.....

.....

.....

.....

15
FOREST PRODUCTS

I. Listen and do the exercise on page 140.

Forest products include: wood, bark, coniferous litter, resin, tree sap (usually birch or maple), essential oils, edible plants and others that have ornamental or medicinal properties. They can also include venison.

Forest products can be divided into two categories: wood-based and non-timber ones (NTFPs). However, the definition of forest products as well as their classification vary in different countries.

The most important and profitable forest product is wood. It is a universal, eco-friendly material used in the construction industry, production of furniture, musical instruments, household goods or packaging.

Small parts of wood are no longer seen as a waste material but have application as fuelwood (when compressed) or to produce particleboard or fibreboard.

Wood can also be subjected to chemical treatment. The end products of chemical processing include paper, cardboard, cellophane and rayon cloth to mention but a few. Other products such as resin and tannin are obtained from wood by extraction while charcoal is produced by heating wood up to 1,000°C in the absence of air. This method is called pyrolisis.

GLOSSARY

litter – ściółka, igliwie
coniferous litter – igliwie, ściółka iglasta
resin – żywica
tree sap – sok drzew
birch sap – oskoła, sok brzozowy
essential oils – olejki eteryczne
ornamental – ozdobne
medicinal properties – właściwości lecznicze
venison – dziczyzna
non-timber products – użytki uboczne
profitable – dochodowy
construction industry – przemysł budowlany
packaging – opakowania
household – gospodarstwo domowe
goods – produkty, towary
waste – odpad
application – zastosowanie
fuelwood – drewno opałowe
particleboard – płyta wiórowa
fibreboard – płyta pilśniowa
subject – poddawać
treatment – *tu:* obróbka
process – przetwarzać
cardboard – karton
rayon – sztuczny jedwab
obtain from – otrzymać z
charcoal – węgiel drzewny
pyrolisis – pyroliza

READING COMPREHENSION

I. Answer the questions.

1. Give examples of forest products.
2. How can forest products be divided?
3. Why is wood the most important forest product?
4. How is it used?
5. How are small parts of wood used?
6. Name products that are the result of wood chemical treatment.
7. What is produced during pyrolisis?

II. In the text find the words that mean:

1. a layer of coniferous needles covering forest soil
2. juice obtained from trees
3. a sticky substance produced by trees
4. an adjective describing fruit or mushrooms which are eaten
5. game meat
6. wood used for heating
7. a board produced from wood fibres. Wood is first subjected to pulping, later boards are formed
8. a board made of small pieces of wood glued together
9. a thick, stiff piece of paper
10. coal produced from wood
11. the process in which charcoal is produced

GLOSSARY

layer – warstwa
needle – igła
cover – pokrywać
soil – gleba
juice – sok
obtain from – uzyskać z
sticky – lepki
adjective – przymiotnik
game – zwierzyna łowna
heating – ogrzewanie
board – płyta
manufacture – wyprodukować
glue – klej, skleić
fibre – włókno
thick – gruby
stiff – sztywny
subject – poddać, poddawać
pulping – przerabiane na papkę

16

FORESTS FEED, FORESTS CURE

I. Listen and do the exercise on page 140.

Apart from wood, forests are a source of edible products, such as fruits or mushrooms as well as those which have medicinal properties, e.g. herbs. In many countries venison is also considered a forest product.

Fruits

The most common edible forest fruits belong to two families: the *Ericaceae* (bilberry, cranberry) and the *Rosaceae* (blackberry, wild strawberry and raspberry). Edible fruit can be eaten raw, dried or processed into juice, jam or alcohol. However, edible fruits are not the only ones picked in forests. Hawthorn, elder, juniper, rowan, rose, barberry or sea buckthorn fruit are also important forest products used as spice, medicine or in cosmetology.

Mushrooms

Mushrooms that grow in forests can be divided into edible, inedible and poisonous. Poisonous mushrooms are very dangerous for our health because they may damage the kidneys, the liver or the heart. What is more, symptoms may sometimes develop even two weeks after eating and then it is too late to save that person's life.

Forest plants' medicinal properties

Many forest trees and shrubs have medicinal properties, e.g. pine, birch, linden, rowan, oak, blackthorn, alder buckthorn, guelder rose, dog rose. The list also includes such plants as: lily of the valley, asarabacca, nettle and buckbean. What is more, many fruits have application in curing illnesses.

Venison

'Game' means animals hunted for their meat such as deer, wild boar, hare or pheasant. Game can be hunted only during the open season. During the closed season hunting is forbidden.

GLOSSARY

cure – leczyć
edible – jadalny
herbs – zioła
venison – dziczyzna
considered – uważany za
bilberry – borówka
cranberry – żurawina
blackberry – jeżyna
wild strawberry – poziomka
raspberry – malina
raw – surowy
pick – zbierać
hawthorn – głóg
elder – bez
juniper – jałowiec
rowan – jarząb/jarzębina
barberry – berberys
sea buckthorn – rokitnik
spice – przyprawa
inedible – niejadalne

poisonous – trujące
kidney – nerka
liver – wątroba
heart – serce
save life – uratować życie
blackthorn – śliwa tarnina
alder buckthorn – kruszyna
guelder rose – kalina koralowa
dog rose – dzika róża
lily of the valley – konwalia majowa
asarabacca – kopytnik pospolity
nettle – pokrzywa
buckbean – bobrek trójlistny
application – zastosowanie
game – zwierzyna łowna
hunt – polować
deer – jeleń
wild boar – dzik
hare – zając
pheasant – bażant
open season – sezon łowiecki
closed season – sezon ochronny

READING COMPREHENSION

I. Answer the questions.

1. Name groups of edible forest products.
2. Which families do edible fruits belong to?
3. What other fruits are picked in forests?
4. What is their application?
5. What organs do poisonous mushrooms damage?
6. When may symptoms develop?
7. Name three trees and three shrubs that have medicinal properties.
8. What is 'game'?
9. When can game be hunted?

II. In the text find the words that mean:

1. something that you can eat safely
2. small plants that have medicinal properties or used as spice
3. a plant with red fruits belonging to the *Ericaceae* family
4. not cooked or processed
5. something put in food to give it flavour
6. opposite to 'edible'
7. something that you shouldn't eat because it is dangerous for your health or can even cause death
8. a small forest plant that produces white, fragrant flowers in May
9. a small forest plant whose leaves are covered by stinging hairs
10. a forest animal that has antlers

GLOSSARY

flavour – smak
fragrant – pachnący
sting – kłuć
antlers – poroże

III. Name the following plants.

1

2

3

4

5

6

7

8

REVISION IX (TEXTS 13–16)

I. Match the words on the left (1–6) with the words of the opposite meaning on the right (A–F).

1. edible	A. light demanding
2. open season	B. non-timber forest products
3. shadebearing	C. cut down
4. seedling	D. inedible
5. wood-based products	E. mature tree
6. plant trees	F. closed season

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

1. Young trees start to grow under the canopy of older ones in:
   a. shelterwood cutting
   b. clearcutting
   c. both
2. 'Cutting interval' means:
   a. the number of trees that are cut down
   b. the time between cutting down next trees
   c. a type of harvesting system
3. The most radical timber harvesting system is:
   a. selection system
   b. shelterwood system
   c. clearcutting
4. To 'cut down' trees means the same as:
   a. to fell
   b. to prevent
   c. to spread
5. Cardboard is a type of:
   a. board
   b. paper
   c. cloth
6. 'Game' is:
   a. an animal hunted for meat, fur and the like
   b. the same as venison
   c. a type of fibreboard
7. Which plant has black fruit?
   a. cranberry
   b. raspberry
   c. elder

III. Match the words on the left with those on the right. Then translate them into Polish.

1. forest stand	A. cutting
2. species	B. interval
3. dog	C. buckthorn
4. sanitation	D. cutting
5. timber harvesting	E. qualities
6. manual	F. properties
7. guelder	G. composition
8. cutting	H. rose
9. desirable	I. boar
10. shelterwood	J. mushrooms
11. medicinal	K. improvement
12. alder	L. systems
13. poisonous	M. rose
14. wild	N. labour

IV. Put the harvesting stages in the proper order.

A. transporting logs to sawmills or other processing factories
B. sorting/ wood classification
C. cutting down trees
D. removing branches and tree tops
E. short-term storing
F. transferring logs to the roadside landing

V. Match the English names with the Latin ones.

1. lily of the valley	A. *Viburnum opulus*
2. cranberry	B. *Vaccinium myrtillus*
3. blackthorn	C. *Convallaria majalis*
4. blackberry	D. *Fragaria vesca*
5. guelder rose	E. *Rubus fructicosus*
6. wild strawberry	F. *Prunus spinosa*
7. black elder	G. *Oxycoccus quadripetalus*
8. raspberry	H. *Crataegus* sp.
9. bilberry	I. *Rubus idaeus*
10. hawthorn	J. *Sambucus nigra*

VI. Which plants have red or orange fruit and which ones black or dark blue?

.....

.....

LISTENING COMPREHENSION

INTRODUCTION

1. THE STATE FORESTS (page 8)

I. Listen and fill in the blanks. Use the words from the box.

ecological	non-afforested	self-financing
national	forest management	Districts

THE STATE FORESTS

The State Forests is a huge, **1.** ..... unit that employs about 26,000 people. It governs 7,609,500 hectares of **2.** ..... property. Forests cover the majority of the administered area (7,316,700 hectares). The remaining part of the property consists of **3.** ..... areas, wastelands, farmlands and waters.

Organisation of the State Forests

Directorate-General of the State Forests
17 Regional Directorates of the State Forests
430 Forest **4.** .....

The objectives of the State Forests

The main objective of the State Forests is an economic one (mainly timber production). However, **5.** ....., recreational, scientific and educational aspects of forests also play an important role in forest management.

Nowadays, **6.** ..... is based on the concept of sustainable development. It means that forests are seen as complex ecosystems performing different roles. As a result, forests are preserved for future generations for further constant use and enjoyment.

Next, read the text on page 8.

2. WHO TAKES CARE OF POLISH FORESTS? (page 10)

I. Listen and fill in the blanks.

Foresters:
..... data
know how to ..... safely
are .....
know how to draw .....
have to be .....

Next, read the text on page 10.

4. THE ROLES FORESTS PLAY (page 14)

I. Are the following statements true or false?

1. Non-timber forest products are the most profitable forest sector.
2. The only important aspect of forests is wood production.
3. Forests prevent landslides.
4. Forests prevent air pollution.
5. Forests protect water resources.
6. Venison is a non-timber forest product.

SILVICULTURAL ABC

1. WHERE TREES COME FROM (page 20)

I. Listen and 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.

2. PARTS OF A TREE (page 22)

I. Listen and fill in the blanks with the words from the box.

Root hairs	nutrients	mycorrhiza	symbiotic	buds
root system	species	branches	taproot	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.** ..... .

3. FACTORS AFFECTING A TREE'S APPEARANCE (page 24)

I. Listen and 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.

4. CONIFEROUS TREES (page 28)

I. Listen and 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.

5. DECIDUOUS TREES (page 30)

I. Listen and fill in the blanks.

Deciduous trees are not as numerous in Poland as **1.** ..... ones. Deciduous trees do not have **2.** ..... in winter. They come into leaf in spring. In autumn 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.

6. BASIC FOREST TREE CHARACTERISTICS (page 36)

I. Listen and 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.

7. TREE TYPES (page 38)

I. 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.
5. A snag is a dominant tree in a stand.

9. FOREST STANDS (page 44)

I. Listen and fill in the blanks with 1–3 words.

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. The basic characteristics include: **2.** ....., species composition, stratification, stand density and stand origin.

Stand age can be described in many ways. The most common is based on **3.** ..... . 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. If trees in a stand belong to one age class such a stand is called even-aged. When they belong to **5.** ..... – uneven-aged.

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.** ..... .

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.

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 neighbouring trees are.

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

10. FOREST FLORA (page 46)

Dear fellow-teachers: don't explain the words: fern, lichen, fungi, alder buckhorn, lily of the valley!

I. 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

II. What is the Polish for 'fern', 'lichen' and 'fungi'?

11. FOREST ANIMAL KINGDOM. PART I (page 52)

I. Listen and 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.

12. FOREST ANIMAL KINGDOM. PART II (page 54)

I. 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.

13. HUNTING (page 58)

I. Choose the correct answer: a, b or c. What is the Polish for 'poaching', 'game' and 'the open season'?

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

14. A FOOD CHAIN (page 60)

I. Listen and 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 Polish for 'food chain', 'carbon dioxide', 'oxygen', 'herbivore', 'carnivore' and 'nutrients'?

15. WHAT DESTROYS POLISH FORESTS? PART I (page 64)

I. Listen and 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.

16. WHAT DESTROYS POLISH FORESTS? PART II (page 66)

I. Listen and 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.** ..... .

FORESTRY FOR INSIDERS

1. THE FOREST BIOLOGICAL CLOCK (page 72)

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.

2. TREE DISEASES (page 76)

I. Listen and 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)*.

3. TREE PESTS (page 78)

I. 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

4. HOW TO CONTROL FOREST PESTS AND DISEASES (page 80)

I. Listen and 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.

5. NATURAL AND ARTIFICIAL REGENERATION (page 84)

I. Listen and 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 ....., ...

6. REFORESTATION AND AFFORESTATION (page 86)

I. 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

7. AFFORESTATION OF FARMLAND (page 88)

I. True or false?

1. The European Union gives Polish 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 Polish for: 'subsidy', 'plough pan', 'mycorrhizal fungi' and 'fungal diseases'? Match the words on the left (1–4) with their Polish equivalents on the right (A–D).

1. subsidy	A. podeszwa płużna
2. plough pan	B. choroby grzybowe
3. mycorrhizal fungi	C. dotacja
4. fungal diseases	D. grzyby mykoryzowe

8. FAST-GROWING TREE PLANTATIONS (page 90)

I. Listen and 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.

9. DIRECT SEEDING VERSUS PLANTING (page 94)

I. True or false?

1. Direct seeding is a very common method of forest regeneration in Poland.
2. Ploughing is very important in preparing soil for sowing seeds.
3. The amount of seeds needed to regenerate one hectare of forest is the same in all regeneration methods.
4. Direct seeding is used for oak and beech.
5. Planted seedlings do not suffer from transplant shock.
6. Planting seedlings is not as reliable as sowing seeds.

10. PLANTING SEEDLINGS (page 96)

I. Fill in the blanks with 1 or 2 words.

1. Only such species are planted which are best adapted to ..... .
2. Seedlings produced in nurseries are either ..... or ..... .
3. As a planting material one-year-old seedlings can be used, e.g. pine, ..., ..., ...
4. Species like fir, spruce or ash need ..... to produce seedlings proper for planting.
5. Seedlings should be planted as soon as possible after they have been transported from a ..... .
6. Species that break their dormancy first, e.g. ....., ..., ..., should be planted the earliest.

11. SEEDLING PRODUCTION (page 100)

I. Listen and fill in the blanks with 1–2 words.

Seedling production may take place outdoors or indoors in plastic tunnel or **1.** ..... . Growing plants under cover allows modification and control of light, **2.** ..... and moisture and lengthening the **3.** ..... . As a result, seedlings produced this way are larger and stronger than those produced **4.** ..... .

Seeds are sown in spring or in autumn. The spring sowing should take place as **5.** ..... as possible because then seedlings have more time to grow before winter. Seeds should be sown when soil is not frozen but still **6.** ..... after winter. In contrast to the spring sowing, the autumn one should take place as **7.** ..... as possible to avoid germination because young, delicate plants are easily damaged by **8.** ..... and may not survive winter.

When seeds are sown outdoors they are often covered with different types of material, e.g. **9.** ....., in order to protect them from **10.** ..... and unfavourable weather conditions. Covering seedbeds also reduces evaporation and cooling off of the soil. After **11.** ..... the cover is removed.

Taking care of young seedlings involves: protecting them from seed predators, pests, diseases, very strong wind, frost and sunshine, keeping soil moist and free of **12.** ....., providing nutrients in the form of fertilisers.

12. SEEDLING LIFTING AND OUTPLANTING (page 102)

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

1. Seedlings are grown in nurseries:
   a. outdoors
   b. outdoors or indoors
   c. indoors

2. During hardening off plants:
    a. spend more and more time outdoors
    b. are protected from lower temperatures, moisture, wind and direct sunshine
    c. adapt to plastic tunnel conditions
3. Lifting takes place when:
    a. soil is not frozen
    b. soil is frozen and covered by snow
    c. in summer
4. After lifting:
    a. seedlings are kept on seedbeds for 1–2 weeks
    b. seedlings are sown
    c. seedling roots are kept moist
5. Inoculation with mycorrhizal fungi means:
    a. application of fungi to seedling leaves
    b. using fungicides
    c. application of fungi to forest soil nurseries or to seedling roots before outplanting

13. FROM SEEDLINGS TO MATURE TREES (page 106)

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

1. Practices between a seedling stage and mature trees are called:
    a. forest intermediate improvement
    b. tending improvement
    c. forest stand improvement
2. Foresters try to improve the quality of the stand as a whole by:
    a. logging
    b. creating the best conditions for tree growth
    c. removing additional seedlings
3. Gradual reduction of stand density is caused by:
    a. foresters
    b. tree competition for light, nutrients and the like
    c. both
4. Sanitation cutting means removing from the stand trees:
    a. attacked by pests or diseases or dead ones
    b. which are too tall
    c. representing undesirable species
5. Tree maturity refers to:
    a. tree age when a tree starts to die
    b. ability to produce seeds and wood
    c. ability to produce seeds, wood of proper quality or the beginning of natural gradual tree death

14. TIMBER HARVESTING SYSTEMS (page 108)

I. Listen and fill in the blanks with 1–2 words.

1. All harvesting systems consist of: ..... trees, removing ..... and tree tops, transferring logs to the roadside landing, ..., short-term storing and transporting them to sawmills or other processing ..... .
2. Basic harvesting systems include: clearcutting, shelterwood system and ..... system.
3. Clearcutting is the most ..... . It results in ..... stands.
4. Selection system promotes ..... and growth of ..... stands because it is based on felling single trees or their small groups over the whole forest area.
5. Shelterwood cutting is a method that can be placed between the mentioned above harvesting systems. ..... trees of desirable qualities are left on the site to produce ..... and the young trees grow under the ..... of older ones.

15. FOREST PRODUCTS (page 116)

I. Listen and fill in the blanks (1–10).

Forest products include: **1.** ....., bark, coniferous **2.** ....., resin, tree sap (usually birch or maple one), essential oils, edible plants and others that have ornamental or **3.** ..... properties. They can also include venison.

Forest products can be divided into two categories: **4.** ..... and non-timber ones (NTFPs).

The most important and profitable forest product is wood. It is a universal, eco-friendly material used in **5.** ..... industry, production of furniture, **6.** ..... instruments, packaging or household goods.

Small parts of wood are no longer seen as a waste material but have application as **7.** ..... (when compressed) or to produce plywood, particleboard or fibreboard.

Wood can also be subjected to chemical treatment. The end products of chemical processing include paper, **8.** ....., cellophane, rayon cloth to mention but a few. Other products such as resin and tannin are obtained from wood by **9.** ..... while charcoal is produced by heating wood up to **10.** ..... in the absence of air. This method is called pyrolisis.

16. FORESTS FEED, FORESTS CURE (page 118)

I. True or false?

1. Edible products include fruits, mushrooms and venison.
2. Bilberry and blackberry belong to the *Ericaceae* family.
3. Raspberry belongs to the *Rosaceae* family.
4. Only edible fruits are picked in forests.
5. There are edible, inedible and poisonous mushrooms in forests.
6. Guelder rose and asarabacca can be used to cure diseases.
7. Game is hunted during the closed season.

KEY

INTRODUCTION

1. THE STATE FORESTS (page 8)

LISTENING COMPREHENSION (page 127)
EX. I
1. self-financing
2. national
3. non-afforested
4. Districts
5. ecological
6. forest management

READING COMPREHENSION
EX. I
1. employ – zatrudniać
2. govern – zarządzać
3. national – państwowy
4. property – własność
5. non-afforested – niezalesiony
6. wasteland – nieużytek
7. timber – drewno, surowiec drzewny

EX. II
Organizacja Lasów Państwowych
Dyrekcja Generalna Lasów Państwowych
17 Regionalnych Dyrekcji Lasów Państwowych
430 nadleśnictw

FOLLOW-UP: RELATED VOCABULARY

EX. I
1D – pożary lasu 2E – zagrożone gatunki 3A – flora i fauna
4C – ochrona przyrody 5B – niszczenie siedliska/środowiska

2. WHO TAKES CARE OF POLISH FORESTS? (page 10)

LISTENING COMPREHENSION (page 127)
EX. I
1. collect 2. cut down trees 3. professionals, experts in many fields
4. maps 5. good managers

READING COMPREHENSION

EX. II

1E 2D 3B 4F 5B/C 6A 7G

EX. III

1. I am a forester.
2. I graduated from the Agricultural University in Cracow.
3. Forests in Poland are mainly state-owned and make a profit.
4. Fighting forest fires is difficult and dangerous.
5. It is easy to plant a tree but it is more difficult to cut it down.

FOLLOW-UP

EX. I

1. The State Forests Information Centre in Warsaw – Centrum Informacyjne Lasów Państwowych w Warszawie
2. The State Forests Centre for Research and Implementation in Bedoń – Ośrodek Rozwojowo-Wdrożeniowy Lasów Państwowych w Bedoniu
3. The Forest Technology Centre in Jarocin – Ośrodek Techniki Leśnej w Jarocinie
4. The State Forests IT Department in Sękocin – Zakład Informatyki Lasów Państwowych w Sękocinie
5. The Coordination Centre for Environmental Projects in Warsaw – Centrum Koordynacji Projektów Środowiskowych w Warszawie
6. The Kostrzyca Forest Gene Bank in Miłków – Leśny Bank Genów Kostrzyca w Miłkowie
7. The Forest Culture Centre in Gołuchów – Ośrodek Kultury Leśnej w Gołuchowie

3. FOREST QUIZ (page 12)

EX. I

1b 2a 3c 4a 5c 6b 7a 8b 9c

EX. II

1b 2b 3c 4d

EX. IV

1. The most wooded province in Poland is the Lubuskie province.
2. Pine is the most common (tree) species in Polish forests.
3. The percentage of area covered by forests is the lowest in the Łódzkie province.
4. Forests in Finland occupy more than 70 per cent of the country's area.
5. Forests in Malta are almost non-existent. They constitute only 1 per cent of the country's area.
6. The most common tree species in Polish forests are pine and oak.
7. Spruce, beech and fir are typical Polish mountain tree species.
8. The majority of Polish forests are not private.

4. THE ROLES FORESTS PLAY (page 14)

LISTENING COMPREHENSION (page 128)
EX. I
1F 2F 3T 4F 5T 6T

READING COMPREHENSION
EX. I
1. Wood.
2. Productive, social, ecological and recreational functions.
3. Yes, they do.
4. They prevent floods, protect water resources, reduce temperature extremes, act as effective noise and wind barriers.
5. Venison, fruit, medicinal plants or mushrooms.

EX. II
1F 2T 3F 4F 5T

EX. III
1H 2I 3E 4A 5J *także:* soil pollution 5D 6B *także:* protect habitat
6I 7F 8C *także:* noise pollution 8D 9G *także:* prevent erosion 9J 10D

REVISION I (TEXTS 1–4) (page 16)

EX. I
1T 2F 3T 4F 5F 6T 7T 8F 9F 10F
11T 12T 13F 14T 15T

EX. II
1. I graduated from ……. (nazwa uczelni).
2. I am a forester.
3. I work in ……. (nazwa nadleśnictwa, np. Piwniczna) district.
4. No, there aren't.
5. Yes, they do.

EX. III
forests promote: biodiversity, recreation
forests prevent: soil erosion, landslides, floods
forests protect: water resources, wildlife habitat

EX. IV
1D 2C 3E 4B 5A

EX. V
1. wood production
2. playing different roles
3. erosion, pollution, protect
4. floods, resources, wind
5. venison, mushrooms

EX. VI
1. Only 13 per cent of the country is covered by forests in the UK.
2. The most wooded part of the UK is Scotland where 19 per cent of its area is covered by forests.
3. The least wooded is Northern Ireland (9 per cent).
4. Forests in Wales occupy 15 per cent and in England only 10 per cent.

SILVICULTURAL ABC

1. WHERE TREES COME FROM (page 20)

LISTENING COMPREHENSION (page 128)
EX. I
1. seeds 2. seedling 3. cut down 4. sexual 5. vegetative 6. parent

READING COMPREHENSION
EX. I
1F 2T 3T 4F 5T 6F 7T 8T 9F 10T 11F

EX. II
1. What is older: a sapling or a seedling?
2. Is reproduction from seed different from sexual propagation?
3. How can trees be reproduced?
4. Can you give me an example of tree vegetative reproduction?
5. Which propagation method is more common in forestry: asexual or sexual?

FOLLOW-UP: PROPAGATION METHODS

EX. I
1. root sucker – odrośl korzeniowa
2. seed – nasiono
3. stump sprout – odrośl pniakowa
4. shoot cutting – zrzez

2. PARTS OF A TREE (page 22)

LISTENING COMPREHENSION (page 128)
EX. I
1. root system 2. species 3. taproot 4. Root hairs 5. symbiotic
6. mycorrhiza 7. trunk 8. nutrients 9. branches 10. buds

READING COMPREHENSION
EX. I
1F 2T 3F 4F 5T 6T 7F 8T 9F

EX. II
1. bark 2. roots 3. bud 4. branch 5. taproot

EX. III
1. root system 2. taproot 3. trunk 4. bark 5. hollow
6. crown 7. leaf 8. branch 9. twig

3. FACTORS AFFECTING A TREE'S APPEARANCE (page 24)

LISTENING COMPREHENSION (page 129)
EX. I
1. age, place 2. thinner, birch 3. pine 4. habitat

READING COMPREHENSION
EX. I
1F 2H 3E 4B 5G 6D 7A 8C

FOLLOW-UP: A TREE'S APPEARANCE

EX. I
1. birch 2. beech seedling 3. uprooted tree
4. broad-leaved tree 5. fir 6. tree growing in the stand
7. broken tree 8. oak 9. fir seedling
10. tree growing alone 11. tree attacked by pests 12. sapling

4. CONIFEROUS TREES (page 28)

LISTENING COMPREHENSION (page 129)
EX. I
A3 B4 C5 D7 E6 F1 G2

READING COMPREHENSION
EX. I
1F 2F 3T 4T

EX. II
1. Douglas fir 2. pine 3. larch 4. spruce 5. fir

5. DECIDUOUS TREES (page 30)

LISTENING COMPREHENSION (page 129)
EX. I
1. coniferous 2. leaves 3. brown 4. cones 5. oak

READING COMPREHENSION
EX. I
1F 2F 3F 4T 5T

EX. II
1E 2D 3F 4B 5C 6G 7A

EX. III
1. pedunculate oak – dąb szypułkowy
2. Norway maple – klon pospolity
3. willow – wierzba
4. grey alder – olsza szara
5. European beech – buk zwyczajny

REVISION II (TEXTS 1–5) (page 32)

EX. I
coniferous: fir, pine, spruce, Douglas fir, larch
broad-leaved: alder, birch, beech, willow, oak, poplar, maple

EX. II
1F 2T 3F 4T 5F 6F 7T

EX. III, IV
A. bark
B. larch
C. twig
D. crown
E. taproot
F. root system
G. coniferous
H. broad-leaved
I. leaf

EX. V
1b 2c 3c 4a 5c 6b 7c 8a

EX. VI
bud, leaf, twig, branch, crown

EX. VII
1. hornbeam 2. rowan 3. ash 4. birch 5. ginkgo 6. black locust
7. aspen 8. sycamore

6. BASIC FOREST TREE CHARACTERISTICS (page 36)

LISTENING COMPREHENSION (page 130)
EX. I
1. soil, wood 2. short-living 3. birch 4. shade-tolerant 5. root

READING COMPREHENSION
EX. II
1. short-living 2. fast-growing 3. shade-tolerant 4. fertile
5. shallow 6. hard

FOLLOW-UP: RELATED VOCABULARY

EX. I
1. shade-bearing
2. gymnosperms – nagozalążkowe
3. conifers
4. ginkgo
5. angiosperms – okrytozalążkowe
6. hardwoods, softwoods

7. TREE TYPES (page 38)

LISTENING COMPREHENSION (page 130)
EX. I
1T 2F 3F 4T 5F

READING COMPREHENSION
EX. II, III
1C – snag 2D – seedling 3A – small pole 4B – sapling

EX. IV
1. suppressed tree 2. high pole 3. codominant tree 4. intermediate tree
5. dominant tree

FOLLOW-UP

EX. I
1. sapling 2. broad-leaved tree 3. intermediate tree 4. coniferous tree
5. fallen tree 6. dominant tree 7. broken tree 8. codominant tree
9. mushroom 10. dead tree 11. shrub

8. TREE GROUPS (page 42)

LISTENING COMPREHENSION (page 42)
EX. II

1E	2D	3B	4H
5A	6F	7C	8G

9. FOREST STANDS (page 44)

LISTENING COMPREHENSION (page 130)
EX. I

1. close 2. age 3. age classes 4. 1–20 years 5. more classes
6. 10–30 per cent 7. how close

FOLLOW-UP: FOREST STRATIFICATION

EX. I

1. soil 2. litter 3. understory 4. canopy 5. bush
6. fern 7. herbaceous plant

10. FOREST FLORA (page 46)

LISTENING COMPREHENSION (page 131)
EX. I

1c 2b 3a 4c 5a 6c

EX. II

fern – paproć, lichen – porost, fungi – grzyby

READING COMPREHENSION
EX. II

1. bilberry
2. moss
3. hazel
4. juniper
5. hawthorn
6. lily of the valley
7. alder buckthorn
8. mushroom
9. blackthorn
10. violet
11. fern
12. wild strawberry

REVISION III (TEXTS 6–10) (page 50)

EX. I

1. moss	2. herbs	3. stand	4. blackthorn
5. lichen	6. fern	7. litter	8. sapling
9. admixture	10. bilberry	11. canopy	12. hazel

EX. II

1. artificially regenerated stands
2. admixture
3. coniferous
4. hard wood
5. state-owned
6. long-living
7. uneven-aged stands
8. slow-growing
9. fertile soil
10. shallow
11. shade intolerance
12. multi-storey
13. mixed

EX. III

1F	2T	3F	4T	5T
6F	7T	8F	9T	10F
11F	12F	13T	14F	15T
16T	17F	18T	19T	20T

EX. IV

seedling, sapling, pole, mature tree

EX. V

1G 2F 3H 4E 5D 6B 7A 8C

11. FOREST ANIMAL KINGDOM. PART I (page 52)

LISTENING COMPREHENSION (page 131)

EX. I

1. predators, webs
2. wet, grassy
3. bees
4. aphids, bark
5. omnivorous

READING COMPREHENSION
EX.II

1. ant	2. ladybird	3. tick	4. spider
5. butterfly	6. bee	7. mosquito	8. aphid

12. FOREST ANIMAL KINGDOM. PART II (page 54)

LISTENING COMPREHENSION (page 132)
EX. I
1T 2F 3T 4F 5F 6T

READING COMPREHENSION
EX. II
1. frog 2. lizard 3. deer 4. bear 5. mouse 6. beaver 7. bat

FOLLOW-UP: RELATED VOCABULARY
EX. I
1a 2b 3c 4a 5c 6a 7b 8a 9b

EX. II
antlers – poroże
Canidae – psowate

EX. III

1. fox – lis	2. wild boar – dzik	3. rabbit – królik	4. adder – żmija
5. owl – sowa	6. duck – kaczka	7. magpie – sroka	8. woodpecker – dzięcioł

13. HUNTING (page 58)

LISTENING COMPREHENSION (page 132)
EX. I
1b 2b 3a 4c 5a
poaching – kłusownictwo
game – zwierzyna łowna
the open season – sezon łowiecki

READING COMPREHENSION
EX. I, II
1. poaching – kłusownictwo
2. hunting – polowanie
3. game – zwierzyna łowna
4. the open season – sezon łowiecki
5. the closed season – sezon ochronny

EX. III

1. Game can be hunted in the open season and it cannot be hunted in the closed season.
2. Poaching is illegal.

FOLLOW-UP: RELATED VOCABULARY

EX. I

1. moose 2. hare 3. pheasant 4. goose 5. roe deer 6. partridge

14. FOOD CHAIN (page 60)

LISTENING COMPREHENSION (page 132)

EX. I

1. producers, consumers and decomposers 2. water, glucose
3. plants 4. meat 5. use them

EX. II

food chain – łańcuch pokarmowy carbon dioxide – dwutlenek węgla
oxygen – tlen herbivore – roślinożerca carnivore – mięsożerca
nutrients – składniki odżywcze

FOLLOW-UP: RELATED VOCABULARY

EX. I

1. scavenger 2. predator 3. prey 4. carrion

EX. II

1B 2C 3D 4A

REVISION IV (TEXTS 11–14) (page 62)

EX. I

1a 2b 3b 4c 5c 6a 7c 8b 9a

EX. II

A. spiders B. ticks C. reptiles D. insects
E. snails F. amphibians G. mammals

EX. III

1F	2F	3T	4F	5T	6T
7F	8F	9T	10T	11F	12T
13T	14F	15F	16T	17T	18F

EX. IV

1C 2D 3E 4A 5B

15. WHAT DESTROYS POLISH FORESTS? PART I (page 64)

LISTENING COMPREHENSION (page 133)
EX. I
1. leaves, soil, pH
2. pastures, tourist, arson
3. poaching, single-species
4. natural, native
5. rubbish, noise

READING COMPREHENSION
EX. II
1. invasive alien species
2. rubbish dump
3. burning pastures /arson
4. people driving vehicles that make noise, e.g. quads
5. factories causing air and water pollution
6. clearcutting
7. single-species, even-aged stand
8. forest fire started by discarded burning cigarettes

16. WHAT DESTROYS POLISH FORESTS? PART II (page 66)

LISTENING COMPREHENSION (page 133)
EX. I

1. rain	2. wind	3. buds	4. bark	5. break
6. fungi	7. pests	8. deer	9. beavers	10. erosion

READING COMPREHENSION
EX. II

1. frost	2. avalanche	3. hail	4. disease	5. flood
6. pest	7. drought	8. beavers	9. deer	10. lightning

FOLLOW-UP: RELATED VOCABULARY

EX. I
1C 2E 3F 4A 5D 6B

REVISION V (TEXTS 15–16) (page 68)

EX. I
1. pollution 2. fires 3. invasive alien 4. pollutants
5. burning 6. arson 7. wood theft 8. even-aged
9. clearcutting 10. squirrel 11. dumps 12. frighten

EX. II

fluorine (F_2)	nitrogen dioxide (NO_2)	ammonia (NH_3)
sulphur dioxide (SO_2)	ozone (O_3)	hydrogen fluoride (HF)

EX. III

1. lightning	2. drought	3. blizzard
4. avalanche	5. gale	6. flood

EX. IV

ice: glaze, rime
snow: blizzard, avalanche
rain: drizzle
rain+snow: sleet
wind: gale

FORESTRY FOR INSIDERS

1. THE FOREST BIOLOGICAL CLOCK (page 72)

LISTENING COMPREHENSION (page 134)

EX. I

1T 2F 3T 4F 5T 6F 7F 8T

READING COMPREHENSION

EX. II

1. raspberry 2. acorn 3. hazel 4. beechnut 5. black elder

EX. III

1. common hawthorn
2. aspen
3. snowdrop
4. small-leaved linden
5. rowan
6. windflower
7. bird cherry
8. dogwood

2. TREE DISEASES (page 76)

LISTENING COMPREHENSION (page 134)

EX. I

1. fungi	2. diseases	3. seedlings	4. wood
5. yellowing	6. trunk	7. elm	8. flowering

READING COMPREHENSION
EX. II
1. Fungi are tree pathogens.
2. Tree diseases are also caused by viruses and bacteria.
3. Shoot dieback and trunk rot are examples of plant disease symptoms.
4. Dutch elm disease is the example of a vascular disease.
5. The European dodder is a parasitic flowering plant.

3. TREE PESTS (page 78)

LISTENING COMPREHENSION (page 134)
EX. I
1b 2c 3a 4b 5c

FOLLOW-UP: RELATED VOCABULARY
EX. I
1D 2C 3B 4A

EX. II
1. outer bark
2. inner bark (phloem)
3. cambium
4. sapwood
5. heartwood
6. pith

4. HOW TO CONTROL FOREST PESTS AND DISEASES (page 80)

LISTENING COMPREHENSION (page 135)
EX. I
1. abiotic
2. Forest management
3. the worst
4. natural enemies
5. Chemical control
6. harmful
7. biological
8. pest
9. poison
10. integrated

REVISION VI (TEXTS 1–4) (page 82)

EX. I
1E 2D 3G 4A 5C 6H 7F 8B

EX. II
1. eggs, larvae, pupae, adults
2. viruses, bacteria, fungi
3. wood, leaves
4. pests
5. parasitic flowering

EX.III
1C 2E 3D 4A 5B

EX. IV

1F	2T	3F	4T	5T	6F	7F	8T	9F	10T
11F	12F	13T	14T	15F	16T	17F	18T	19F	20T

EX. V
1E – czynniki antropogeniczne
2I – bioróżnorodność
3A – grzyby jadalne
4G – wrogowie naturalni
5B – zastosowanie/stosowanie pestycydów
6J – szkodniki leśne
7D – owady pożyteczne
8C – choroba naczyniowa
9F – warunki pogodowe
10H – zagrożenie pożarowe

5. NATURAL AND ARTIFICIAL REGENERATION (page 84)

LISTENING COMPREHENSION (page 136)
EX. I
NATURAL REGENERATION
1. seeds, stump sprouts, root suckers
2. nothing
3. ecotypes well adapted, cheap/ not expensive, mixed, multi- storey

ARTIFICIAL REGENERATION
1. sown seeds, planted seedlings
2. species composition, seed
3. survive, quicker

FOLLOW-UP: SEEDLINGS

EX. I
1. spruce 2. pine 3. hornbeam 4. sycamore

6. REFORESTATION AND AFFORESTATION (page 86)

LISTENING COMPREHENSION (page 136)
EX. I
1b 2c 3b 4a 5a

FOLLOW-UP: SOILS

EX. I
topsoil – górna warstwa gleby
subsoil – podglebie
parent rock – skała macierzysta

EX. II
1. litter 2. soil 3. topsoil 4. organic matter 5. subsoil
6. nutrient 7. pH

7. AFFORESTATION OF FARMLAND (page 88)

LISTENING COMPREHENSION (page 137)
EX. I
1T 2F 3F 4T 5T 6F

EX. II
1C 2A 3D 4B

READING COMPREHENSION
EX. I, II
1. government – rząd
2. subsidy – dotacja
3. income – dochód
4. agricultural equipment – sprzęt rolniczy
5. ratio – stosunek
6. resistant – odporny
7. litter – ściółka
8. sapling – młode drzewko

EX. IV
1. Mycorrhiza is a symbiotic relationship between tree roots and fungi.
2. Owing to mycorrhizal fungi trees are more resistant to diseases.
3. It isn't difficult to get afforestation subsidiary in Poland.
4. Agricultural equipment damages soil structure.
5. Afforestation is/means planting trees on non-forest land.
6. Forest soils are covered by litter.
7. Seedlings and saplings are often attacked by fungal diseases / suffer from fungal diseases.

8. FAST-GROWING TREE PLANTATIONS (page 90)

LISTENING COMPREHENSION (page 137)
EX. I
1. ancient 2. baskets 3. monocultures 4. fast-growing, black alder
5. 2, 60 6. Fuelwood

FOLLOW-UP: WICKER QUIZ

EX. I
1b 2a 3c 4b 5b 6c

REVISION VII (TEXTS 5–8) (page 92)

EX. I
natural regeneration: B, E, G, I, J, L
artificial regeneration: A, C, D, F, H, K

EX. II, III
1C – plough pan
2E – litter
3D – mycorrhiza
4A – plantation
5B – afforestation subsidies

EX. IV
1. reforestation 2. non-forest 3. afforestation
4. pests 5. pollution 6. logging
7. litter 8. mycorrhizal 9. plough pan

EX. V
1c 2b 3a 4c 5a

9. DIRECT SEEDING VERSUS PLANTING (page 94)

LISTENING COMPREHENSION (page 137)
EX. I
1F 2T 3F 4T 5F 6F

FOLLOW-UP: FRUIT TYPES

EX. I
1. maple 2. linden 3. oak 4. black locust
5. ash 6. sycamore 7. hazel 8. beech

EX. II
black locust: pod/legume – strąk
ash: samara – skrzydlak
hazel: hazelnut – orzech laskowy
linden: nutlet – orzeszek
beech: beechnut/beechmast – bukiew
oak: acorn – żołądź
maple: samara – skrzydlak
sycamore: samara – skrzydlak

10. PLANTING SEEDLINGS (page 96)

LISTENING COMPREHENSION (page 138)
EX. I
1. local conditions
2. bare-root, containerised
3. oak, beech, larch
4. longer
5. nursery
6. birch, larch, aspen

FOLLOW-UP: HOW TO PLANT A TREE

EX. I

Correct:	1b	2a	3b	4a	5b	6b	7a	8a	9b	10b
Incorrect:	1a	2b	3a	4b	5a	6a	7b	8b	9a	10a

EX. II
1F 2B 3H 4E 5C 6J 7G 8I 9D 10A

11. SEEDLING PRODUCTION (page 100)

LISTENING COMPREHENSION (page 138)
EX. I

1. greenhouse	2. temperature	3. growing season	4. outdoors
5. early	6. moist	7. late	8. frost
9. branches	10. birds	11. germination	12. weeds

READING COMPREHENSION
EX. II

1. nursery / plastic tunnel / greenhouse	2. indoors	3. tunnel
4. greenhouse	5. growing season	6. sow
7. moist	8. germination	9. seed predators
10. weeds	11. nutrients	12. fertilisers

12. SEEDLING LIFTING AND OUTPLANTING (page 102)

LISTENING COMPREHENSION (page138)
EX. I
1b 2a 3a 4c 5c

FOLLOW-UP: SEEDLING STORAGE

EX. I
1B 2D 3A 4C

EX. II
1D – refrigerated storage
2C – long-term storage
3B – short-term storage
4A – heeling-in

EX. III

1. Short-term	2. lifting	3. shaded	4. heeling-in
5. long-term	6. dormant	7. refrigerated	8. controlled

REVISION VIII (TEXTS 9–12) (page 104)

EX. I

1b	2b	3a	4b	5b	6a	7a
8c	9c	10a	11c	12b	13b	

EX. II
1H 2J 3E 4A 5I 6B 7D 8C 9G 10F

EX. III
1. indoor
2. bare-root
3. artificial
4. short-term
5. dry

13. FROM SEEDLINGS TO MATURE TREES (page 106)

LISTENING COMPREHENSION (page 139)
EX. I
1c 2b 3c 4a 5c

FOLLOW-UP: TREE DESCRIPTION

EX. I
tree height: tall, low, high
tree size: huge, large, small, massive
tree origin: exotic, tropical, native
tree function: ornamental, fruit, Christmas
tree parts: stump, trunk, branch, bark, canopy, hollow
tree leaves: coniferous, deciduous
old trees: hollow, gnarled
trees in winter: bare, leafless

14. TIMBER HARVESTING SYSTEMS (page 108)

LISTENING COMPREHENSION (page 140)
EX. I
1. cutting down, branches, wood classification, factories
2. selection
3. radical, even-aged
4. biodiversity, uneven-aged
5. Mature, seeds, canopy

READING COMPREHENSION
EX. II

1. harvesting	2. a log	3. classification
4. sawmill	5. decompose	6. clearcutting
7. felling	8. light demanding	9. time-consuming
10. shadebearing		

FOLLOW-UP: RELATED VOCABULARY

A. HARVESTING EQUIPMENT AND OPERATIONS

EX. I
A4 – przerzynka B5 – skider C2 – forwarder D6 – harwester
E1 – okrzesywanie F3 – odcięcie wierzchołka

EX. II, III
1. axe – siekiera 2. cutting edge – ostrze 3. handle – stylisko
4. chainsaw – pilarka/ piła łańcuchowa 5. saw guide – prowadnica
6. chain – łańcuch 7. wedge – klin 8. saw – piła 9. hookeroon – capina
10. cant hook – obracak

B. PROTECTIVE CLOTHING

EX. I

1. Wellington boots – gumowce 2. hard hat – kask 3. visor – przyłbica
4. ear muffs / hearing protectors – słuchawki 5. protective gloves – rękawice ochronne 6. high visibility safety vest – kamizelka odblaskowa
7. work boots – buty robocze

C. FOREST MEASURING EGUIPMENT AND TOOLS

EX. I

1E 2D 3A 4C 5B

EX. II

1C 2E 3A 4B 5D

EX. III

1. increment borer
2. measuring tape
3. caliper

D. OTHER FOREST TOOLS AND ACCESSORIES

EX. I

1. hoe – motyka
2. shovel – szpadel
3. planting bar – kostur
4. tree guard – osłonka
5. mesh fence – płot z siatki
6. steel spurs – drzewołazy
7. tool belt – pas narzędziowy
8. climbing line – lina
9. lumber crayons – lubryka
10. extension ladder – drabina rozsuwana

15. FOREST PRODUCTS (page 116)

LISTENING COMPREHENSION (page 140)

EX. I

1. wood	2. litter	3. medicinal	4. wood-based
5. construction	6. musical	7. fuelwood	8. cardboard
9. extraction	10. 1,000°C		

READING COMPREHENSION
EX. II
1. coniferous litter
2. sap
3. resin
4. edible
5. venison
6. fuelwood
7. fibreboard
8. particleboard
9. cardboard
10. charcoal
11. pyrolisis

16. FORESTS FEED, FORESTS CURE (page 118)

LISTENING COMPREHENSION (page 140)
EX. I
1T 2F 3T 4F 5T 6T 7F

READING COMPREHENSION
EX. II
1. edible
2. herbs
3. cranberry
4. raw
5. spice
6. inedible
7. poisonous
8. lily of the valley
9. nettle
10. deer

EX. III

1. guelder rose	2. lily of the valley	3. dog rose	4. stinging nettle
5. cranberry	6. asarabacca	7. blackberry	8. buckbean

REVISION IX (TEXTS 13–16) (page 122)

EX. I
1D 2F 3A 4E 5B 6C

EX. II
1a 2b 3c 4a 5b 6a 7c

KEY

EX. III
1K – pielęgnowanie drzewostanu
2G – skład gatunkowy
3H/M – dzika róża
4A/D – cięcie sanitarne
5L – metody pozyskiwania drewna/rodzaje rębni
6N – praca ręczna
7M/H – kalina koralowa
8B – nawroty cięć
9E – pożądane cechy
10D/A – rębnia częściowa
11F – właściwości lecznicze
12C – kruszyna
13J – grzyby trujące
14I – dzik

EX. IV
1C 2D 3F 4B 5E 6A
cutting down trees, removing branches and tree tops, transferring logs to the road-side landing, sorting/ wood classification, short-term storing, transporting them to sawmills or other processing factories

EX. V
1C 2G 3F 4E 5A 6D 7J 8I 9B 10H

EX. VI
red or orange fruit: guelder rose, lily of the valley, wild strawberry, cranberry, raspberry, hawthorn
black or dark blue: bilberry, blackberry, blackthorn, black elder

GLOSSARY

A

a little	trochę, odrobinę
abiotic	abiotyczny
according to	według
acidic	kwaśny
acorn	żołądź
adapt	przystosować się
adapted	przystosowany
adder	żmija
adjective	przymiotnik
admixture	domieszka
adult	dorosły
afforestation	zalesienie
afterwards	potem
against	przeciwko
agricultural	rolniczy
agricultural equipment	sprzęt rolniczy
agriculture	rolnictwo
aim	cel
aimed at	skierowany na
alder	olsza
alder buckthorn	kruszyna pospolita
alkaline	zasadowy
all year round	przez cały rok
allow	pozwalać
amount	ilość
amphibian	płaz
ancient	starożytny
angiosperms	okrytozalążkowe
ant	mrówka
antenna *l.mn.* antennae	czułek
anthropogenic	antropogeniczny
anthropogenic factors	czynniki antropogeniczne
anti-cancer	przeciwrakowy
antlers	poroże
aphid	mszyca
appear	pojawiać się
appearance	wygląd
application	zastosowanie
apply	stosować
approximately	około
arachnid	pajęczak
area	obszar, teren, powierzchnia
arson	podpalenie

artificial	sztuczny
artificially	sztucznie
artificial regeneration	odnowienie sztuczne
as a result of	w wyniku, z powodu
asarabacca	kopytnik pospolity (*Asarum europaeum)*
asexually	wegetatywnie
ash	jesion wyniosły
aspen	osika, topola osika *(Populus tremula)*
attach	przytwierdzać, przyczepiać
attitude	podejście
avalanche	lawina
avoid	unikać
axe	siekiera

B

bacterial	bakteryjny
bacterium *l.mn.* bacteria	bakteria
ball	kulka
ban	zakazać
barberry	berberys
bareroot seedling	sadzonka z odkrytym systemem korzeniowym
bark	kora
based on	oparty na
basic	podstawowy
basket	kosz
bat	nietoperz
be in danger of	być zagrożonym
be in flower	kwitnąć
be treated as	być traktowanym jako
bear	niedźwiedź
beaver	bóbr
become	stawać się
bee	pszczoła
beech	buk
beechnut	bukiew
behaviour	zachowanie
belong to	należeć do
beneficial	pożyteczny
beneficial insects	owady pożyteczne
bilberry	borówka czarna (*Vaccinium myrtillus*)
biodiversity/ biological diversity	różnorodność bilogiczna

birch	brzoza
birch sap	oskoła, sok brzozowy
bird cherry	czeremcha zwyczajna
black alder	olsza czarna (*Alnus glutinosa*)
black cherry	czeremcha amerykańska
black elder	bez czarny *(Sambucus nigra)*
black locust	robinia akacjowa, grochodrzew (*Robinia pseudoacacia*)
black poplar	topola czarna (*Populus nigra*)
blackberry	jeżyna, ostrężyna (*Rubus fructicosus*)
blackthorn	śliwa tarnina (*Prunus spinosa*)
blame for	winić za
bleeding	krwawienie
blizzard	śnieżyca
blood	krew
blood pressure	ciśnienie krwi
bloom	kwitnąć
board	płyta
border	granica
bottle	butelka
bough	duża gałąź (wyrażenie literackie)
branch	gałąź
break down	rozłożyć
breed	hodować, rozmnażać się
bridge	most
briefly	krótko, zwięźle
broad	szeroki
buckbean	bobrek trójlistny
bucking	przerzynanie
bud	pączek
burn	palić, wypalać
bush	krzew
butterfly	motyl

C

caliper	klupa/średnicomierz
cambium	kambium
Canidae	psowate
canopy	okap drzewostanu, korona drzewa
cant hook	obracak
capture	chwytać
carbon dioxide	dwutlenek węgla
cardboard	karton

carnivore	mięsożerca
carnivorous	mięsożerny
carrion	padlina
carry out	przenosić
cause	powodować
cause damage	powodować szkody
certain	pewny
chain	łańcuch
chainsaw	piła łańcuchowa /pilarka
chamois *l.mn.* chamois	kozica
change	zmiana
characteristic	cecha
charcoal	węgiel drzewny
chipper	rębarka
chipping	zrębkowanie
chips	zrębki
choice	wybór
circulation	krążenie
citizen	obywatel
city limit	granica miasta
clay	glina
clearcutting	rębnia zupełna, całkowita
climbing line	lina
clinometer	wysokościomierz
clone	klon
closed season	sezon/okres ochronny zwierzyny
cloud	chmura
clump	kępa
codominant	współpanujący
coexist	współistnieć
cold frame	inspekt
collect data	zbierać dane
collect seeds	zbierać nasiona
come into leaf	wypuszczać liście
commercial	handlowy, rynkowy
common	powszechny, popularny
common birch	brzoza brodawkowata (*Betula pendula*)
common elm	wiąz pospolity/polny (*Ulmus campestris*)
common hawthorn	głóg jednoszyjkowy (*Crataegus monogyna*)
common horsechesnut	kasztanowiec pospolity (*Aesculus hippocastanum*)
common oak	dąb szypułkowy (*Quercus robur*)
common yew	cis pospolity (*Taxus baccata*)
comparatively	stosunkowo
competition	współzawodnictwo

complement	uzupełniać
complex	złożony
component	składnik
condition	warunek
cone	szyszka
conifer	roślina iglasta
coniferous	szpilkowy, iglasty
coniferous litter	igliwie, ściółka iglasta
connected with	związany z
conservation	ochrona
conserve	chronić
considered as	uważany za
consist of	składać się z
constant	ciągły
constantly	ciągle
constitute	stanowić
construction industry	przemysł budowlany
contain	zawierać
container	pojemnik
contaminated	skażony
content	zawartość
contribute	przyczyniać się do, mieć wkład w
cool off	schładzać
coppice	odrośl, las odroślowy
cork oak	dąb korkowy
Cornelian cherry	dereń właściwy
cover	przykrycie, przykryć, pokrywać
covered by	pokryty przez
cranberry	żurawina błotna (*Oxycoccus quadripetalus*)
create	tworzyć
cross-section	przekrój
crown	korona drzewa
cure	leczyć
cut down /log/ fell	ścinać
cutting	zrzez, sadzonka
cutting edge	ostrze
cutting interval	nawroty cięć

D

dam	tama
damage	uszkadzać, niszczyć
debarker	korowarka

deciduous	zrzucający liście
decompose	rozkładać się
decomposed	rozłożony
decomposer	destruent
decomposition	rozkład
deer	jeleń
deforestation	wylesienie
degraded	zdegradowany
delimbing	okrzesywanie
density	gęstość
depend on	zależeć od
derive from	otrzymać z
description	opis
desirable	pożądany
desirable qualities	pożądane cechy
despite	pomimo
destroy	niszczyć
develop	rozwijać się
development	rozwój
developmental	rozwojowy
dewinging	odskrzydlanie
diameter	średnica
dieback	zamieranie
differ in	różnić się
dig	kopać
direct	bezpośredni
direct seeding	siew bezpośredni
disadvantage	wada, minus
discover	odkryć
disease	choroba
disperse	rozsiewać
distance	odległość
distribution	rozmieszczenie
divide into	podzielić na
dog rose	dzika róża
dogwood	dereń świdwa
dominant	panujący
dominant species	gatunek dominujący
dormant	w stanie spoczynku
Douglas fir	daglezja zielona, jedlica (*Pseudotsuga menziesii*)
down	puch
downwards	w dół
draw maps	rysować mapy
drizzle	mżawka

drought	susza
dry	suchy
dry out	wysychać
duck	kaczka
due to	dzięki
Dutch elm disease	holenderska choroba wiązów

E

ear muffs	słuchawki
earth	ziemia
earthworm	dżdżownica
eastern grey squirrel	wiewiórka szara
edible	jadalny
edible mushrooms	grzyby jadalne
effective	skuteczny
egg	jajo
elm	wiąz
encourage	zachęcać
enemy	wróg
environment	środowisko
environmental	środowiskowy
equation	równanie
equipment	sprzęt
essential oils	olejki eteryczne
establish	założyć
establishment	założenie
European ash	jesion wyniosły (*Fraxinus excelsior*)
European beech	buk zwyczajny (*Fagus sylvatica*)
European dodder	kanianka pospolita
European hornbeam	grab zwyczajny (*Carpinus betulus*)
European spindle tree	trzmielina pospolita (*Euonymus europaeus*)
European spruce bark beetle	kornik drukarz
evaporation	parowanie
even-aged	jednowiekowy
even-aged stand	drzewostan jedno-/równowiekowy
evergreen	wiecznie zielony
exist	istnieć
explain	wyjaśniać
expose	odsłaniać
extend	rozciągać się
extension ladder	drabina rozsuwana
extinction	wymarcie
extract	ekstrahować

F

factor	czynnik
fail	zawodzić, spadać
fallow deer	daniel
famous for	znany z
fascicle	pęczek
fast-growing	szybko rosnący
feather	pióro
feed on	odżywiać się, jeść, żywić się
felled tree	ścięte drzewo
fence	ogrodzenie
fern	paproć
fertile	żyzny
fertilisation	zapłodnienie
fertiliser	nawóz
fibre	włókno
fibreboard	płyta pilśniowa
field	dziedzina
fight fires	walczyć z pożarami
filled with	wypełniony
fir	jodła
fire	pożar
fire risk	zagrożenie pożarowe
firstly	po pierwsze
flavour	smak
flood	zatapiać, powódź
flowering	kwitnięcie
fly	mucha
follow	następować po, stosować się do
food	jedzenie, pożywienie
food chain	łańcuch pokarmowy
forest floor	dno lasu
forest layers	piętra/warstwy lasu
forest management	gospodarka leśna
forest pests	szkodniki leśne
forest regeneration	odnowienie
forest stand improvement / tending the forest / intermediate treatments	pielęgnowanie lasu
forest stand	drzewostan
forest	las
forester	leśnik
forestry	leśnictwo
fortunately	na szczęście

fox	lis
fragrant	pachnący
frighten	przestraszyć
frog	żaba
frost	mróz
fruition	owocowanie
fuelwood	drewno opałowe
fungus *l.mn.* fungi	grzyb
fur	futro
future	przyszłość

G

gale	wichura
game	zwierzyna łowna
gene bank	bank genów
generation	pokolenie
germinate	kiełkować
germination	kiełkowanie
ghost	duch
giant redwood	sekwoja wiecznie zielona
ginkgo/ maidenhair tree	miłorząb dwuklapowy (*Ginkgo biloba*)
glaze	gołoledź
glue	klej, skleić
gnarled	sękaty, poskręcany, zdeformowany
good luck	szczęście
goods	produkty, towary
goose	gęś
government	rząd
gradual	stopniowy
greenhouse	szklarnia
grey alder	olsza szara (*Alnus incana*)
growing season	sezon wegetacyjny
growth rate	tempo wzrostu
guarantee	gwarantować
guelder rose	kalina koralowa (*Viburnum opulus*)
gymnosperms	nagozalążkowe

H

habitat	siedlisko
hail	grad

handle	stylisko
hard hat	kask
hardening off	hartowanie, uodparnianie roślin
hardwoods	liściaste
hare	zając
harmful	szkodliwy
harvest	zbiór, żniwa
harvester	harwester
hawthorn	głóg (*Crataegus* sp.)
hazel /European filbert	leszczyna pospolita (*Corylus avellana*)
hazelnut	orzech leszczyny
heart	serce
heartwood	twardziel
heating	ogrzewanie
hedgehog	jeż
heeling-in	dołowanie sadzonek
height	wysokość
herb	zioło
herbaceous plant	roślina zielna
herbivore	roślinożerca
herbivorous	roślinożerny
high pole	drągowina
high visibility safety vest	kamizelka odblaskowa
hinder	utrudniać
hoe	motyka
hollow	dziupla, pusty w środku
hookeroon	capina
horn	róg
hornbeam	grab pospolity
host	gospodarz
household	gospodarstwo domowe
however	jednakże
humid	wilgotny
hunt	polować

I

ice	lód
illegally	nielegalnie
illness	choroba
immediately	natychmiast
impact	wpływ
implementation	zastosowanie w praktyce
improper	niewłaściwy

improve	polepszać
in comparison to	w porównaniu do
in contrast to	w przeciwieństwie do
in order to	w celu
in the case of	w przypadku
include	zawierać *tu*: łącznie z
income	dochód
increment borer	przyrostomierz/ świder Presslera
indoors	wewnątrz, w budynku, pod osłoną
industry	przemysł
inedible	niejadalne
influence	wpływ, mieć wpływ
injured	ranny
inner	wewnętrzny
inoculation	szczepienie
insect	owad
instil	wpoić
integrated	zintegrowany
interact	wzajemnie oddziaływać
intermediate tree	drzewo opanowane
interval	przerwa
introduce	wprowadzić
introduction	wprowadzenie
invasive alien species	inwazyjny gatunek obcy
involve	zawierać
irresponsible	nieodpowiedzialny
is concerned	dotyczy
it is not difficult	nie jest trudno
ivy	bluszcz (*Hedera helix*)

J

Joshua Tree	*Drzewo Jozuego*
joy	radość
juice	sok
juniper	jałowiec pospolity (*Juniperus communis*)

K

kidney	nerka
kingdom	królestwo

L

labour	praca
lack	brakować
lack of	brak
ladybird	biedronka
landslide	osuwisko
larch	modrzew
larva *l.mn.* larvae	larwa
lateral root	korzeń boczny
layer	warstwa
leaf *l.mn.* leaves	liść
leafless	bezlistny
legally	legalnie, zgodnie z prawem
lengthen	wydłużyć
let	pozwolić
level	poziom
lichen	porost
lifting	wyjmowanie sadzonek
light demanding	światłożądny
lightning	piorun
lily of the valley	konwalia majowa (*Convallaria majalis*)
limb	duża gałąź
linden/lime	lipa
litter	ściółka, śmiecić, igliwie
liver	wątroba
lizard	jaszczurka
loamy	ilasty
log	ścinać drzewa, kłoda
longevity	długowieczność
look like	wyglądać jak
loss	utrata
louse *l.mn.* lice	wesz
lower	obniżać, zmniejszać
lumber crayon	lubryka
Lyme disease	borelioza
lynx	ryś

M

magpie	sroka
mainly	głównie
majority	większość

mammal	ssak
management	*tu*: gospodarka
manual labour	praca ręczna
manufacture	produkować, wyprodukować
maple	klon
market value	wartość rynkowa
marmot	świstak
massive	olbrzymi
mature	dojrzały
mature stand	drzewostan dojrzały/rębny
maturity	dojrzałość
measuring tape	taśma miernicza
meat	mięso
medicinal plants	rośliny lecznicze
medicinal properties	właściwości lecznicze
Mediterranean	śródziemnomorski
merely	zaledwie
mesh fence	ogrodzenie druciane, siatka
migrant birds	ptaki wędrowne
mistletoe	jemioła
mixed-species stand	drzewostan wielogatunkowy, mieszany
moist	wilgotny
moist area	teren, obszar wilgotny
moisture	wilgotność
moisture meter	wilgotnościomierz
monophage	monofag
moose	łoś
mosquito	komar
moss	mech
mountain	góra
mountain pine	kosodrzewina (*Pinus mugo*)
mouse *l.mn.* mice	mysz
move	poruszać się
multipurpose	wielofunkcyjny
multi-storey	wielopiętrowy
multi-storey stand	drzewostan wielopiętrowy
mushroom	grzyb, grzyb kapeluszowy

N

native	rodzimy, miejscowy
natural enemies	wrogowie naturalni
natural regeneration	odnowienia naturalne
natural seeding	samosiew

needle	igła
needle-like	podobne do igieł
neighbouring	sąsiadujący
nematode	nicień
nettle	pokrzywa
neutral	obojętny
Nightmare on Elm Street	*Koszmar z ulicy wiązów*
nitrogen	azot
nocturnal	nocny
noiselessly	bezszelestnie
non-existent	nieistniejący
non-timber products	użytki uboczne
Norway maple	klon zwyczajny (*Acer platanoides*)
Norway spruce	świerk pospolity (*Picea abies*)
nowadays	obecnie
number	liczba
numerous	liczny
nursery	szkółka
nutrient	składnik pokarmowy, odżywczy

O

oak-hornbeam forest	grąd
oak	dąb
objective	cel, zadanie
obtain	otrzymać, otrzymywać
obtain from	otrzymać z, uzyskać z
obvious	oczywisty
oligophage	oligofag
omnivorous	wszystkożerny
on a massive scale	na masową skalę
on the other hand	z drugiej strony
open season	sezon łowiecki
organic matter	materia organiczna
origin	pochodzenie
ornamental	ozdobny
outdoors	na zewnątrz, na świeżym powietrzu
outer	zewnętrzny
outplanting	wysadzanie
ovary	zalążnia
owing to	dzięki
owl	sowa
ownership	stan posiadania
oxygen	tlen

P

packaging	opakowania
parasitic	pasożytniczy
parent plant	roślina macierzysta
parent rock	skała macierzysta
particleboard	płyta wiórowa
particular	poszczególny, szczególny
partridge	kuropatwa
pasture	pastwisko
pathogen	patogen
percentage	odsetek, procent
perform	odgrywać
period	okres
persistent	trwały
pest	szkodnik
pest control	ochrona przed, zwalczanie szkodników
pesticide	pestycyd
pesticide application	zastosowanie/stosowanie pestycydów
pheasant	bażant
phenology	fenologia
phloem	floem, łyko
phytoncide	fitoncyd
pick	zbierać
pine	sosna
pith	rdzeń
plant	sadzić
plant arrangement	rozmieszczenie roślin
plant trees	sadzić drzewa
planting bar	kostur
play a role	odgrywać rolę
plough	orka, pług
plough pan	podeszwa płużna
plywood	sklejka
poaching	kłusownictwo
pod	strąk
poison	zatruwać
poisonous	trujące
pole	pal
Polish larch	modrzew polski (*Larix polonica*)
pollinate	zapylać
polluted	zanieczyszczony
pollution	zanieczyszczenie
polyphage	polifag
poor	słaby, ubogi

poor soil	gleba słaba
poplar	topola
predator	drapieżnik
predict	przewidywać, przewidzieć
prefer	woleć
prepare	przygotować
preserve	zachować
prevent	zapobiegać
prey	ofiara
primary consumer	konsument pierwszego rzędu
primary pest	szkodnik pierwotny
process	przetwarzać, obrabiać, proces
productive	gospodarczy, użytkowy
profitable	dochodowy
promote	wspierać, przyczyniać się do
prone to	podatne na
proper	właściwy
properly	właściwie
property	właściwość
protect	chronić
protective gloves	rękawice ochronne
protein	białko
protozoan *l.mn.* protozoa	pierwotniak
provide	zapewnić, dostarczyć
province	województwo
pulp	miazga, pulpa, usuwać miąższ z owoców
pupa *l.mn.* pupae	poczwarka
purple/red osier	wierzba purpurowa
purpose	cel
pyrolisis	pyroliza

Q

quality	jakość
quantity	ilość

R

rabbit	królik
raspberry	malina właściwa (*Rubus idaeus*)
ratio	stosunek
raw	surowy
rayon	sztuczny jedwab

reach	docierać do, dosięgać
recognise	rozpoznać
red deer	jeleń
refer to	odnosić się do
reforestation	odnowienie
refuse	odmówić
regeneration	odnowienie
reindeer	renifer
relationship	związek
relatively	stosunkowo
release	uwolnić
reliable	pewny
remaining	pozostały
removal	usuwanie
remove	usuwać
replace	zastąpić
reproduce	rozmnażać się
reproduction, propagation	rozmnażanie
reptile	gad
require	wymagać
requirements	wymagania
research	badania naukowe
resemble	przypominać
resident birds	ptaki osiadłe
resin	żywica
resist	opierać się, być odpornym na
resistant	odporny
resistant to	odporny na
responsible for	odpowiedzialny za
restrict	ograniczać
rich in	bogate w
rime	szadź
riparian	łęgowy
ripen	dojrzewać
roadside landing	składnica
rodent	gryzoń
roe deer	sarna
root hair	włośnik
root sprout	odrośl korzeniowa
root sucker	odrost korzeniowy
root system	system korzeniowy
rooted	ukorzeniony
rot	zgnilizna
rowan	jarzębina pospolita (*Sorbus aucuparia*)
rubbish dump	wysypisko śmieci

S

salicylic acid	kwas salicylowy
salinity	zasolenie
Salix americana	wierzba amerykanka
Salix amygdalina	wierzba migdałowa
Salix purpurea	wierzba purpurowa
Salix viminalis	wierzba konopiana
samara	skrzydlak
sand	piasek
sanitation cutting	cięcia sanitarne
sapling	młode drzewko
sapwood	biel
save life	uratować życie
saw guide	prowadnica
saw	piła
sawmill	tartak
sawnwood	tarcica
scale	łuska
scavenger	padlinożerca
Scot/Scots pine	sosna zwyczajna (*Pinus sylvestris*)
sea buckthorn	rokitnik
season	pora roku
secondary consumer	konsument drugiego rzędu
secondary pest	szkodnik wtórny
secondly	po drugie
seed	nasiono
seed dispersal	rozsiewanie nasion
seedling lifting	wyjmowanie sadzonek
seedling	siewka, sadzonka
selection cutting	rębnia przerębowa
several	wiele
sexual propagation	rozmnażanie generatywne
shade	ocieniać, cień
shadebearing	roślina znosząca/tolerująca cień, cienioznośna
shade-tolerant	cienioznośny
shallow	płytki
shape	kształt
shed	tracić, gubić, stracić, zrzucać
shell	muszla
shelterwood method	rębnia częściowa
shield	tarcza
shoot	pęd
shoot cutting	zrzez

shovel	szpadel
shrub	krzak
silver fir	jodła pospolita (*Abies alba*)
simplified	uproszczony
since	od
single-species	jednogatunkowy
single-species stand	drzewostan jednogatunkowy, lity
single-storey	jednopiętrowy
single-storey stand	drzewostan jednopiętrowy
site	miejsce, teren
skidder	skider
skidding	zrywka
skin	skóra
sleet	deszcz ze śniegiem
slightly	trochę, lekko
slope	zbocze
slug	ślimak nie wytwarzający muszli, nagi
small pole	tyczkowina
small/little leaf liden	lipa drobnolistna (*Tilia cordata*)
smooth	gładki
snail	ślimak
snake	wąż
snow willow	wierzba arktyczna
snowdrop	śnieżyczka przebiśnieg
softwoods	iglaste
soil	gleba
soil profile	profil glebowy
source	źródło
sow	siać
species *l.mn.* species	gatunek
species composition	skład gatunkowy
speed	szybkość
spice	przyprawa
spider	pająk
spot	plama
spread	rozprzestrzenianie się
sprout	odrośl
spruce	świerk
squirrel	wiewiórka
stage	stadium
stand	drzewostan
stand density	zagęszczenie drzewostanu
state-owned	państwowy
steel spurs	drzewołazy
stem cutting	zrzez

stem	pęd
sticky	lepki
stiff	sztywny
sting	kłuć
store	składować, przechowywać
straight	prosty
stratification	budowa piętrowa
stream	strumień
stump sprouts	odrośl pniakowa
stump	pniak
subject	poddać, poddawać
subsidise	dotować
subsidy	dotacja
subsoil	podglebie
sucker	odrost korzeniowy
suitable for	odpowiedni dla
sunlight	światło słoneczne
supply	dostarczać
suppressed	przygłuszone
surface	powierzchnia
surrounding	otaczające
survival rate	wskaźnik, współczynnik przeżycia
survive	przetrwać, przeżyć
sustainable	zrównoważony
sycamore/ sycamore maple	klon jawor (*Acer pseudoplatanus*)

T

take care of	opiekować się, zajmować
take place	mieć miejsce
taproot	korzeń palowy, główny
tasty	smaczny
temperate forests	lasy strefy umiarkowanej
term	termin
terrain	teren
tertiary consumer	konsument trzeciego rzędu
The Cherry Orchard	*Wiśniowy sad*
the least	najmniej
the State Forests	Lasy Państwowe
The Tree of Life	*Drzewo życia*
the UK	Zjednoczone Królestwo
The Wind in the Willows	*O czym szumią wierzby*
then	wtedy
therefore	dlatego

thick	gruby
thin	cienki
thirdly	po trzecie
tick	kleszcz
timber	surowiec drzewny, drewno, tarcica
timber harvesting systems	pozyskiwanie drewna, typy rębni
time-consuming	czasochłonny
tissue	tkanka
toad	ropucha
too heavy	zbyt ciężkie
too wet	zbyt wilgotne
tool belt	pas narzędziowy
topsoil	górna warstwa gleby
transfer	przekazywać, przenosić
transmit	przenosić
transplant	przesadka, sadzonka szkółkowana
transplanting	przesadzanie
treat as	traktować jako
treated like	traktowane jako
treatment	*tu*: obróbka
tree guard	osłonka na drzewka
tree sap	sok drzew
trunk	pień
tunnel	tunel
turn yellow	żółknąć
twig	gałązka

U

undesirable	niepożądany
uneven-aged	wielo-/różnowiekowy
uneven-aged stand	drzewostan wielo-/różnowiekowy
unfavourable	niekorzystny
uniform	jednolity
unit	jednostka
upright	rosnący do góry, wyprostowany
uproot	wyrwać z korzeniami
upwards	do góry

V

valuable	cenny
value	wartość

vascular	naczyniowy
vascular disease	choroba naczyniowa
vegetative	wegetatywny
vegetative reproduction	rozmnażanie wegetatywne
vehicle	pojazd
veneer	fornir
Venice	Wenecja
venison	dziczyzna
versus	w porównaniu z
viability	żywotność, zdolność kiełkowania
violet	fiołek
viral	wirusowy
visor	przyłbica

W

walnut	orzech włoski (*Juglans regia*)
was believed	wierzono, że
was planted	był posadzony
was sown	został zasiany
waste	odpad
wasteland	nieużytki
water resources	zasoby wodne
weak	słaby
weaken	osłabiać
weakened	osłabiony
weather conditions	warunki pogodowe
web	sieć
wedge	klin
weed	chwast
Wellington boots	gumowce
wet	mokry
what is more	co więcej
whereas	podczas gdy
white poplar	topola biała (*Populus alba*)
white willow	wierzba biała (*Salix alba*)
wicker	wiklina
wild boar	dzik
wild strawberry	poziomka pospolita (*Fragaria vesca*)
wildlife	fauna i flora
willow	wierzba
wilt	więdnąć
windflower	zawilec gajowy
windthrow	wiatrował

wine	wino
wolf	wilk
wood	las, drewno
wood hardness	twardość drewna
wood theft	kradzież drewna
wooded	zalesione
woodland	teren leśny
woodpecker	dzięcioł
woody	zdrewniały
work boots	buty robocze (powyżej kostki)

Y

yellow	żółknąć

Z

zone	strefa

REFERENCES

Bruchwald A., Borecki T., Olenderek H., Rosa W., Stępień E. *Urządzanie lasu*. Fundacja Rozwój SGGW. Warszawa 1998.
Buławiński T. *Łowiectwo*. Wydawnictwo Świat. Warszawa 1994.
Górnicka J. *Apteka natury*. BISS-PRESS. Warszawa 2004.
Grochowski W. *Uboczna produkcja leśna*. PWN. Warszawa 1976.
Henschel D. *Jadalne dzikie jagody i rośliny*. Muza S.A. Warszawa 2004.
Ilmurzyński E., Włoczewski T. *Hodowla lasu*. PWRiL. Warszawa 2003.
Jaworski A. *Hodowla lasu: rębnie, zasady projektowania upraw*. Akademia Rolnicza. Kraków 1990.
Koncewicz J., Lewak S. *Fizjologia roślin*. Praca zbiorowa PWN. Warszawa 2007.
Kubiak M., Laurow Z. *Surowiec drzewny*. Fundacja Rozwój SGGW. Warszawa 1994.
Laurow Z. *Pozyskiwanie drewna i podstawowe wiadomości o jego przerobie*. Wydawnictwo SGGW. Warszawa 1994.
Linford J. *Kieszonkowy przewodnik – drzewa*. Wydawnictwo Parragon 2009.
Mańka K. *Fitopatologia leśna*. PWRiL. Warszawa 1998.
Meier H. *Rozmnażanie roślin*. Wiedza i Życie. Warszawa 2005.
Murat E. *Szczegółowa hodowla lasu*. Wydawnictwo Świat. Warszawa 2002.
Muszyński Z. *Drewno*. Skrypt dla szkół wyższych AR. Kraków 1992.
Prawo łowieckie. Dz. U. z 2020 r. poz. 1683, 2320.
Rogaliński K. 1991. *Poradnik leśniczego*. Wydawnictwo Świat. Warszawa.
Russel T., Cutler C., Walters M. *Ilustrowana Encyklopedia. Drzewa świata*. Universitas. Kraków 2008. .
Rutkowski B. *Urządzanie lasu*. Skrypt dla szkół wyższych. AR. Kraków 1989.
Seneta W. *Dendrologia*. PWN. Warszawa 1997.
Sierpiński Z., Łukowski S. *Ochrona lasu dla techników leśnych*. PWRiL. Warszawa 1983.
Sobczak R. *Szkółkarstwo leśne*. Wydawnictwo Świat. Warszawa 1992.
Suwała M. *Poradnik użytkownika lasu*. Wydawnictwo Świat. Warszawa 2000.
Szujecki A. *Entomologia leśna*. Wydawnictwo SGGW. Warszawa 1998.
Wesoły W. *Nasiennictwo i szkółkarstwo leśne w realizacji trwale zrównoważonej gospodarki leśnej*. Wydawnictwo Świat. Warszawa 2009.

Dictionaries and reference books

Britannica Concise Encyclopaedia. 2003. Encyclopaedia Britannica.
Collins Cobuild. 1995. Harper Collins Publisher.
Longman Illustrated Dictionary of Botany. 1984. Longman Group.
Macmillan English Dictionary. 2006. Macmillan Publishers.
Merriam-Webster online dictionary www.merriam-webster.com.
Oxford Collocations. 2002. Oxford University Press.
Podbielkowski Z. 1985. Słownik roślin użytkowych. PWRiL. Warszawa.
The New Encyclopaedia Britannica. 2001. Encyclopaedia Britannica.

Online references

http://www.nazdrowie.pl/artykul/leczenie-klimatem.

http://www.hphpcentral.com/wp-content/uploads/2010/09/5000-paper-by-Qing-Li2-2.pdf.

http://www.silvaportal.info/index.jsp?p_lang=pl&p_contrib=66.

http://sciencefocus.com/qa/how-many-trees-are-needed-provide-enough-oxygen-one-person.

http://www.shannontech.com/ParkVision/Redwood/Redwood2.html.

www.treeservice.com/Fun-Facts-AboutTrees.

http://www.treedictionary.com/DICT2003/shigo/TREECHEM.html.

http://www.songfacts.com/category-songs_with_trees_in_the_title.php.

www.forestproductivity.net/pdfs/regen_methods.pdf -Mary L. Duryea, Forest Regeneration Methods: Natural Regeneration, Direct Seeding and Planting, www. ifas.ufl.edu.

Gatunki introdukowane

http://www.ekoportal.gov.pl/opencms/export/sites/default/ekoportal/warto_wiedziec_i_odwiedzic/artykuly/tekstyartykulow/pp_12_2010_c.pdf.

http://www.gdansk.lasy.gov.pl/rdlpgdansk/jednostki/lebork/edukacja/obce-gatunki-w-polsce-1.

http://www.academia.pan.pl/pdf/zagrozenia_str.%2006-09_solarz.pdf

www.thehistoryofchristmas.com/trivia/mistletoe.htm.

www.the-christmas-game.com/trivia/christmas-trivia-mistletoe.

Pestycydy. http://people.oregonstate.edu/~muirp/pesthist.htm.

Próchnica leśna. http://www.up.poznan.pl/kppl/files/_zsl/nowinski/Prochnica_gleb_lesnych.pdf.

Zalesianie

http://www.wgik.umwd.pl/konf/Karczewska.pdf.

http://www.landis.org.uk/downloads/downloads/glossary.pdf.

http://www.arimr.gov.pl/pomoc-unijna/prow-2007-2013/zalesianie-gruntow-rolnych-oraz-gruntow-innych-niz-rolne.html.

http://stary.wl.sggw.pl/units/hodowla/lwf_ssz/hodowla2/pomocnicze/Plantacje%20IBL.pdf.

Timber Harvesting Machines and Systems. www.cnre.vt.edu/harvestingsystems.

Harvesting Methods. www.sfrc.ufl.edu./Extension/florida_information/forest_management.

Odnowienia i zalesienia, o czym należy wiedzieć. www.jforest.interia.pl/Odnowienia%20zalesienia.

Problemy zalesień porolnych w specyficznych warunkach siedliskowych - grunty porolne. www.lasypolskie.pl/selekcja.

Forest Biology and Ecology for Educators.www. cne.vt.edu/dendro/forestbiology.

Timber Harvesting Machines and Systems, *Harvesting Methods.* www.cnre.vt.edu/harvestingsystems.