Державний біотехнологічний університет
Інститут сільського господарства Північного Сходу НААН

АНГЛІЙСЬКА МОВА

(професійне спрямування) для здобувачів другого (магістерського) рівня вищої освіти спеціальності 202 «Захист та карантин рослин»

Навчальний посібник

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Посібник включає 10 тем, які базуються на професійно орієнтованих текстах, та комплекс вправ, спрямованих на розвиток фахової комунікації. Містить завдання для самоконтролю та самостійної роботи здобувачів, граматичний додаток та глосарій фахових термінів.

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MODULE I
PEST AND DISEASE CONTROL IN CROPS

UNIT 1

I. Read and translate the text.

BEGINNING OF PEST CONTROL

Wherever agriculture has been practiced, pests have attacked destroying part or even all of the crop. In modern usage, the term *pest* includes animals (mostly insects), fungi, plants, bacteria, and viruses.

Human efforts to control pests have a long history. Even in Neolithic times farmers practiced a crude form of biological pest control involving the more or less unconscious selection of seed from resistant plants. Severe locust attacks in the Nile Valley during the 13th century BP are dramatically described in the Bible and, in his *Natural History*, the Roman author Pliny the Elder describes picking insects from plants by hand and spraying.

The scientific study of pests was not undertaken until the 17th and 18th centuries. The first successful large-scale conquest of a pest by chemical means was the control of the vine powdery mildew in Europe in the 1840s. The disease, brought from the Americas, was controlled first by spraying with lime sulfur and, subsequently, by sulfur dusting.

Another serious epidemic was the potato blight that caused famine in Ireland in 1845 and some subsequent years and severe losses in many other parts of Europe and the United States. Insects and fungi from Europe became serious pests in the United States, too. Among these were the European corn borer, the gypsy moth, and the chestnut blight, which practically annihilated that tree.

The first book to deal with pests in a scientific way was John Curtis's *Farm Insects*, published in 1860. Though farmers were well aware that insects caused losses, Curtis was the first writer to call attention to their significant economic impact. The successful battle for control of the Colorado potato beetle of the western United States also occurred in the 19th century. When miners and pioneers brought the potato into the Colorado region, the beetle fell upon this crop and became a severe pest, spreading steadily eastward and devastating crops until it reached the

Atlantic. It crossed the ocean and eventually established itself in Europe. But an American entomologist in 1877 found a practical control method consisting of spraying with water-insoluble chemicals such as London Purple, Paris green, calcium, and lead arsenates.

Other pesticides that were developed soon thereafter included nicotine, pyrethrum, derris, quassia, and tar oils, first used, albeit unsuccessfully in 1870 against the winter eggs of the *Phylloxera* plant louse. The Bordeaux mixture fungicide (copper sulfate and lime), was used successfully against vine downy mildew; this compound is still employed to combat it and potato blight.

Since many insecticides available in the 19th century were comparatively weak, other pest-control methods were used as well. A species of ladybird beetle was imported from Australia to California, where it controlled the cottony-cushion scale then threatening to destroy the citrus industry. A moth introduced into Australia destroyed the prickly pear, which had made millions of acres of pasture useless for grazing.

This period of the late 19th and early 20th centuries was thus characterized by increasing awareness of the possibilities of avoiding losses from pests, by the rise of firms specializing in pesticide manufacture, and by development of better application machinery.

In 1942 the Swiss chemist Paul Hermann Müller discovered the insecticidal properties of a synthetic chlorinated organic chemical dichlorodiphenyltrichloroethane that subsequently became known as DDT. Müller received the Nobel Prize for Physiology or Medicine in 1948 for his discovery. DDT was far more persistent and effective than any previously known insecticide. It stopped typhus epidemic threatening Naples. Müller's work led to discovery of other chlorinated insecticides.

Research on poison gas in Germany during World War II led to the discovery of another group of yet more powerful insecticides and acaricides (killers of ticks and mites) – the organophosphorus compounds, some of which had systemic properties; that is, the plant absorbed them without harm and became itself toxic to insects.

The first organophosphorus insecticides of enormous power were also made. Though low in cost, these compounds were toxic to humans and other warm-blooded animals. The products could poison by absorption through the skin, as well as through the mouth or lungs. Thus, spray operators must wear respirators and special clothing. Systemic insecticides need not be carefully sprayed, however; the compound may be absorbed by watering the plant.

Though the advances made in the fungicide field in the first half of the 20th century were not as spectacular as those made with insecticides and herbicides, certain preparations were found to have special uses. It began to seem that almost any pest, disease, or weed problem could be mastered by suitable chemical treatment. Farmers foresaw a pest-free millennium. Crop losses were cut sharply; locust attack was reduced to a manageable problem; and the new chemicals, by killing carriers of human disease, saved the lives of millions of people.

INCREASE YOUR VOCABULARY

EXERCISES

II. Give the Ukrainian equivalents to the following words and word-combinations:

plants and fungi; enormous power; crop losses; plant diseases; special uses; chemical compound; warm-blooded animals; carefully sprayed; systemic properties; low in cost; typhus epidemic; toxic to insects; discovery of chlorinated insecticides; to cause famine; downy mildew; potato blight; poison; chemical treatment; ladybird beetle; pastures useless for grazing; pesticide manufacture; water-insoluble chemicals; application machinery; tar oils; economic impact; corn borer; gypsy moth; the chestnut blight; severe pest; severe locust attacks.

III. Give the English equivalents to the following words and word-combinations:

людські зусилля; біологічна боротьба зі шкідниками; стійкі рослини; відомий раніше інсектицид; всмоктування через шкіру; інсектициди та гербіциди; людські хвороби; хвороби рослин; хімічна обробка; виробництво пестицидів; жук сонечко; кукурудзяний метелик; певні препарати; засвоюватися без шкоди; синтетична хлорована органіка; непарний міль; пероноспороз виноградної лози; через рот або легені; колорадський жук; мідний купорос і вапно; арсенати свинцю; потужні акарициди.

IV. Insert the appropriate term from the box into the text given below.

crop, quality, agriculture, increase, pesticide, control, herbicides, advantages, method, plants, machines, weather

WEED CONTROL

Weed control is vital to … , because weeds decrease yields, … production costs, interfere with harvest, and lower product … . Weeds also impede irrigation water-flow, interfere with … application, and harbor disease organisms.

Early methods of weed … included mowing, flooding, cultivating, smothering, burning, and … rotation. Though these methods are still important, other means are perhaps more typical today, particularly the use of … (plant-killing) chemicals.

Spraying is the most common … , permitting extremely small amounts to be applied uniformly because of dilution. Sprays can be accurately directed underneath growing … , and calibration and rate control are easier with spray … than with granular applicators. Granular formulations have … under some conditions, however.

The use of herbicides must be integrated into the overall farm program because the optimum date and application rate depend on the crop stage, the weed stage, … conditions, and other factors.

V. Match the following terms with their definitions:

1. insecticide	a. chlorinated aromatic hydrocarbon, a synthetic organic compound used as an insecticide.
2. DDT	b. a fungicide for vines, fruit trees, and other plants, composed of equal quantities of copper sulfate and calcium oxide in water.
3. locust	c. the supply of water to land or crops to help growth, typically by means of channels.
4.Bordeaux mixture	d. a substance used for killing insects.
5.downy mildew	e. a chemical that destroys fungus.
6. fungicide	f. a large and mainly tropical grasshopper with strong powers of flight; it migrates in vast swarms that cause extensive damage to crops.
7. irrigation	g. mildew on a plant which is marked by a whitish down composed of spore-forming hyphae, penetrating more deeply into the plant than powdery mildew.
8. bacteria	h. the world award given annually to the authors of the great achievements in different spheres of science and culture

9. virus	i. an infective agent that typically consists of a nucleic acid molecule in a protein coat, is too small to be seen by light microscopy, and is able to multiply only within the living cells of a host.
10.the Nobel Prize	j. a member of a large group of unicellular microorganisms which have cell walls but lack organelles and an organized nucleus, including some that can cause disease.

VI. Complete the following sentences with the information from the text:

1. Wherever agriculture has been practiced, pests have attacked … .
2. The products could poison by absorption through the skin … .
3. DDT was far more persistent and effective … .
4. Since many insecticides available in the 19th century were comparatively weak … .
5. In modern usage, the term *pest* includes … .
6. It began to seem that almost any pest, disease, or weed problem could be mastered … .
7. Systemic insecticides need not be carefully sprayed, however … .
8. The first organophosphorus insecticides … .
9. The Bordeaux mixture fungicide (copper sulfate and lime), was used successfully … .
10. The beetle fell upon this crop and became a severe pest … .

VII. Look through the text again and write down the names of the chemicals used for pest control.

VIII. Look through the text again and write down the names of the pests mentioned in the text.

IX. Find Participles I and II in the text and define their functions.

X. Speak about the beginning of pest control.

XI. Make a summary to the text.

UNIT 2

I. Read and translate the text.

BIOLOGICAL CONTROL
(Part 1)

The problem of using biological control has always been of considerable public interest.

Biological controls cannot replace insecticides entirely, because nature provides for survival of both beneficial and destructive insects. Before the population of a parasite or predator can expand, a high population of the host species must also be present.

The control agents include parasites, predators, diseases, protozoa, and nematodes that attack the insect pests. Microbial agents can be used for control. There exist about 1,100 viruses, bacteria, fungi, protozoa, rickettsiae, and nematodes that parasitize insects. Many pathogens are specific to a particular insect but are harmless to man and domestic animals. It is a possibility that insect pathogens can be produced, packaged, distributed, and applied in much the same way as insecticides.

One method of biological control involved the breeding and release of males sterilized by means of gamma rays. Though sexually potent, such insects have inactive sperm. Released among the wild population, they mate with the females who either lay sterile eggs or none at all. The method was used with considerable success against the screwworm, a pest of cattle, in Texas.

Sterilization of male insects by gamma radiation and their release into a population of wild insects is a promising approach. It has proved successful in control of screwworms and fruit flies, replacing chemicals in some areas. Chemical attractants, which lure insects into contact with small amounts of insecticide or a sterilant, also offer much promise.

A second method of biological control employed lethal genes. It is sometimes possible to introduce a lethal or weakening gene into a pest population, leading to the breeding of intersex (effectively neuter) moths or a predominance of males.

Biological control of plant diseases involves the use of organisms other than humans to reduce or prevent infection by a pathogen. These organisms are called antagonists; they may occur naturally within the host's environment, or they may be purposefully applied to those parts of

the potential host plant where they can act directly or indirectly on the pathogen.

Although the effects of biological control have long been observed, the mechanisms by which antagonists achieve control is not completely understood. Several methods have been observed: some antagonists produce antibiotics that kill or reduce the number of closely related pathogens; some are parasites on pathogens; and others simply compete with pathogens for available food.

Cultural practices that favor a naturally occurring antagonist and exploit its beneficial action often are effective in reducing disease. One technique is to incorporate green manure, such as alfalfa, into the soil. Saprotrophic microorganisms feed on the green manure, depriving potential pathogens of available nitrogen.

Another practice is to make use of suppressive soils—those in which a pathogen is known to persist but causes little damage to the crop. A likely explanation for this phenomenon is that suppressive soils harbor antagonists that compete with the pathogen for food and thereby limit the growth of the pathogen population.

Other antagonists produce substances that inhibit or kill potential pathogens occurring in close proximity. An example of this process, called antibiosis, is provided by marigold (*Tagetes* species) roots, which release some chemicals that are toxic to several species of nematodes and fungi.

Therapy.

Therapeutic measures have been used much less often in plant pathology than in human or animal medicine. The recent development of systemic fungicides such as oxathiins, benzimidazoles, and pyrimidines have enabled growers to treat many plants after an infection has begun. Systemic chemicals are absorbed by and translocated within the plant, restricting the spread and development of pathogens by direct or indirect toxic effects or by increasing the ability of the host to resist infection.

Antibiotics have been developed to control various plant diseases. Most of these drugs are absorbed by and translocated throughout the plant, providing systemic therapy. Streptomycin is used against a variety of bacterial pathogens, tetracycline is able to control the growth of certain mycoplasmas, and cycloheximides offer effective control for certain diseases caused by fungi.

INCREASE YOUR VOCABULARY

EXERCISES

II. Give the Ukrainian equivalents to the following words and word-combinations:

several species of nematodes; diseases caused by fungi; damage to the crop; systemic therapy; to treat plants; to inhibit or kill potential pathogens; screwworm; saprotrophic microorganisms; to prevent infection by a pathogen; to replace; available food; suppressive soils; host's environment; to lay sterile eggs; explanation; promising approach; chemical attractants; beneficial action; gamma radiation; parasite or predator; beneficial and destructive insects; potential host plant.

III. Give the English equivalents to the following words and word-combinations:

значний суспільний інтерес; безпосередня близькість; близькоспоріднені збудники; збудник; доступний азот; обробляти рослини пестицидами; непрямий токсичний вплив; різні бактеріальні збудники; терапевтичні заходи; рослина-господар; захворювання, викликані грибками; обмеження поширення; розвиток патогенів; хімічні атрактанти; супресивні ґрунти; вносити сидерати; переносити всередину рослини; руйнівні комахи.

IV. Complete the table to make word families. Use the dictionary to help you. In a case there are no corresponding derivatives put a "No" sign. Give translation of the created words.

Noun	Verb	Adjective	Adverb
	consider		
		effective	
determination			
			consequently
	compare		
	alter		
	qualify		
growth			
		relative	
			widely

V. Insert the appropriate term from the box into the text given below.

measures, weather, crops, nematodes, agents, damage, resistant, plowing, treatment, diseases, pollution, spores

Control of plant diseases and nematodes

Insects, of course, are not the only … hazardous to crops. Plant diseases and the microscopic worms called … have the potential of creating wholesale destruction of crops, especially those grown in regions of wide … fluctuation. In fact, these plant pests sometimes limit the kinds and varieties of … that can be grown. The … they cause may sometimes be mistaken for that caused by unfavorable weather. Epidemics may destroy crops completely.

As with insects, control of plant diseases and nematodes covers a broad spectrum of … : use of chemicals, … varieties, quarantine, forecasting and warning, cultural practices, heat … , and others. Furthermore, most plant virus … are transmitted by insect carriers, so control of insects is linked to control of disease.

Nematodes and plant disease can at times be controlled fairly well by crop rotation, deep … , and burning of stubble and debris that remain after harvest. Though burning destroys aboveground organisms and permits economical control by chemicals, it contributes to air … and destroys organic matter. In another technique, propane-gas flame is applied to living plants as well as stubble to kill disease … . A virus disease of sugarcane is controlled by heating diseased cuttings in hot-air ovens.

VI. Match the terms with their definitions:

1) alfalfa	a) animal dung used for fertilizing land.
2) predator	b) a medicine (such as penicillin or its derivatives) that inhibits the growth of or destroys microorganisms.
3) nematode	c) a bacterium, virus, or other microorganism that can cause disease.
4) pathogen	d) an organism that lives in or on an organism of another species (its host) and benefits by deriving nutrients at the other's expense.
5) antibiotic	e) to apply smoke, vapor or gas to especially for the purpose of disinfecting or destroying pests

6) parasite	f) a leguminous plant with clover-like leaves and bluish flowers, native to southwestern Asia and widely grown for fodder.
7) screwworm	g) an animal that naturally preys on others.
8) to fumigate	h) a worm of the large phylum Nematoda, such as a roundworm or threadworm.
9) antibiosis	i) a large American blowfly larva that enters the wounds of mammals, developing under the skin and often causing death
10) manure	j) an antagonistic association between two organisms (especially microorganisms), in which one is adversely affected.

VII. Complete the following sentences with the information from the text:

1. Saprotrophic microorganisms feed on the green manure … .
2. One technique is to incorporate green manure … .
3. The control agents include parasites, predators, diseases, protozoa, and nematodes … .
4. Sterilization of male insects by gamma radiation and their release into a population of wild insects … .
5. Many pathogens are specific to a particular insect but … .
6. A second method of biological control … .
7. Biological controls cannot replace insecticides entirely, because … .
8. Chemical attractants, which lure insects into contact with small amounts of insecticide … .
9. Biological control of plant diseases involves … .
10. One method of biological control involved the breeding and release of males … .

VIII. State the voice and the tense-form of the verbs in the abstracts 3 and 4 of the text.

IX. Discuss the advantages and disadvantages of biological control according to the following plan:

a) compare biological controls and the use of insecticides;
b) the main pathogens and control agents;
C) sterilization of male insects by gamma radiation;

d) employment of lethal genes;
e) the use of antagonists;
f) incorporating green manure;
g) the use of suppressive soils;
h) therapeutic measures.

X. Using the *GLOSSARY OF TERMS* on pages 102-112, give the definition of the following terms:

target pest
symptom
broad-spectrum pesticide
fungus
endoparasite
protectant fungicide

XI. Make a summary to the text.

UNIT 3

I. Read and translate the text.

BIOLOGICAL CONTROL
(Part II)

Host resistance and selection

Disease-resistant varieties of plants offer an effective, safe, and relatively inexpensive method of control for many crop diseases. Most available commercial varieties of crop plants bear resistance to at least one, and often several, pathogens. Resistant or immune varieties are critically important for low-value crops in which other controls are unavailable, or their expense makes them impractical.

Much has been accomplished in developing disease-resistant varieties of field crops, vegetables, fruits, turf grasses, and ornamentals. Although great flexibility and potential for genetic change exist in most economically important plants, pathogens are also flexible. Sometimes, a new plant variety is developed that is highly susceptible to a previously unimportant pathogen.

Obtaining disease-resistant plants

Some research into biological methods was undertaken by governments, and in many countries plant breeders began to develop and patent new pest-resistant and disease-resistant plant varieties.

The ideal solution to insect-control problems is to plant crop varieties that are resistant to attack. The only difficulty is that such varieties are not universally available, and development entails a very long process. Several means of obtaining disease-resistant plants are commonly employed alone or in combination. These include introduction from an outside source, selection, and induced variation. All three may be used at different stages in a continuous process; for example, varieties free from injurious insects or plant diseases may be introduced for comparison with local varieties.

The more promising lines or strains are then selected for further propagation, and they are further improved by promoting as much variation as possible through hybridization or special treatment. Finally, selection of the plants showing greatest promise takes place. Developing disease-resistant plants is a continuing process.

Special treatments for inducing gene changes include the application of mutation-inducing chemicals and irradiation with ultraviolet light and X-rays. These treatments commonly induce deleterious genetic changes, but, occasionally, beneficial ones also may occur.

Methods used in breeding plants for disease resistance are similar to those used in breeding for other characters, except that, two organisms are involved – the host plant and the pathogen. Thus, it is necessary to know as much as possible about the nature of inheritance of the resistant characters in the host plant and the existence of physiological races or strains of the pathogen.

The use of genetic engineering in developing disease-resistant plants

Conventional breeding plays an essential role in crop improvement but usually entails growing and examining large populations of crops over multiple generations, a lengthy and labor-intensive process. Genetic engineering, which refers to the direct alteration of an organism’s genetic material using biotechnology possesses several advantages compared with conventional breeding.

First, it enables the introduction, removal, modification, or fine-tuning of specific genes of interest with minimal undesired changes to the rest of the crop genome. As a result, crops exhibiting desired agronomic traits can be obtained in fewer generations compared with conventional breeding.

Second, genetic engineering allows for interchange of genetic material across species. Thus, the raw genetic materials that can be exploited for this process is not restricted to the genes available within the species.

Third, plant transformation during genetic engineering allows the introduction of new genes into vegetatively propagated crops such as banana, cassava, and potato. These features make genetic engineering a powerful tool for enhancing resistance against plant pathogens.

The techniques of genetic engineering can be used to manipulate the genetic material of a cell in order to produce a new characteristic in an organism. Genes from plants, microbes, and animals can be recombined (recombinant DNA) and introduced into the living cells of any of these organisms.

Genetically modified organisms that have had genes from other species inserted into their genome (the full complement of an organism’s genes) are called transgenic. The production of pathogen-resistant transgenic plants has been achieved by this method; certain genes are inserted into the plant’s genome that confer resistance to such pathogens as viruses, fungi, and insects. Transgenic plants that are tolerant to herbicides and that show improvements in other qualities also have been developed.

Apprehension about the release of transgenic plants into the environment exists, and measures to safeguard the application of this technology have been adopted.

In the United States several federal agencies, such as the U.S. Department of Agriculture, the Food and Drug Administration, and the Environmental Protection Agency, regulate the use of genetically engineered organisms.

In 2016 more than 457 million acres (185 million hectares) worldwide were planted with genetically modified (GM) crops. Among the most successful GM crops are corn (maize), soybeans, and cotton, all of which have proved valuable to farmers with respect to producing increased yields and having economic advantages.

INCREASE YOUR VOCABULARY

EXERCISES

II. Give the Ukrainian equivalents to the following words and word-combinations:

disease-resistant varieties; low-value crops; genetically modified organisms; transgenic plants; to confer resistance to pathogens; living cells; tolerant to herbicides; vegetatively propagated crops; pathogen-resistant transgenic plants; breeding plants; interchange of genetic material; flexibility for genetic change; crop varieties resistant to attack; mutation-inducing chemicals; to bear resistance; economic advantages; a host plant and a pathogen; highly susceptible; raw genetic materials; injurious insects; inheritance of the resistant characters.

III. Give the English equivalents to the following words and word-combinations:

традиційна селекція; генно-інженерні організми; мінімальні небажані зміни; сорти рослин; стійкі до шкідників і хвороб; трудомісткий процес; дуже сприйнятливий; гібридизація або спеціальна обробка; рішення проблеми; толерантний до гербіцидів; підвищена врожайність; гнучкий; потужний засіб; бажані агрономічні властивості; дослідження біологічних методів; універсально доступні; викликати шкідливі генетичні зміни; опромінення ультрафіолетом і рентгенівськими променями.

IV. Match the synonyms:

technique	to protect
release	method
to safeguard	emission
powerful	to increase
trait	obtainable
to enhance	to operate
available	unwanted
to manipulate	strong
undesired	feature
resistance	hostility

V. Match the terms with their definitions:

1.transgenic plant	a) resembling without being identical.
2. breeding	b) a self-replicating material that is present in nearly all living organisms as the main constituent of chromosomes.
3. susceptible	c) a process in which environmental or genetic influences determine which types of organism thrive better than others, regarded as a factor in evolution.
4. similar	d) a distinctive attribute or aspect of something.
5. gene	e) likely or liable to be influenced or harmed by a particular thing.
6. turfgrass	f) an organism or crop containing genetic material that has been artificially altered so as to produce a desired characteristic.
7. DNA	g) the shrubby tree from which cassava is obtained, native to tropical America and cultivated throughout the tropics.
8. cassava	h) a unit of heredity which is transferred from a parent to offspring and is held to determine some characteristic of the offspring.
9. GMO	i) genetically modified organisms that have had genes from other species inserted into their genome
10. feature	j) grass and the surface layer of earth held together by its roots.

VI. Match the beginning of the sentence with its ending.

1. Genes from plants, microbes, and animals can be recombined and introduced …	a) … highly susceptible to a previously unimportant pathogen.
2. Genetic engineering …	b) … and irradiation with ultraviolet light and X-rays.
3. Several means of obtaining disease-resistant plants …	c) … an essential role in crop improvement
4.Special treatments for inducing gene changes include	d) … into the living cells of any of these organisms.

the application of mutation-inducing chemicals …	
5. Some features make genetic engineering a powerful tool …	e) … method of control for many crop diseases.
6. Disease-resistant varieties of plants offer an effective, safe, and relatively inexpensive …	f) … are commonly employed alone or in combination.
7. The ideal solution to insect-control problems is …	g) … possesses several advantages compared with conventional breeding.
8. Sometimes, a new plant variety is developed that is …	h) … for enhancing resistance against plant pathogens.
9. Developing disease-resistant plants is … a continuing process.	i) … to plant crop varieties that are resistant to attack.
10. Conventional breeding plays …	j) … a continuing process.

VII. Insert the appropriate term from the box into the text given below:

crops, science, insects, minimal, rotation, yields, tolerant, irrigation, moisture, preventive

Methods of Crop Protection

Crop protection is the … and practice of managing weather, weeds, pests and diseases that damage or inhibit the growth of fruit, vegetable, other horticultural … and forestry. The crops in the field are exposed to many factors. The crop plants may be damaged by … , birds, rodents, bacteria, etc. Proper crop protection is important to produce higher quality crops with … wastage. This increase in productivity leads to less land, water and labor being required for food crops.

Crop … is one of the most valuable and versatile crops protection methods. However, not all cultures are equally … of the practice. For example, corn can be planted in the exact location for up to five years. On the other hand, rye, wheat, and sugar beet react negatively to double cropping but can produce higher … if properly rotated.

The proper soil moisture level has a crucial influence on plant health and yields. To determine this, you need to consider rainfall and … measures and the topography. A lack or an abundance of … can weaken cultures and

encourage the growth of weeds. Thus, farmers must use … measures to protect crops.

VIII. Find *the Gerund* in the text, state its function and translate.

IX. Speak about the use of genetic engineering in developing disease-resistant plants using the following words and expressions:

disease-resistant varieties; low-value crops; great flexibility and potential for genetic change; highly susceptible plants; biological methods; plant breeders; selection and induced variation; injurious insects; further propagation; mutation-inducing chemicals; irradiation with ultraviolet light and X-rays; plant treatment; inheritance; genetically modified organisms; plant's genome; transgenic organisms; such pathogens as viruses, fungi, and insects; economic advantages; to confer resistance; herbicides; a powerful tool; desired agronomic traits; ideal solution to insect-control problems.

UNIT 4

I. Read and translate the text.

CHEMICAL CONTROL

Various studies have also been made on the chemical identification of substances attracting pests to the opposite sex or to food. With such substances traps can be devised that attract only a specific pest species.

Insecticides can be classified on the basis of their chemistry, toxicological action, or principal method of penetration. The method of penetration scheme allows insecticides to be listed as stomach poisons, contact poisons, fumigants, or systemics. The distinction between these latter categories is somewhat arbitrary and a given compound may fall into two or more of them.

Stomach poisons are used against insects with biting mouthparts, such as caterpillars, and are toxic only if ingested. Contact poisons penetrate the skin of the pest and are used against those arthropods, such as aphids, that pierce the surface of a plant and suck out juices.

Fumigants are used mainly for killing insect pests of stored products or nursery stock. Systemic poisons are absorbed into a plant and later kill sucking insects and mites feeding on it. Absorption into the plant is achieved by spraying the leaves and stems or by applying solutions or

granules impregnated with the chemical to the soil, so that intake occurs through the roots.

Finally, certain chemicals have been fed to insects to sterilize them. Used in connection with a food lure, these can lead to the elimination of a pest from an area. Chemicals tested so far, however, have been considered too dangerous to humans and other mammals for any general use.

Some countries (notably the United States, Sweden, and the United Kingdom) have partly or wholly banned the use of DDT because of its persistence and accumulation in human body fat and its effect on wildlife.

A wide range of organophosphate and carbamate materials is now available. These can be applied to avoid most of the problems related to residues. New pesticides of lesser human toxicity have been found. Malathion and carbaryl, for example, are used to control insects in areas where persistent materials might appear later in meat or milk and can also be applied in areas where fish and wildlife might be affected.

Those two chemicals offer a broad range of toxicity to insect pests. Unlike chlorinated hydrocarbons, they can be applied up to within a day or so of harvest without harm to many crops; they are dangerous, however, to those who apply them and must be handled with care. A more recent important discovery was the systemic fungicide, absorbed by the plant and transmitted throughout it, making it resistant to certain diseases.

The majority of pesticides are sprayed on crops as solutions or suspensions in water. Spraying machinery has developed from the small hand syringes and “garden engines” of the 18th century to the very powerful “autoblast machines” of the 1950s that were capable of applying up to some 400 gallons per acre (4,000 liters per hectare).

Though spraying suspended or dissolved pesticide was effective, it involved moving a great quantity of inert material for only a relatively small amount of active ingredient. Low-volume spraying was invented about 1950, particularly for the application of herbicides, in which 10 or 20 gallons of water, transformed into fine drops, would carry the pesticide. Ultralow-volume spraying has also been introduced; four ounces (about 110 grams) of the active ingredient itself (usually Malathion) are applied to an acre from aircraft. The spray as applied is invisible to the naked eye.

A variety of chemicals are available that have been designed to control plant diseases by inhibiting the growth of or by killing the disease-causing pathogens. Chemicals used to control bacteria (bactericides), fungi (fungicides), and nematodes (nematicides) may be applied to seeds,

foliage, flowers, fruit, or soil. They prevent or reduce infections by utilizing various principles of disease control.

Eradicants are designed to kill a pathogen that may be present in the soil, on the seeds, or on vegetative propagative organs, such as bulbs, corms, and tubers. Protectants place a chemical barrier between the plant and the pathogen. Therapeutic chemicals are applied to combat an infection in progress.

Soil treatments are designed to kill soil-inhabiting nematodes, fungi, and bacteria. This eradication can be accomplished using steam or chemical fumigants. Soilborne nematodes can be killed by applying granular or liquid nematicides. Most soil is treated well before planting; however, certain fungicides can be mixed with the soil at planting time.

Seeds, bulbs, corms, and tubers are frequently treated with chemicals to eradicate pathogenic bacteria, fungi, and nematodes and to protect the seeds against organisms in the soil–mainly fungi–that cause decay and damping-off. Seeds are often treated with systemic fungicides, which are absorbed and provide protection for the growing seedling.

Protective sprays and dusts applied to the foliage and fruit of crops and ornamentals include a wide range of organic chemicals designed to prevent infection. Protectants are not absorbed by or translocated through the plant; thus, they protect only those parts of the plant treated before invasion by the pathogen. A second application is often necessary because the chemical may be removed by wind, rain, or irrigation or may be broken down by sunlight. New, untreated growth also is susceptible to infection. New chemicals are constantly being developed.

Many complex chemicals are routinely applied to plants to prevent attack by insects, mites, and pathogens; to kill weeds; or to control growth. Serious damage may result when fertilizers, herbicides, fumigants, growth regulators, antidesiccants, insecticides, miticides, fungicides, nematicides are applied at excessive rates or under hot, cold, or slow-drying conditions.

The future of chemical pesticides and herbicides is under debate by those who manufacture, sell, and use them and by those who are concerned about environmental quality. The value of an assured food and fiber supply at reasonable cost is undeniable, and chemicals contribute much toward this. These substances also cause undesirable effects upon the environment, however, and indeed can be toxic to a wide range of organisms. This fact will demand an increasing amount of care in using chemicals, perhaps enforced by law, along with increasing use of nonchemical control techniques.

INCREASE YOUR VOCABULARY

EXERCISES

II. Give the Ukrainian equivalents to the following words and word-combinations:

soil treatments; to cause undesirable effects; biting mouthparts; soil-inhabiting nematodes; a chemical barrier; protectants; to reduce infections; to prevent attack by insects, mites, and pathogens; to kill weeds; serious damage; applying fertilizes; growth regulators; antidesiccants, insecticides and miticides; eradication; residues; less harmful; susceptible to infection; spraying suspended or dissolved pesticide; food lure; to ban the use of DDT; method of penetration; stomach poisons; to pierce the surface of a plant; suck out juices; nursery stock; sucking insects and mites.

III. Give the English equivalents to the following words and word-combinations:

знищення шкідника; небезпечні для людини та ссавців; спосіб проникнення; накопичення в організмі; широкий асортимент органофосфатів; малооб'ємне розпилення; проткнути поверхню рослини; дрібні краплі; розчинений пестицид; продукти, що зберігаються; розплідник; розпилювати з літаків; невидимий неозброєним оком; обприскування; протилежна стать; широкий спектр токсичності; важливе відкриття; системний фунгіцид; розчини або суспензії; ручні шприци; садові двигуни; гальмування росту; листя та плоди.

IV. Match the terms with their definitions:

1. mammal	a) a chemical that produces fumes used to disinfect or purify an area.
2. tuber	b) a plant or tree grown for its attractive appearance to decorate the landscape
3. disease	c) the larva of a butterfly or moth, having a segmented wormlike body with three pairs of true legs and several pairs of appendages similar to legs.
4. organophosphate	d) a much thickened underground part of a stem or rhizome, e.g., in the potato, serving as a food reserve and bearing buds from which new plants arise.

5. fumigant	e) a minute bug that feeds by sucking sap from plants. It reproduces rapidly, often producing live young without mating,
6. ornamental	f) a disorder of structure or function in a human, animal, or plant, especially one that produces specific signs or symptoms.
7. aphid	g) something that tempts or is used to tempt somebody or something for some kind of action.
8. trap	h) any organic compound whose molecule contains one or more phosphate ester groups, especially a pesticide of this kind.
9. caterpillar	i) a device or enclosure designed to catch and retain somebody or something.
10. lure	j) a warm-blooded vertebrate animal of a class that is distinguished by the secretion of milk by females for the nourishment of the young.

V. Insert the appropriate term from the box into the text given below:

management, integrated, eradication, ecosystem, damage, pest, minimize, pesticides, enemies

Integrated control

The term pest management is a summary definition of … control practices. Pest … implies both the manipulation of the populations to maintain them at noneconomic levels of abundance and the … of a pest species when this is attainable and desirable.

In developing an integrated program there are two groups of facts that must be determined in some detail. These are the structure of the agricultural … and the population densities of the pests below which little economic … will occur.

Pesticides are the main tools in … control, and an integrated program attempts to … their disruptive effects on the agricultural ecosystem by making them as selective as possible.

Natural enemies should be fostered as much as possible, and the use of selective … , when available, is an important means of accomplishing this. Food for natural … has been provided in some cases by maintaining an

acceptable population level of pests in special plantings of alternate crops that support the pest or other hosts.

VI. What derivatives can you make with the words:

- manage
- relate
- cultivate
- investigate
- select
- disrupt
- develop

VII. Match the synonyms:

competitor	result
single-crop	injurious
pest	intrude
consequence	evolution
harmful	opponent
invade	danger
development	monoculture
threat	sickness
genus	vermin
disease	species

VIII. Are the *-ing* forms in the following sentences Gerund or Participle I? Define its function in the sentence and translate.

1. In developing an integrated program there are two groups of facts that must be determined in some detail.

2. A sufficiently large area must be considered so that all of the biotic elements having an effect on pest density are capable of being evaluated.

3. The area surrounding a group of cultivated fields cannot be ignored, for it may harbor reservoirs of pests and their natural enemies.

4. This is a difficult task because it involves estimating a series of factors, some biological and some economic.

5. The type of injury that is sustained by the plant is quite important in determining to what extent a pest may be tolerated before economic injury results.

6. A degree of selectivity can be achieved by applying pesticides at a time when beneficial insects are elsewhere or are protected?

IX. Ask questions to the following sentences and then use them to discuss the problem of chemical control:

Certain chemicals have been fed to insects to sterilize them.

A wide range of organophosphate and carbamate materials is now available.

Malathion and carbaryl are used to control insects in areas where persistent materials might appear later in meat or milk of the animals.

A more recent important discovery was the systemic fungicide, absorbed by the plant and transmitted throughout it, making it resistant to certain diseases.

A variety of chemicals are available that have been designed to control plant diseases by inhibiting the growth of or by killing the disease-causing pathogens.

Eradicants are designed to kill a pathogen that may be present in the soil, on the seeds, or on vegetative propagative organs.

Soil treatments are designed to kill soil-inhabiting nematodes, fungi, and bacteria.

Protective sprays and dusts applied to the foliage and fruit of crops and ornamentals include a wide range of organic chemicals designed to prevent infection.

X. Using the *GLOSSARY OF TERMS* on page 102, give the definition of the following terms:

translocated pesticide
toxin
sanitation
parthenogenesis
persistent virus
oviposition

XI. Make a summary to the text

UNIT 5

I. Read and translate the text.

MECHANICAL, PHYSICAL AND CULTURAL CONTROL

Pest control is as old as agriculture, as there has always been a need to keep crops free from pests in order to maximize food production.

Historically, mechanical and cultural practices were the major methods used by farmers to prevent crop losses. Prior to the emergence of the plant protection sciences farmers evolved many cultural practices through trial-and-error experiences to minimize the damage caused by insect pests.

In recent years pesticides have become the major method of pest control. Due to the problems related to the use of pesticides physical, mechanical and cultural controls serve as an alternative to the use of pesticides in an integrated pest management approach.

Physical methods consist of thermal methods and electromagnetic radiation. It has been discovered that, if adult Indian-meal moths were exposed to certain wavelengths of sound during the egg-laying period, their reproduction was reduced by 75 percent. The sound waves had a similar effect on flour beetles. Further development is needed, but this method offers potential as a nonchemical control.

Other types of physical energy can also kill insects. Light waves, high-frequency electric fields, high-intensity radio frequencies, and gamma radiation have been investigated; some offer promise.

Light traps that give off radiation that attracts insects have been under test for many years. They have been somewhat successful in controlling the codling moth and the tobacco hornworm.

Use of reflective aluminum strips, placed like a mulch in vegetable fields, has reduced or prevented aphid attack and thus protected cucumbers, squash, and watermelons from mosaic diseases. This technique may supplant insecticides, which frequently do not kill aphids quickly enough to prevent crop losses from virus transmitted by them.

Mechanical control refers to measures that involve the operation of machinery or manual operations such as the hand picking of insects from plants or hand pulling different weeds and pests which works best when pests are clearly visible. It also includes pest prohibition with the use of mesh or row covers, vacuuming or modifying the environmental

conditions, such as heat, humidity levels in the green-houses, heat sterilization, or solarization which are some common methods employed.

For stored products, heat or cold can control many insects that frequent such places. Also, changing the proportions of oxygen, nitrogen, and carbon dioxide in the storage atmosphere can provide control.

Cultural control consists of modifications of standard agricultural practices such as time of planting and crop rotation. Certain cultural practices can prevent or reduce insect crop damage. These include destruction of crop residues, deep plowing, crop rotation, use of fertilizers, strip-cropping, irrigation, and scheduled planting operations. Such practices are useful but cannot be relied upon entirely to eliminate severe infestations.

Integrated control

All aspects of insect control considered, it is possible that "integrated control," coordinated employment of more than one method, may be the answer. Combining resistant varieties with a systemic insecticide that leaves the parasites and predators unharmed, for example, has been successful in combatting the spotted alfalfa aphid in California.

An integrated program requires a determination of the density of each pest that will result in economic damage to the crop. This is a difficult task because it involves estimating a series of factors, some biological and some economic.

Many biological factors may alter the evaluation of pest density in relation to pest damage. The susceptibility of a given plant to attack can be modified by variation in the physical environment, stage of development of the plant, irrigation, fertilization, and variety of crop. The type of injury that is sustained by the plant is quite important in determining to what extent a pest may be tolerated before economic injury results.

One important consequence of the concept of an economic threshold of pest damage is the acceptance by growers of noneconomic levels of pest populations in the agricultural ecosystem.

Pesticides are the main tools in pest control, and an integrated program attempts to minimize their disruptive effects on the agricultural ecosystem by making them as selective as possible.

Preliminary reduction of heavy infestation by chemical spray combined with bait, followed by the sterile-insect technique, provides another example of integrated control. Use of sex attractant in light traps, plus special management of postharvest residues, has controlled the

tobacco hornworm. Other examples might be cited, but the principal value of such control methods lies in using less insecticide and thus contributing to maintenance of a good environment.

INCREASE YOUR VOCABULARY

EXERCISES

II. Give the Ukrainian equivalents to the following words and word-combinations:

economic threshold; preliminary reduction; postharvest residues; sex attractant in light traps; attempts; trial-and-error experience; to determine the density of a pest; integrated control; deep plowing; manual handpicking; the use of mesh or row covers; heavy infestation; light traps; high-frequency electric fields; reflective aluminum strips; gamma radiation; high-intensity radio frequencies; codling moth; egg-laying period; heat treatment; spotted alfalfa aphid; management approach; to prevent crop losses; to minimize disruptive effects; proportions of oxygen.

III. Give the English equivalents to the following words and word-combinations:

наслідки економічної шкоди; замінити інсектициди; головні засоби боротьби зі шкідниками; алюмінієві смуги, які відбивають світло; сприйнятливість; інтегрований контроль; мульча; глибока оранка; ручний збір; попелиця; післяжнивні залишки; сітчасті або рядкові покриття; підтримувати; попереднє скорочення; плямиста люцернова попелиця; дорослий моль; різні бур'яни; стерильно-інсектна техніка; високочастотні електричні поля; фізичне середовище; використання добрив; стійкі сорти.

IV. Match the terms with their definitions:

1. susceptibility	a) the presence of an unusually large number of insects or animals in a place, typically so as to cause damage or disease.
2. moth	b) the state or fact of being likely or liable to be influenced or harmed by a particular thing.
3. bait	c) a small amount of something that remains after the main part has gone or been taken or used.

4. infestation	d) the process of coming into view or becoming exposed after being concealed.
5. treatment	e) the magnitude or intensity that must be exceeded for a certain reaction, phenomenon, result, or condition to occur or be manifested.
6. residues	f) a chiefly nocturnal insect related to the butterflies. It lacks the antennae of butterflies and typically has a stout body, drab coloration, and wings that fold flat when resting.
7. emergence	g) practical contact with and observation of facts or events.
8. experience	h) food used to entice fish, animals and insects as prey.
9. threshold	i) the procedure or the way of doing something
10. hornworm	j) a very large caterpillar with a horn-like tail which chews leaves and can completely defoliate plants.

V. Insert the appropriate term from the box into the text given below:

resistant, preventive, technique, diseases, circumstances, plant, host, preventives, organism, rotation, measures, moisture

CONTROL

Control of plant … covers a broad, highly technical and rapidly developing field of study. A … effective with one disease may be ineffective for another. Also, the effective method for a disease in one situation may be ineffective for the same disease in other … . Furthermore, with continuing research, improved procedures keep developing.

Various … measures are possible at each of the stages in the life history of … pathogens.

The entrance of a microorganism into the … may be opposed, for example: (l) by employing chemical … such as sprays, dusts, disinfectants and wound dressings; (2) by using disease-escaping or … varieties; (3) by removing the host from the contaminating … , as through the selection of disease-free seed and through … with other nonhost crops; and (4) by reducing the inoculum with available sanitary … or with environmental conditions such as soil character, soil reaction, … and temperature that are unfavorable to the microorganism.

VI. Complete the table to make word families. Use the dictionary to help you. In case there is no corresponding derivative, put a "No" sign.

Noun	Verb	Adjective	Adverb
	differ		
breeder			
	tolerate		
			slowly
			relatively
		chemical	
introduction			
		open	
resistance			
	produce		

VI. Each sentence below has a content mistake. Find and correct it using the speech patterns of disagreement.

1. Pest control is comparatively new field of agriculture.
2. In recent years pesticides have become less important method of pest control.
3. Mechanical control includes destruction of crop residues, deep plowing and crop rotation.
4. Physical method means the employment of great number of physicists in pest and disease control.
5. One of the most complicated methods of control is manual handpicking or hand pulling of different weeds and pests.
6. The susceptibility of a given plant to attack can be modified only by the physical environment.
7. An integrated method attempts to maximize the use of pesticides.
8. One important consequence of the concept of an economic threshold of pest damage is the acceptance by growers of economic levels of pest populations in the agricultural ecosystem.

VIII. Using the *GLOSSARY OF TERMS* on pages 102-112, give the definition of the following terms:

integrated pest management (IPM)

host resistance
arthropod
antagonist
biotype
blight

IX. State the voice and the tense-form of the verbs in the abstracts 2, 3 and 4 of the text.

IX. Make a plan to the text and use it while speaking about mechanical, physical, cultural and integrated control.

X. Find information in the Internet and prepare a short report on the problem of using different methods of pest and disease control.

TASKS FOR SELF-CONTROL

Module 1

I. Match the terms with their definitions:

1. mammal	a) a plant or tree grown for its attractive appearance to decorate the landscape
2. tuber	b) a chemical that produces fumes used to disinfect or purify an area.
3. disease	c) the larva of a butterfly or moth, having a segmented wormlike body with three pairs of true legs and several pairs of appendages similar to legs.
4. organophosphate	d) a much thickened underground part of a stem or rhizome, e.g., in the potato, serving as a food reserve and bearing buds from which new plants arise.
5. fumigant	e) a minute bug that feeds by sucking sap from plants. It reproduces rapidly, often producing live young without mating,
6. ornamental	f) a disorder of structure or function in a human, animal, or plant, especially one that produces specific signs or symptoms.

7. aphid	g) something that tempts or is used to tempt somebody or something for some kind of action
8. trap	h) any organic compound whose molecule contains one or more phosphate ester groups, especially a pesticide of this kind.
9. caterpillar	i) a warm-blooded vertebrate animal of a class that is distinguished by the secretion of milk by females for the nourishment of the young, and (typically) the birth of live young
10. lure	j) a device or enclosure designed to catch and retain somebody or something
11. insecticide	k. chlorinated aromatic hydrocarbon, a synthetic organic compound used as an insecticide.
12. DDT	l. a fungicide for vines, fruit trees, and other plants, composed of equal quantities of copper sulfate and calcium oxide in water.
13. locust	m. the supply of water to land or crops to help growth, typically by means of channels.
14.Bordeaux mixture	n. a chemical that destroys fungus
15.downy mildew	o. a substance used for killing insects
16. fungicide	p. a large and mainly tropical grasshopper with strong powers of flight; it migrates in vast swarms that cause extensive damage to crops.
17. irrigation	q. mildew on a plant which is marked by a whitish down composed of spore-forming hyphae, penetrating more deeply into the plant than powdery mildew.
18. bacteria	r. the world award given annually to the authors of the great achievements in different spheres of science and culture
19. virus	s. an infective agent that typically consists of a nucleic acid molecule in a protein coat, is too small to be seen by light microscopy, and is able to multiply only within the living cells of a host.
20. the Nobel Prize	t. a member of a large group of unicellular microorganisms which have cell walls but lack organelles and an organized nucleus, including some that can cause disease.

II. Choose the word or phrase you think best completes the sentences:

1. Human efforts to … pests have a long history.

a) fight
b) control
c) apply

2. The scientific … of pests was not undertaken until the 17th and 18th centuries.

a) research
b) study
c) list

3. It began to seem that almost any pest, disease or weed problem could be mastered by suitable chemical ….

a) treatment
b) processing
c) application

4. Biological controls cannot … insecticides entirely, because nature provides for survival of both beneficial and destructive insects.

a) change
b) fight
c) replace

5. One method of biological control involved the breeding and release of males sterilized … means of gamma rays.

a) by
b) with
c) together

6. Many pathogens are … to a particular insect but are harmless to man and domestic animals.

a) specific
b) essential
c) typical

7. Sterilization of male insects by gamma radiation and their release into a population of wild insects is a promising … .

a) approach
b) task
c) idea

8. Biological … of plant diseases involves the use of organisms other than humans to reduce or prevent infection by a pathogen.

a) weapon
b) control
c) means

9. Disease-resistant …of plants offer an effective, safe, and relatively inexpensive method of control for many crop diseases.

a) species
b) varieties
c) kinds

10. Most available commercial varieties of crop plants … resistance to at least one, and often several, pathogens.

a) die
b) bear
c) carry

11. Much … in developing disease-resistant varieties of field crops, vegetables, fruits, turf grasses, and ornamentals.

a) has accomplished
b) accomplishes
c) has been accomplished

12. … engineering, which refers to the direct alteration of an organism's genetic material using biotechnology possesses several advantages compared with conventional breeding.

a) foreign
b) genetic
c) modern

13. Genetic engineering … the introduction, removal, modification, or fine-tuning of specific genes of interest with minimal undesired changes to the rest of the crop genome.

a) enable
b) enables
c) enabled

14. Plant transformation … genetic engineering allows the introduction of new genes into vegetatively propagated crops.

a) at
b) after
c) during

15. Insecticides can be classified on the basis of their chemistry, toxicological … , or principal method of penetration.

a) action
b) activity
c) influence

16. Stomach poisons … against insects with biting mouthparts, such as caterpillars, and are toxic only if ingested.

a) are used
b) use
c) is used

17. Fumigants are used mainly for killing insect … of stored products or nursery stock.

a) diseases
b) pests
c) invasions

18. Certain chemicals have been fed to … to sterilize them.

a) men
b) insects
c) animals

19. Physical methods of pest control … of thermal methods and electromagnetic radiation.

a) include
b) consist
c) divide

20. Mechanical control refers to measures … involve the operation of machinery or manual operations such as the hand picking of insects from plants.

a) that
b) which
c) while

MODULE II
PRINCIPLES OF PLANT HEALTH AND QUARANTINE

UNIT 6

I. Read and translate the text.

QUARANTINE, PLANT HEALTH AND PLANT PROTECTION

The word *quarantine* derives from the Italian *quarantina,* meaning ‘about 40’. After the Black Death arrived in Europe in 1347, observation and experience showed that the incubation time for the disease, from infection to the appearance of symptoms, was a little less than 40 days. This was therefore the period imposed on ships suspected of carrying infection, during which passengers and crew were prohibited from disembarking. If any of them showed symptoms, appropriate action could then be taken to prevent disembarkation for a further period, or to refuse entry to the ship and everyone on board.

This was a very prudent precautionary and preventive action and, in some circumstances, the same principle is employed today for animals and plants of unknown or suspect health status that arrive at national entry points. However, in some countries the term ‘quarantine’ has acquired a wider meaning in relation to prevent the spread of harmful organisms.

In Europe, the terms ‘plant quarantine’ and ‘plant health’ cover much the same subject areas, some countries tending to prefer the former and others the latter. In North America the term ‘plant protection’ is commonly used. These terms cover the legislative and regulatory measures and associated activities designed to minimize the transport and spread of organisms harmful to plants by means of human activities. There is some variation between countries in just what subject areas these terms are understood to cover. As well as legislative and regulatory measures, sometimes referred to as ‘quarantines’, they generally include eradication and containment campaigns, surveys, risk assessment and all closely related topics.

Generally, the term ‘plant health’ is also taken to include certification and marketing schemes, and sometimes other less closely connected

subject areas, such as the control of migratory pests and the prevention of the plant pest misuse. A technical term that could also cover these areas is ‘phytosanitation. However, there is also some variation in the interpretation of this term, and the term ‘plant health’ can be generally used further.

At its widest, the meaning of ‘plant health’ also embraces the science of pesticides and their application, registration and regulation. In Europe, the term ‘plant protection’ covers pesticide science, but can also include the areas of plant quarantine and plant health. Pesticides constitute a very wide and well-demarcated specialist field, which impinges directly on other plant health activities, as with the availability of pesticides for pest eradication campaigns.

In plant health one is continually dealing with a great variety of organisms potentially harmful to plants, including other plants, fungi, bacteria, viruses, insects, mites, nematodes and members of many other categories of organisms.

For simplicity and convenience of reference, therefore, a widely adopted convention is to use the term ‘plant pest’ to refer to all kinds of organisms harmful to plants, and not only to those belonging to the animal kingdom. This is the sense in which ‘pest’ is used here, unless another meaning is made clear. Like all scientific disciplines, plant health has a large and distinct terminology of its own and the adjective ‘phytosanitary’ is usually appropriate to describe matters belonging to this discipline.

As a branch of applied biology, plant health combines much of the disciplines concerning plant pathology and plant entomology, including nematology and the biology of other invertebrate plant pests.

Other branches of biology, and the science of pesticides and their chemistry, also frequently impinge on plant health. Indeed, the endless variety of problems and circumstances that have to be dealt with can involve almost any branch of science, commerce or law, contributing both to its interest and to its intellectual challenge. In short, plant health is the application of scientific knowledge, logic and innovation to administrative and regulatory systems for achieving a good standard of health in plants, including those planted or cultivated and those that constitute the natural vegetation.

INCREASE YOUR VOCABULARY
EXERCISES

II. Give the Ukrainian equivalents to the following words and word-combinations:

to derive from; observation and experience; incubation time; for the disease; appearance of symptoms; to be prohibited from; appropriate action; for a further period; to refuse; preventive; in some circumstances; the same principle; unknown health status; a term; harmful organisms; plant protection; subject areas; eradication and containment campaigns; plant health; the science of pesticides; fungi; insects; nematodes; a distinct terminology; phytosanitary; a branch of applied biology; invertebrate plant pests; administrative systems; natural vegetation.

III. Give the English equivalents to the following words and word-combinations:

карантин; захист рослин; інфекція; хвороба; проявляти симптоми; запобігати; тварини; рослини; у деяких країнах; ширше значення; розповсюдження; здоров'я рослин; надавати перевагу; заходи регулювання; звести до мінімуму; людська діяльність; оцінка ризику; сертифікат; інтерпретація терміну; шкідники рослин; застосування; бактерії; віруси; кліщі; наукові дисципліни; ентомологія; хімія; знання; інновації; досягати стандарту; висаджені та вирощені рослини.

IV. Match the antonyms:

prohibit	incaution
refuse	disease
precaution	separate
same	useful
health	different
minimize	pacific
harmful	permit
invasive	exclude
include	agree
connect	maximize

V. Match the following terms with their definitions:

1) quarantine	a) a physical or mental feature indicating a condition of disease
2) plant	b) a multicellular eukaryotic organism in the biological kingdom *Animalia*
3) symptom	c) a state of complete physical mental and social well-being
4) precaution	d) a minute arachnid with four pairs of legs when adult, related to the ticks
5) animal	e) a complex of restricted and regime measures to limit contacts of infected people, animals, goods, plants
6) health	f) a destructive insect that attacks crops
7) mite	g) spore-producing organisms feeding on organic matter, including molds, yeast, etc.
8) pest	h) the branch of zoology concerned with the study of insects
9) fungi	i) a measure taken in advance to prevent something dangerous and unpleasant
10) entomology	j) a multicellular organism in the kingdom *Plantae* that uses photosynthesis to make its own food

VI. Complete the following sentences with the information from the text:

1. The word *quarantine* derives from … .
2. After the Black Death arrived in Europe … .
3. The appropriate action could be taken to … .
4. In some countries the term "quarantine" has acquired … .
5. The terms "plant quarantine" and "plant health" cover … .
6. At its widest the meaning of "plant health" also embraces … .
7. In Europe, the term "plant protection" covers … .
8. In plant health one is continually dealing with a great variety of …
9. As a branch of applied biology, plant health combines … .
10. Other branches of biology and the science of pesticides … .

VII. Insert the appropriate term from the box into the text given below.

species, phytosanitary, variation, responsible, environment, competition, control, injurious, measures, invasive, nutrients, crops

Weeds and Parasitic Plants

Phytosanitary authorities are usually ... for control of serious parasitic plant … , such as the dwarf mistletoes. However, there is considerable ... between countries in responsibility for ... of other plants that may be classified as serious weeds or ... plants. Although plants that damage ... and other plants by means of … for space, light and … may fall within definitions of 'plant pest', as being … or damaging to plants, they are not always a concern of … authorities. Some countries have few or no plant species that are covered by legislative measures for control, while others have many. Responsibility for administering such … may lie with the phytosanitary authorities or, alternatively, may be the concern of some other part of government, often another part of the agriculture department, the government administration dealing with the … , or an extension agency.

VIII. What derivatives can you make with the words?

- observe
- infect
- act
- prevent
- harm
- eradicate
- science

IX. Find modal verbs in the text and use them in your own sentences.

X. Retell the text according to your plan.

UNIT 7

I. Read and translate the text.

PLANT PASSPORTS AND PHYTOSANITARY CERTIFICATES

Certain plants and plant products are identified as associated with risks to plant health in the European Community (EC). For the movement and marketing of these plants and plant products within the EC, including the EC Member State of origin, they must be accompanied by a plant passport giving relevant details and assurances as to the health of these items.

Phytosanitary certificates are not required for this trade. Only those species and items considered to present a significant risk of spreading quarantine organisms are required to have plant passports, the aim of which is to give assurance of adequate plant health status and to permit the origin of the traded material to be traced in cases where faults are discovered. The proper issue of plant passports is the responsibility of the EC Member State in which the traded material has been produced or to which it is imported from a third country.

Plant passports are issued by the responsible official body, normally the National Plant Protection Organization (NPPO) or an independent organization delegated for the purpose, or by producers or traders authorized to do so by the responsible official body. Inspections for issue of plant passports are normally required to be done at the place of production at an appropriate time in relation to the growth of the plants or production of products. Plants and other items subject to passporting which are imported into the EC from third countries must be issued with a plant passport after entry and after passing proper phytosanitary inspection.

Replacement plant passports may also be issued where the status of the material or the composition of the consignment changes, for example, where passported consignments are split or amalgamated. All authorized issuers of plant passports are required to maintain adequate records to permit trace-back. The authorities, or the final recipients of passported items, are also required to retain the plant passports from traded items for a period of 1 year.

Plant passports consist of a label and an accompanying document, normally the invoice or consignment note, but may be a label alone, provided it carries all the required information. In the case of seed potatoes, for example, the official label required under the seed potatoes legislation also functions as the plant passport. The information required begins with the statement ‘EC – plant passport’ and then gives the codes of the EC Member State and responsible official body, the producer’s registration number, and the serial or batch number of the product.

Finally, there must be a statement of the botanical name, consignment quantity and where appropriate, marking of validity for the relevant protected zone ‘ZP’ and name and, in the case of replacement passports, the mark ‘RP’ (protected region) and either the name of the third country whence the item was imported or the EC Member State of origin.

Some plants and plant products that are considered to present a smaller risk to plant health are exempt from the plant passport regime, but are subject to a system of lighter controls designed to enable trace- back. Such items include ware potatoes for consumption or industrial use, most citrus fruit, and certain kinds of planting material, which are prepared ready for sale to the final consumer and whose production is clearly separate from that of other, passportable, material. However, producers and traders of such items do have to be registered.

Passported material is subject to a system of official inspections during marketing to check that it complies with required standards. However, such checks may not be made at national boundaries and must be random spot checks not targeted or made in a regular pattern.

Often known as 'phytos', phytosanitary certificates are issued only for consignments of plants and other relevant items that require a phytosanitary certificate and which are destined for export from the EC to third countries.

The certificate confirms that the requisite inspections and conditions specified by the country of destination are believed to have been fulfilled. Phytosanitary certificates are issued only by the responsible official body designated under the International Plant Protection Convention (IPPC, normally the NPPO) or under its direct supervision, and their issue cannot be delegated to private producers or traders as with issue of plant passports.

Here is an example of a phytosanitary certificate:

This is to certify that the plants, plant products or other regulated articles described herein have been inspected and/or tested according to appropriate official procedures and are considered to be free from the quarantine pests specified by the importing contracting party and to conform with the current phytosanitary requirements of the importing contracting party, including those for regulated non-quarantine pests.

Such a phytosanitary certificate often referred to as the 'PC' or 'Phyto' as the original document or, in certain circumstances, as a certified copy, must accompany each consignment of goods subject to phytosanitary regulation, except in circumstances where trading partners have specifically agreed to bypass or replace this requirement. Phytosanitary certification in electronic form is also acceptable, so long as the intent of such certification under the IPPC is achieved and with certain other provisos.

INCREASE YOUR VOCABULARY
EXERCISES

II. Give the Ukrainian equivalents to the following words and word – combinations:

to be identified: risks to plant health; must be accompanied; relevant details; assurance; to be required; species; adequate plant health status; to be traced; the proper issue; independent; to delegate for the purpose; an official body; appropriate time; subjects to passporting; inspection; authorized issuers; the final recipients of passported items; consignment notes; a batch number; to be exempt from; to enable traceback; to be prepared ready for sale; to comply with required standards; to be issued for; to be destined for export; to confirm; the country of destination; direct supervision.

III. Give the English equivalents to the following words and word – combinations:

асоціюватися; рух; рослинна продукція; включати; паспорт рослини; фітосанітарні сертифікати; значний ризик; дозволяти; походження; недоліки; відповідальність; Європейська спільнота; національна організація по захисту рослин; вимагатися; виробники; ріст рослин; імпортуватися; дозволяти; утримувати; складатися з; необхідна інформація; насіння картоплі; відповідальний офіційний орган; реєстраційний номер; ботанічна назва; кількість; захищена зона; системи контролю; споживання; реквізити інспекції.

IV. Complete the table to make word families. Use the dictionary to help you. In a case there is no corresponding derivative, put a "No" sign.

Noun	Verb	Adjective	Adverb
		responsible	
product			
	regulate		
assurance			
		phytosanitary	
			finally
	confirm		
		independent	
	prepare		
			normally

V. Insert the appropriate term from the box into the text given below.

plant, fulfilling, responsibilities, to keep, products, quarantine, registered, conditions, inspections, items, regulations, phytosanitary

Registration of Producers

Producers of, or traders in, plants, plant … or other items that require a … passport for marketing within the EC are required to be … by the appropriate responsible official body and approved by it as … the requisite … . These are designed to ensure that the producer has suitable facilities and has suitably qualified staff who know their … , including that of notifying the plant health authorities of the occurrence of any … organisms, are able to carry out timely and effective … , and are able to recognize the relevant quarantine organisms.

Registered producers and traders are required to … records and documentation relating to the planting, production, trading or storage of relevant … on their premises, to cooperate with the responsible official bodies or their representatives, and to carry out … inspections in an appropriate and timely manner according to guidelines provided. Small producers or traders supplying only the non-professional local market may be exempted from these … .

VI. Match the terms with their definitions:

1) certificate	a) relating to the health of plants, especially with respect to the requirements of international trade
2) inspection	b) a thing that ensures admission to or the achievement of something
3) phytosanitary	c) a piece of written, printed, or electronic matter that provides information or evidence or that serves
4) consignment	d) a small piece of paper, fabric, plastic, or similar material attached to an object and giving information about it
5) document	e) the action of using up a resource
6) label	f) a level of quality or attainment
7) registration	g) a document serving as evidence or as written testimony, as of status, qualifications, privileges, or the truth of something

8) consumption	h) a batch of goods destined for or delivered to some one
9) standard	i) the action or process of registering or of being registered
10) passport	j) careful examination or scrutiny

VII. Complete the following sentences with the information from the text:

1. For the movement and marketing of the plants and plant products associated with risk to plant health, they must be … .
2. The aim of passports is to give … .
3. The proper issue of plant passports is … .
4. Plant passports are issued by … .
5. Replacement plant passports may also be issued, where … .
6. All authorized issuers of plant passports are required to … .
7. Plant passports consist of … .
8. Some plants and products that present a smaller risk to plant health are … .
9. Passported material is subject to … .
10. The certificate confirms that … .

VIII. Using the *GLOSSARY OF TERMS* on pages 102 -112, give the definition of the following terms:

pheromone
virulent
secondary pest outbreak
sign
stylet-borne virus
predator

IX. Discuss the plant documents according to the following plan:

a) the plants and plant products to be accompanied by a plant passport;
b) the information given by plant passports;
c) the aim of plant passports;
d) the authorities responsible for the proper issue of plant passports;
e) the issue of replacement plant passports;
f) the plants and plant products which are exempt from the plant passport regime;

g) the cases of phytosanitary certificates issue;
h) the information phytosanitary certificates confirm.

X. Find the sentences containing Passive Voice and transform them into Active.

XI. Make a summary to the text.

UNIT 8

I. Read and translate the text.

SPECIFIC IMPORT MEASURES

Phytosanitary regulations relating to imports usually begin with a list of quarantine organisms whose import is prohibited. This will usually correspond more or less to the local Regional Plant Protection Organization (RPPO) lists. As a minimum, the regulations will specify that imported consignments must be free from such organisms. In addition, for their major hosts and substrates, a phytosanitary certificate will usually be required, through which the NPPO of the exporting country certifies that the consignment has been inspected or tested and found free from the quarantine pests specified by the importing country.

However, in order successfully to exclude the specified pests, it may also be necessary to regulate or even prohibit the import of their hosts or substrates. Special measures may be required if the organisms can be present on imported consignments in a state or stage in which they are impossible or difficult to detect. For example, viruses of fruit trees that show symptoms only on the leaves or fruit will not be visually detectable if the trees are imported during the dormant season.

On the other hand, importation during the dormant season, when leaves are absent, will guard against pests that affect only the leaves. In most cases, complete prohibition is not necessary as many less-restrictive measures can be applied. The more usual types of regulatory measures that are applied to plants, plant products or other items to reduce or eliminate a phytosanitary risk are:

1. Material required to be free of relevant symptoms.
2. Import only from declared pest free areas.

3. Importation restricted to certain times of the year, during which symptoms would be visible or susceptible organs absent.

4. Import limited to plants from crops that have been officially inspected or tested and certified free from the pest.

5. Material required to have been treated with heat, cold, fumigation or pesticide during growth or as part of preparation for export.

6. Material required to have been trimmed to eliminate the parts or organs likely to harbor particular pests (e.g., debarking of timber).

7. Plants required to have been propagated from parent or ancestral material that has been appropriately tested and maintained.

8. Material required to have been grown on land tested and found free from relevant pests, or which has not carried relevant hosts for a certain length of time.

9. Items required to be free from soil or organic debris.

10. A representative sample (e.g., seeds) required to have been tested and found free from relevant pests.

11. Plants required to have been cultivated and not collected from the wild.

All of these measures will be applied prior to export and should be confirmed by the NPPO through the issue of a phytosanitary certificate. Other measures may be required either during transport or on arrival.

These include:

1. In-transit treatments, such as with heat, cold, fumigation or pesticide.

2. Retaining plants in post-importation isolation (quarantine), pending official inspection, testing or treatment by the authorities of the importing country.

In-transit treatments fall between the responsibilities of the NPPOs of both the exporting and importing countries, as at the time they are being performed they fall outside the jurisdiction of both services. Therefore, they cannot be covered by the normal phytosanitary certificate. To be effective they require the close cooperation of all trade sectors involved, including in particular the carrier of the consignment (e.g., the ship operator and staff), and close monitoring of treatment records by the NPPO of the importing country on arrival. Quarantine procedures required on arrival or post-entry are wholly the responsibility of the NPPO of the importing country.

INCREASE YOUR VOCABULARY

Exercises

II. Give the Ukrainian equivalents to the following words and word-combinations:

phytosanitary regulations; quarantine organisms; imported consignments; to be free from pests; major hosts; a certificate to be required; to exclude the specified pests; to be impossible to detect; to show symptoms; not to be visually detectable; dormant seasons; to guard against pests; to affect; less-restrictive measures; to eliminate; declared pest free areas; susceptible organs; officially tested crops; treated material; to trim; to harbor particular pests; appropriately maintained; to carry relevant hosts; organic debris; a representative sample.

III. Give the English equivalents to the following words and word- combinations:

особливі заходи; список шкідливих організмів; заборонений; уточнювати; субстрати; перевіряти партію продукції; імпортуюча країна; організми, що можуть бути присутніми; віруси фруктових дерев; листя та плоди; необхідний; для того, щоб успішно виключати; шкідники; повна заборона; застосовувати до рослин; рослинна продукція; зменшувати фітосанітарний ризик; необхідний матеріал; відповідні симптоми; обмежений; необхідний матеріал; застосовувати пріоритетні заходи; ізоляція (карантин) рослин після ввозу.

IV. Match the synonyms:

regulation	party
relate	precise
isolation	examine
consignment	concern
specify	forbid
inspect	limit
prohibit	remove
restrict	control
pest	quarantine
eliminate	parasite

V. Match the terms with their definitions:

1) regulation	a) the sweet and fleshy product of a tree or other plant that contains seeds and can be eaten as food
2) host	b) a flattened structure of a higher plant, typically green and blade-like that is attached to a stem
3) substrate	c) likely or liable to be influenced or harmed by a particular thing
4) test	d) wood prepared for use in building and carpentry
5) fruit	e) an animal or plant on or in which a parasite lives
6) tree	f) a procedure intended to establish the quality, performance or reliability of something, especially before it is taken into widespread use
7) leaf	g) a woody perennial plant with a single stem or truck growing to a considerable height
8) susceptible	h) a rule or directive made and maintained by an authority
9) timber	i) the upper layer of earth in which plants grow
10) soil	j) an underlying substance or layer; the surface or material on or from which an organism lives, grows, obtains its nourishment

VI. Match the beginning of the sentence with its ending.

1) Phytosanitary regulations relating to imports usually …	a) … will usually be required.
2) The regulations will specify …	b) … or even prohibit, the import of their hosts or substrates.
3) In addition, for their major hosts and substrates a phytosanitary certificate ...	c) … found free from the quarantine pests.
4) The consignment has been inspected and ...	d) … will not be visually detectable if the trees are imported during the dormant season.
5) It may also be necessary to regulate ...	e) … will guard against pests that affect only the leaves.
6) Special measures may be required if ...	f) … begin with a list of quarantine organisms whose import is prohibited.

7) Viruses of fruit trees that show symptoms only on the leaves or fruit ...	g) … many less-restrictive measures can be applied.
8) Importation during the dormant season, when leaves are absent ...	h) … wholly the responsibility of the NPPO of the importing country.
9) Complete prohibition is not necessary as ...	i) … that imported consignments must be free from such organisms.
10) Quarantine procedures required on arrival or post – entry are ...	j) … the organisms can be present on imported consignments.

VII. Insert the appropriate term from the box into the text given below:

species, prohibiting, pests, vulnerable, commodities, measures, exclude, effective, areas, control, serious, hosts.

Phytosanitary Measures

Phytosanitary … can be formulated to diminish but not necessarily to eliminate most phytosanitary risks. Generally, the simplest and most effective measure to … a particular pest is to prohibit its import and the import of its … or substrates. There may be a lack of information on certain … of plants or pests, but enough information to justify … the importation of plants belonging to certain plant groups or originating from certain geographical … .

Geographically isolated countries, such as islands, which tend to be particularly … to damage by alien pests, may be more justified in taking stringent measures than countries that are a part of a large land mass and which already have a large range of pests.

However, prohibition obviously prevents trade in such … and can be justified only for the most … pests or those that are the most difficult to … by other means. With some … , including most with an air-borne dispersal stage, in certain situations it would be impractical or uneconomic to operate … exclusion measures, for example, if they are already present in neighboring countries.

VIII. Find the Infinitive in the text, state its function and translate the sentences.

IX. Find complex sentences in the text and define their types.

X. Speak about specific import measures using the following words and expressions:

phytosanitary regulations; a list of quarantine organisms; to correspond; the local NPPO; imported consignments; to be required; to be found free from pests; successfully; to be present; major hosts; to be difficult to detect; to guard against pests; less – restrictive measures; relevant symptoms; limited import; to be treated with heat, cold, fumigation, pesticides; to be trimmed; to habour pests; debarking of timber; organic debris; a representative sample; to be applied and confirmed; in-transit treatments; to retain plants in post-importation isolation (quarantine).

UNIT 9

I. Read and translate the text.

CONTAINMENT: QUARANTINE UNITS (Part 1)

Plant quarantine facilities do not need large areas of land, but should be in areas well isolated from crops related to the imported plant species being held. Town sites can be suitable. They should have secure boundaries with adequate perimeter fences or walls to prevent unauthorized access and usually will need both an area for growing plants in the open, protected accommodation, and laboratory facilities. Quarantine facilities for plants are commonly operated by the NPPO but may be operated privately under license or by approval. In either case, good management and satisfactory technical expertise are essential.

Overall responsibility for the premises should be vested in one senior person, who should maintain liaison with the NPPO and keep detailed records, including dates and times of personnel entry, incoming and outgoing plant material, and treatments applied. Electronic swipe cards can conveniently restrict access to any area and also automatically provide a record of times of entry and exit.

Premises should be clean, well- organized and efficient, not only for the purposes to minimize escape of quarantine or alien organisms or cross-contamination of material held, but should be seen to be so to engender confidence in clients and trading partners in both the domestic and foreign commercial spheres and government services. Regular official inspections for which a checklist of items is helpful and good maintenance of facilities and equipment are necessary.

Adequate office, storage, laboratory and plant-handling space is helpful in maintaining order and efficiency. An emergency generator, soil and plant washing facilities, and access to an incinerator will also usually be necessary. Quarantine premises should display a conspicuous notice of their title. At the entrance and within the facilities there should be further signs restricting entry to designated personnel and designating the use of particular rooms or reminding workers of necessary hygiene precautions. Non-essential visitors to quarantine facilities should be banned or restricted, according to the phytosanitary risk.

Plant quarantine facilities will normally be equipped with greenhouses, glasshouses, ‘poly-tunnels’ or other protective structures. A modular design is often convenient, although special structures are not always required; provided isolation and security are adequate to counter the assessed plant health risk and no relevant vectors can gain access to the material.

For example, many apple virus diseases have no known vectors and, depending on their provenance, imported apple trees might safely be grown in the open during the quarantine period. Separate specialized facilities may be required for handling seeds and growing them on.

Containment structures should be built to a high standard and be more than sufficiently robust to withstand the most extreme weather conditions likely to occur. Severe weather frequently causes damage to commercial glasshouses and tunnels, so structures of equivalent strength would be inadequate.

Natural or artificial windbreaks may be advantageous, but the structures should not be near tall trees or dense foliage. An area of about 2 m width around the structure should be kept clear of all vegetation, perhaps by covering with paving, tarmac, or other impervious material. Beyond this a wider area of mown grass helps to keep down local pest populations in the vicinity. Joints between glass, partitions and walls should be sealed and there should be no unsealed gaps between glass or plastic panels and retaining frames.

Within the main structure it is convenient to have separate compartments to house different types of material, or for different conditions, and these also need sealed joints and close-fitting doors. Entrance to the main structure should be through an air lock created by a vestibule with both inner and outer well-fitting doors. Ideally, it should not be possible for both inner and outer doors to be open simultaneously.

Alternatively, an audible alarm can be fitted to sound if both inner and outer doors are open at the same time. A further refinement, especially when containing mobile insect pests, is to keep the vestibule dark. The main door and doors to compartments should be lockable; combination locks are often convenient. One vestibule may serve several units or compartments and should serve as an exit as well as an entrance, although in large or high-security containment facilities an alternative emergency exit will be necessary.

Sometimes it is also good to furnish the vestibule with washing facilities. Foot-operated taps are an option for high-security containment units. Disposable or easily washable protective clothing should be available for use, including disposable covering for or alternative footwear. Otherwise, a foot pad containing a broad-spectrum disinfectant should be placed at the external door.

If necessary, protective clothing can be color coded for use in different units. There should be bins with plastic bags to receive used disposable clothing and, in facilities dealing with invertebrates, a small deep freeze conveniently serves this purpose, killing or immobilizing any invertebrates that may be contaminating the clothing.

INCREASE YOUR VOCABULARY
EXERCISES

II. Give the Ukrainian equivalents to the following words and word-combinations:

quarantine facilities; to secure boundaries; to prevent unauthorized access; to be commonly operated; by approval; overall responsibility; to keep detailed records; incoming and outgoing plant material; to apply treatments; swipe cards; alien organisms; cross-contamination; to engender confidence; good maintenance; plant handling space; an emergency generator; to display a notice of the title; to remind necessary hygiene precautions; non-essential visitors; to be equipped; for handling seeds; artificial windbreaks; unsealed gaps; lockable doors; to be color coded.

III. Give the English equivalents to the following words and word-combinations:

ізольовані території; відповідні по периметру загорожі; лабораторні установи; захищені приміщення; по ліцензії; задовільна технічна експертиза; підтримувати зв'язок; містити данні; обмежувати доступ; автоматично забезпечувати запис; чисті приміщення; сфери внутрішньої та зовнішньої торгівлі; регулярні офіційні інспекції; зберігання; знаки, що обмежують вхід; бути забороненим; теплиці; густе листя; місцеві популяції шкідників; доступний для використання; захисний одяг.

IV. Match the terms with their definitions:

1) containment	a) a quantity or consignment of goods produced at one time
2) alien	b) an apparatus burning waste material, especially industrial waste at high temperatures until it is reduced to ash
3) emergency	c) an official or legal prohibition
4) incinerator	d) a house or building, together with its land and outbuildings, occupied by a business or considered in an official context
5) ban	e) a chemical liquid that destroys bacteria
6) batch	f) a glass building in which plants that need protection from cold weather are grown
7) premises	g) unfamiliar and disturbing or distasteful
8) greenhouse	h) the state of being free from danger or threat
9) security	i) the action of keeping something harmful under control or within limits
10) disinfectant	j) a serious, unexpected and often dangerous situation requiring immediate action

V. Insert the appropriate term from the box into the text given below:

agricultural, check, risk, pests, minimize, remove, movement, soil – borne, restrictions, position, precautions, contaminated

Large-Scale Soil Movement

Major civil engineering projects often necessitate the … of soil on a large scale. The construction of large or extensive buildings, roads, railways and pipelines are all examples that involve the large-scale movement of soil, and where this is to be done in … areas there may be a risk of spreading … plant pests. The NPPO will need to … from records held whether any serious soil-borne pests, or any areas on which phytosanitary … have been imposed, occur in the area of operations. If so, a … analysis should be done to determine whether … are necessary to … the risk of spreading soil-borne pests. Even where pests are not known or suspected to occur, it is good practice to … the movement of soil as much as possible, to replace as much of the soil as possible in its former … , and to avoid the mixture of soil from different places.

It is usually possible to … the topsoil, which will contain virtually all of any pest population, and retain it separately nearby on site. Soil-handling machinery should be well cleaned and, if necessary, disinfected on site before moving to other areas. Where … or suspect soil must be removed from the site, this should be done as for disposal of solid waste.

VI. What derivatives can you make with the words?

- isolate
- relate
- manage
- treat
- restrict
- provide
- equip

VII. Match the synonyms:

need	important
species	support
adequate	source
essential	mark
maintain	demand
material	show
engender	appropriate
designate	variety
provenance	cause
display	substance

VIII. Find Participle II in the following sentences. Define its function and translate these sentences:

1. These areas must be isolated from crops related to the imported plant species.
2. The unauthorized access is prevented with fences or walls.
3. Accommodations and laboratory facilities should be open and protected when required.
4. Operated by the NPPO, quarantine facilities may be managed privately under license or by approval.
5. At the entrance there should be further signs restricting entry to designated personnel.
6. The plants look healthy as if grown in special greenhouses free from pests.

IX. Ask questions to the following sentences and then use them to discuss the problem of quarantine units:

1) Plant quarantine facilities should have secure boundaries and need an area for growing plants in the protected accommodation and laboratory facilities.
2) Overall responsibility for the premises should be vested in one senior person maintaining liaison with the NPPO.
3) Regular official inspections and good maintenance of facilities and equipment are necessary.
4) Plant quarantine facilities must be equipped with green- and glass houses.
5) Containment structures should be built to a high standard and be robust to withstand the most extreme weather conditions.
6) An area around the structure should be kept clear of all vegetation by covering with paving, etc.
7) Within the main structure it is convenient to have separate compartments to house different types of material.
8) It is also good to furnish the vestibule with washing facilities.

X. Using the *GLOSSARY OF TERMS* on pages 102-112, give the definition of the following terms:

pest resurgence
pesticide rotation
infestation
immune

ectoparasite
nematicide

XI. Make a summary to the text.

UNIT 10

I. Read and translate the text.

CONTAINMENT: QUARANTINE UNITS (Part 2)

Within glass or plastic-covered structures, plants should not be grown in the existing soil but in containers of some kind, supported on benches if convenient. The floor of the structure should preferably be solid and easily washable, although it may be acceptable to use stout floor coverings in some circumstances. New or cleaned and disinfected growing containers and packaging should be used, with new or sterilized soil-less growing medium, and each container should be clearly labeled.

Commercial composts are often suitable but soil, even if partially sterilized, is inadvisable. Even large growing containers should be isolated from local soil and stood within individual drainage saucers or trays in such a way as to avoid splash or contact between neighbouring plants or containers.

However, several containers of similar plants can be treated and retained within a single drainage tray. Watering should normally be from below to avoid cross-contamination by splash. Capillary mats should be replaced after each crop of plants. Automatic watering arrangements will reduce the frequency of visits by maintenance personnel.

Benches should be at a convenient height and easily cleanable. At least some benches should be available that have controlled drainage with arrangements for safe disposal or treatment of drainage water. The water supply should come from a chemically and biologically uncontaminated source, such as a mains supply, a deep borehole, or rainwater retained in a covered tank.

Supply from rivers or other surface watercourses should be avoided, especially in agricultural areas. Precautionary treatment of the water supply with ultra violet radiation may be advisable in some circumstances

to minimize bacterial contamination, for example, in production of *Solanum* potato planting material free from contamination with *Erwinia carotovora*.

Positive or negative pressure, if required to prevent the entrance or escape of air-borne organisms, can be provided by fans with screens or, for high security, high-efficiency particulate air filters. This can be done on a small scale with bench-top cabinets where appropriate. In warm climates, or when the contained plants require a cold period, it is often difficult to prevent temperatures within protective structures escalating above acceptable levels. In these situations, increased ventilation can be provided by use of fine mesh gauze screening to cover part or all of the structure, fans to increase the throughput of air, or a cooling system using evaporative or mechanical air conditioning may be installed.

Controlled shading is also helpful. Gauze screening is easily damaged and must be inspected frequently and repaired promptly where necessary. Depending on color and mesh size, it may also reduce incoming light levels more than glass or plastic sheet, and even the smallest available mesh sizes usually are not impermeable to spores or very small invertebrates such as thrips. There should be well-fitted screens or brushes at vent openings.

Particular attention should be given to the gaps around doors, which may need to be fitted with flanges, and to the thorough cleaning and disinfection of compartments when each project has been completed or after the plants have been removed.

New introductions to quarantine facilities should be held in a separate structure to those already tested and found free from significant pests. For seeds and other robust material, routine fumigation or cold treatment may be a helpful precaution before consignments are opened.

Disposable knives or scalpels should be used where appropriate and, depending on circumstances, there should be separate sets of implements for each house, compartment or crop, which are cleaned and disinfected after each batch of operations. Disposable gloves should be worn or hands washed before each operation.

Where appropriate, a suitable pest control regime should be applied as a precaution to give effective control of pests that might be expected to occur, but it should not mask the symptoms of pests for which plants are being quarantined. Where possible, plants in quarantine should not be allowed to flower, or should at least be prevented from disseminating

pollen. Where tubers or cuttings are stored before planting, they should be kept free from pests, such as aphids or mites, by suitable treatment.

INCREASE YOUR VOCABULARY
EXERCISES

II. Give the Ukrainian equivalents to the following words and word-combinations:

should preferably be solid; easily washable; stout floor coverings; soil-less growing medium; clearly labeled; commercial composts; drainage saucers; to avoid splash or contacts; to be treated; to retain within a drainage tray; cross-contamination; capillary mats; maintenance personnel; convenient; easily cleanable; fine mesh gauze screening; for safe disposal; chemically and biologically uncontaminated source; to retain in a covered tank; surface watercourses; in some circumstances; to prevent the entrance of air - borne organisms; bench-top cabinets.

III. Give the English equivalents to the following words and word-combinations:

будівлі, вкриті склом або пластиком; вирощуватися у грунті; дезінфіковані контейнери; частково стерильний; недоцільний; ізольовані від місцевого грунту; полив знизу; замінятися; автоматичний полив; зменшувати частотність; висота; бути доступним; запас води; глибока свердловина; дощова вода; мінімізувати бактеріальне забруднення; високоефективний; повітряні фільтри; теплий клімат; запобігати; збільшена вентиляція; пошкоджувати; залежно від кольору; зменшувати доступ світла; режим боротьби із шкідниками.

IV. Match the terms with their definitions:

1) container	a) done or being in the air, being off the ground
2) compost	b) the action or process of draining something
3) sterilize	c) a large receptacle or storage chamber, especially for liquid or gas
4) drainage	d) the science or practice of farming including cultivation of the soil for the growing of crops and the rearing of animals to provide food, wool and other products

5) capillary	e) an object for holding or transporting something
6) tank	f) the emission of energy as electromagnetic waves
7) agriculture	g) make something free from bacteria or other living microorganisms
8) radiation	h) a tool, utensil, or other piece of equipment that is used for a particular purpose
9) air-borne	i) a tube that has an internal diameter of hairlike thinness
10) implement	j) decayed organic material used as a fertilizer for growing plants

V. Insert the appropriate term from the box into the text given below:

pests, trading, health, widespread, partners, survive, country, obtain, efforts, climates, plant, present.

Established Plant Pests

Where countries have been trading … over many decades or centuries, especially if they share similar … , it is likely that they will have already exchanged any … of traded plants and … products, which are able to … in the partner country. This makes it less likely that such … partners will now mutually … great plant … risks. However, there may be serious plant pests already present in a … that are not as yet … in all areas where they could survive. In this case, the prevention of further spread, control and eradication of such pests, where possible, are major plant health objectives and these are closely linked with … aimed at enabling farmers and growers to … healthy and vigorous planting material.

VI. Complete the table to make word families. Use the dictionary to help you. In case there is no corresponding derivative, put a "No" sign.

Noun	Verb	Adjective	Adverb
			chemically
situation			
		protective	
	evaporate		
			biologically
precaution			

			frequently
		necessary	
		impermeable	
	introduce		

VII. Each sentence below has a content mistake. Find and correct it using the speech patterns of disagreement.

1. Within glass or plastic-covered structures, plants should be grown in the existing soil.
2. The floor of the structure should not be solid and easily washable.
3. Large growing containers should not be isolated from local soil.
4. Watering should not be normally from below.
5. Supply from rivers or other surface watercourses is advisable.
6. Positive or negative pressure if required to prevent the entrance or escape of air-borne organisms can be provided by containers.
7. In warm climates or when the contained plants require a cold period, it is often easy to prevent temperatures within protective structures escalating above acceptable levels.
8. Gauze screening is not easily damaged and must not be inspected frequently.

VIII. Using the *GLOSSARY OF TERMS* on pages 102-112, give the definition of the following terms:

biological control or biocontrol
multiple cycle disease
inoculum
quarantine
sanitation
competitive exclusion agent
caterpillar

IX. Make a plan to the text and use it while speaking about containment in quarantine units.

X. Find information in the Internet and prepare a short report on the problem of pest and disease containment.

TASKS FOR SELF-CONTROL

MODULE 2

I. Match the terms with their definitions:

1) container	a) the action or process of draining something
2) compost	b) done or being in the air, being off the ground
3) sterilize	c) a large receptacle or storage chamber, especially for liquid or gas
4) drainage	d) the science or practice of farming including cultivation of the soil for the growing of crops and the rearing of animals to provide food, wool and other products
5) capillary	e) an object for holding or transporting something
6) tank	f) a tool, utensil, or other piece of equipment that is used for a particular
7) agriculture	g) make something free from bacteria or other living microorganisms
8) radiation	h) the emission of energy as electromagnetic waves
9) air-borne	i) a tube that has an internal diameter of hairlike thinness
10) implement	j) decayed organic material used as a fertilizer for growing plants
11) certificate	k) relating to the health of plants, especially with respect to the requirements of international trade
12) inspection	l) a thing that ensures admission to or the achievement of something
13) phytosanitary	m) a piece of written, printed, or electronic matter that provides information or evidence or that serves
14) consignment	n) a small piece of paper, fabric, plastic, or similar material attached to an object and giving information about it
15) document	o) the action of using up a resource

16) label	p) a level of quality or attainment
17) registration	q) a document serving as evidence or as written testimony, as of status, qualifications, privileges, or the truth of something
18) consumption	r) careful examination or scrutiny
19) standard	s) the action or process of registering or of being registered
20) passport	t) a batch of goods destined for or delivered to someone careful examination or scrutiny

II. Choose the word or phrase you think best completes the sentences:

1. In Europe, the terms ‘plant quarantine’ and ‘plant health’ … the legislative and regulatory measures to minimize the transport and spread of organisms harmful to plants.

a) cover
b) describe
c) explain

2. As a branch of applied …, plant health combines much of the disciplines concerning plant pathology and plant entomology.

a) biology
b) geography
c) ecology

3. In plant health one is continually dealing with a great variety of organisms potentially … to plants

a) harmful
b) special
c) useful

4. Plant health is the application of scientific knowledge, logic and innovation to administrative and regulatory systems … achieving a good standard of health in plants.

a) for
b) at
c) by

5. Certain plants and plant products … as associated with risks to plant health in the European Community

a) is identified
b) are identified
c) has been identified

6. The aim of plant passports is … assurance of adequate plant health.

a) to give
b) to get
c) to take

7. Passported material is subject to a system of official inspections during marketing to check that it complies with … standards.

a) useful
b) required
c) important

8. Plants and plant products within the EC must be accompanied by a plant … giving relevant details and assurances as to the health of these items.

a) passport
b) certificate
c) document

9. Plant passports … by the responsible official body, normally the National Plant Protection Organization or an independent organization delegated for the purpose.

a) are issued
b) is issued
c) have been issued

10. Inspection issue of plant passports are normally required to be done at the place of production at an appropriate time … relation to the growth of the plants or production of products.

a) by
b) in
c) for

11. Plant passports consist of a label and an accompanying document, normally the invoice or consignment note, but may be a label alone, provided it carries all the required ….

a) information
b) data
c)notes

12. Some plants and plant products that … considered to present a smaller risk to plant health are exempt from the plant passport regime.

a) is
b) are
c) am

13. Passported material is subject to a system of official inspections during marketing to check that it complies with required … .

a) standards
b) rules
c) requirements

14. Phytosanitary regulations relating to imports usually begin with a list of quarantine organisms … import is prohibited.

a) that
b) whose
c) which

15. Special … may be required if the organisms can be present on imported consignments in a state or stage in which they are impossible or difficult to detect.

a) measures
b) means
c) rules

16. Plant quarantine facilities do not need large … of land, but should be in areas well isolated from crops related to the imported plant species being held.

a) areas
b) plots
c) territories

17. Adequate office, storage, laboratory and plant-handling space is … in maintaining order and efficiency.

a) appropriate

b) available

c) helpful

18. … glass or plastic-covered structures, plants should not be grown in the existing soil but in containers of some kind.

a) within

b) in

c) on

19. New or cleaned and disinfected growing containers and packaging … with new or sterilized soil-less growing medium, and each container should be clearly labeled.

a) are being used

b) should be used

c) are used

20. The water supply should … from a chemically and biologically uncontaminated source, such as a mains supply, a deep borehole, or rainwater retained in a covered tank.

a) get

b) receive

c) come

GRAMMAR APPENDIX
NON-FINITE FORMS OF THE VERB

	Infinitive (з часткою *to*)		**Gerund (-*ing*)**		**Participle I (-*ing*)**		**Participle II (ст. д. – ed, нест. д. – 3 ф. д.)**
Voice / Tenses	Active	Passive	Active	Passive	Active	Passive	
Simple	to ask to write	to be asked to be written	asking writing	being asked being written	asking writing	being asked being written	asked written
Continuous	to be asking to be writing	-	-	-	-	-	-----
Perfect	to have asked to have written	to have been asked to have been written	having asked having written	having been asked having been written	having asked having written	having been asked having been written	-----

The use of non-finite forms of the verb

Члени речення	Infinitive (to)	Gerund (-ing)	Participle I (-ing)	Participle II (ст. д. – ed, нест. д. – 3 ф. д.)
1. Підмет	To walk is useful Гуляти – корисно	Walking is useful	----	----
2. Частина присудка	Our aim is to master English. Наша мета – оволодіти англійською мовою	Our aim is mastering English. Наша мета – оволодіння англійською мовою	He is writing a letter. Він пише листа	He has written a letter. Він написав листа
3. Додаток	She likes to sing Вона любить співати	She likes singing	----	----
4.Означення	The method to be used is not new. Метод, який треба використати, не новий	____	Look at the trees growing in our garden. Подивись на дерева, які ростуть у нашому садку	The method used is not new. Використаний метод не новий
5.Обставина	He went there to study. Він пішов туди навчатися	He went there for studying. Він пішов туди навчатися	(While) reading he made notes. Читаючи, він робив записи	When done, this work will give good results. Коли робота буде зроблена, вона дасть гарні результати

INFINITIVE CONSTRUCTIONS
Complex Subject
"Складний підмет"

Підмет	Присудок	Інфінітив	Другорядні члени речення	Переклад
He	is said	to come	to us	Говорять, що він прийде до нас
This farm	is known	to have	rich soil	Відомо, що це господарство має багаті ґрунти
They	are expected	to work	on the farm	Сподіваються, що вони будуть. працювати в господарстві
This crop	is likely	to give	high yields	Ймовірно, що ця культура дасть високі врожаї

Дієслова, що вживається як присудок:
в **Passive Voice:**
to report, to say, to know, to suppose, to state, to expect, to believe
в **Active Voice:**
to seem, to appear, to be likely, to be unlikely, to be sure.

Complex Object
“Складний додаток”

Підмет	Присудок	Додаток, виражений іменником або займенником в об’єктному відмінку	Інфінітив	Другорядні члени речення	Переклад
We	expect	them	to do	it in time.	Ми сподіваємось, що вони зроблять це вчасно
I	want	you	to work	better.	Я хочу, щоб ви працювали краще
They	consider	us	to translate	this text.	Вони сподіваються, що ми перекладемо цей текст

Конструкція вживається після дієслів (в активному стані):
to know, to want, to expect, to consider, to think, to suppose, to find, to believe

SENTENCE

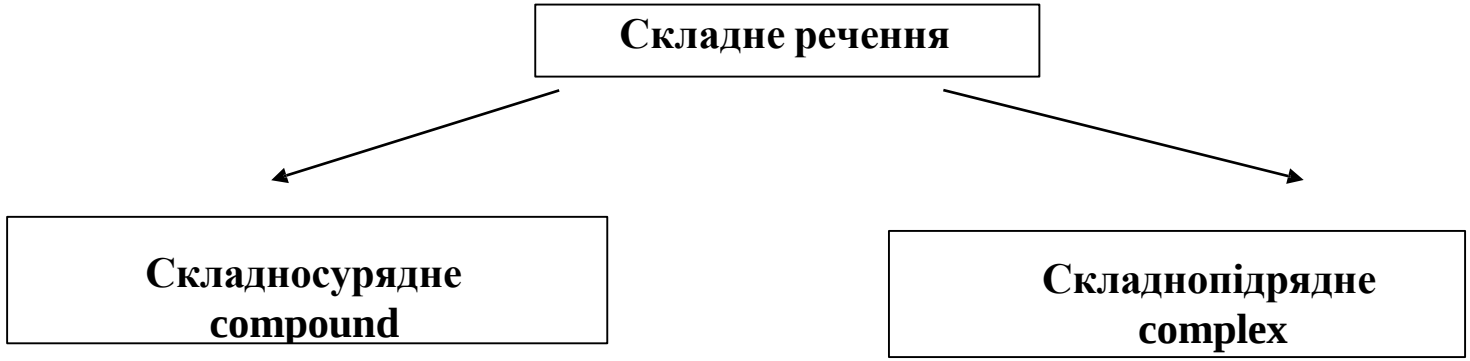
Типи речень в залежності від цілі висловлювання

розповідні (declarative)	питальні (interrogative)	наказові (imperative)	окличні (exclamatory)
The flat is on the first floor. Квартира знаходиться на другому поверсі	When will you come back? Коли ти повернешся?	Open the window, please. Відчини вікно, будь ласка.	How well she dances! Як гарно вона танцює!

ТИПИ ПРОСТОГО РЕЧЕННЯ (в залежності від структури)

Непоширене (unextended)	Поширене (extended)
Підмет + присудок The bus has stopped Автобус зупинився	**Підмет + присудок + другорядні члени** а) The bus stopped at the bus station Автобус зупинився на автобусній зупинці (Підмет + присудок + обставина місця) б) The manager has received a telegram Менеджер отримав телеграму (Підмет + присудок + додаток)

ТИПИ СКЛАДНИХ РЕЧЕНЬ



включає 2 або більше простих рівноправних речень **включає головне та підрядне**

Сполучники сурядності ***and, as well as, but, either or*** та сполучні слова: ***or*** та ін. Tom phoned me and left a message. Том зателефонував мені і залишив повідомлення	**1) підрядне – підмет та сполучні слова (**сполучники**:** ***that, whether, if, who, what, how, why …).*** That he has made a mistake is strange. Те, що він зробив помилку, дивно. **2) підрядне – присудок (**ті ж сполучники, що і у підрядному – підметі**).** The question is whether they will help us. Питання полягає у тому, чи допоможуть вони нам. **3) додаткове (*that, what, who* …)** He asked us what we thought of it. Він запитав, що ми думаємо про це. **4) означальне (who, whose, where, why)** I have found the house, where Tolstoj lived. Я знайшов будинок, в якому жив Толстой.

	5) підрядне-обставинне: часу, місця, причини, способу дії, цілі, умови та ін.: **підрядне часу (*when, whenever, while, after, till, until as, since, as long as* та ін.)** As I was going along the street I met my friend. Коли я йшов вулицею, я зустрів свого товариша. **місця (*where, wherever*)** Wherever he went he was welcome. Куди б він не пішов, його радісно зустрічали. **причини (*as, since, because, for*)** He walked quickly for he was in a hurry. Він йшов швидко, бо дуже квапився. **способу дії (*as, as if, that, so … that*)** He spoke as if he knew this question well. Він говорив, начебто добре знав це питання. **результату дії (*so that, so*)** He went to the lecture early so that he got a good seat. Він пішов на лекцію рано, так що зайняв хороше міс**це.** **цілі: (*so that, so, in order that*)** I gave him a dictionary so that he might translate the text. Я дав йому словник, щоб він переклав текст. **умовні (*if, unless, on condition that, … unless …*)** If I have time I will help her. Якщо у мене буде час, я їй допоможу.

WORD-FORMATION

I. Афіксація		
Частини мови	**Префіксація**	**Суфіксація**
1) іменник	**counter:** counteraction **anti:** antifascist **over:** overproduction **non:** nonconductor **in:** inability та ін.	**er / or** (додається до дієслів): doer **ee** (від дієслів) – payee **age** (від дієслів) – marriage **ance / ence** (від прикметників) – resistance **dom** (від іменників та прикметників) – freedom **hood** (від іменників) – brotherhood **ion (ation, tion, sion, ssion)** (від дієслів) – collection **ment** (від дієслів) – development **ness** (від прикметників) – coldness **ship** (від п іменників) – friendship **ure** (від дієслів) – departure та ін.
2) прикметник	**un:** unequal **in (il):** incomplete, illegal **dis:** dishonest **non:** nonessential **post:** post-revolutionary **inter:** interdependent **sub:** subconscious **ultra:** ultra-short та ін.	**able /ble** (від дієслів) eatable **al** (від іменників) central **ant / ent** (від дієслів) different **ful** (від іменників) beautiful **ish:** (від іменників та прикметників) Danish, reddish **ive:** (від дієслів та прикметників) active **-less:** (від іменників) hopeless

		-ous: (від іменників) glorious **y** (від іменників) windly та ін.
Частини мови	**Префіксація**	**Суфіксація**
дієслово	**un:** to undress **dis:** to disapprove **re:** to re-elect **mis:** to mislead **to over:** to over-estimate **under:** underpay **counter:** to counteract **en:** to enslave	**en** (від прикметників / іменників) to sharpen **fy** (від прикметників) to simplify **ize** (від іменників) to characterize
II. Конверсія		
а) іменник answer work **б) прикметник** clean empty		**дієслово** to answer to work **дієслово** to clean to empty
III. Чергування звуків (букв)		
іменник use [ju:s] life [laif]		**дієслово** to use [ju:z] to live [li:v]

IV. Зміна наголосу	
éxport	to expórt
ímport	to impórt

V. Словоскладення:

а) утворення іменника

bed + room = bedroom
school + boy = schoolboy
father + in + law = father-in-law

б) утворення прикметника

dark + blue =dark-blue
first + class = first-class

в) утворення дієслова

white + wash = to whitewash
broad + cast = to broadcast

IRREGULAR VERBS

(Список неправильних дієслів)

be	was, were	been	бути
become	became	become	стати, зробитися
begin	began	begun	починати(ся)
blow	blew	blown	дути
break	broke	broken	ламати(ся)
bring	brought	brought	приносити
build	built	built	будувати
burn	burnt	burnt	горіти, палити
buy	bought	bought	купувати
catch	caught	caught	ловити, схоплювати
choose	chose	chosen	вибирати, добирати
come	came	come	приходити
cost	cost	cost	коштувати
cut	cut	cut	різати
do	did	done	робити
draw	drew	drawn	тягти; малювати
drink	drank	drunk	пити
eat	ate	eaten	їсти
fall	fell	fallen	падати
feed	fed	fed	годувати
feel	felt	felt	почувати (себе)
fight	fought	fought	боротися, битися
find	found	found	знаходити
fly	flew	flown	літати
forget	forgot	forgotten	забувати
freeze	froze	frozen	заморожувати

get	got	got	одержувати; ставити
give	gave	given	давати
go	went	gone	іти, ходити
grow	grew	grown	рости, ставати
have	had	had	мати
hear	heard	heard	чути
hold	held	held	тримати
keep	kept	kept	тримати, зберігати
know lead	knew led	known led	знати вести
learn	learnt	learnt	вчити(ся)
leave	left	left	залишати
let	let	let	дозволяти
loose	lost	lost	губити, втрачати
make	made	made	робити
meet	met	met	зустрічатися
pay	paid	paid	платити
put	put	put	класти
read	read	read	читати
ride	rode	ridden	їздити верхи
rise	rose	risen	вставати, сходити
run	ran	run	бігти
say	said	said	сказати
see	saw	seen	бачити
sell	sold	sold	продавати
send	sent	sent	посилати
shake	shook	shaken	трясти

shine	shone	shone	сяяти, блищати
show	showed	shown	показувати
sing	sang	sung	співати
sleep	slept	slept	спати
smell	smelt	smelt	нюхати, пахнути
speak	spoke	spoken	говорити, розмовляти
spend	spent	spent	витрачати
stand	stood	stood	стояти
swim	swam	swum	плавати
take	took	taken	брати
teach	taught	taught	вчити
tell	told	told	розповідати, говорити
think	thought	thought	думати
throw	threw	thrown	кидати
understand	understood	understood	розуміти
wake (up)	woke (up)	woken (up)	прокидатися
wear	wore	worn	носити
win	won	won	перемагати
write	wrote	written	писати

TASKS FOR SELF-STUDY

Phrases for making summaries:

I. Вступна частина

1. The title of the text (article) is ... (The text (article) is entitled ...) (The text is headlined ...)
2. The author of the text (article) is ... (It deals with ...)
3. The article was published in ... (The title of the magazine (journal, No ..., year))

II. Мета написання статті або тексту

1. The object (purpose) of this paper is to present (to discuss, to describe, to show, to develop, to give) ...
2. The paper (article, text) puts forward the idea (attempts to determine)
3. In the introduction (beginning) of the article(text) it is pointed out that ...

III. Питання, що обговорюються

1. The paper (article, text) discusses some problems relating to (deals with some aspects of, considers the problem of, presents the basic theory, provides with the information on, reviews the basic principles of) ...
2. The paper (article,text) is concerned with (is devoted) ...
3. The key information of the article/text is the following ...

IV. Виклад змісту тексту

1. The paper (article/text) begins with a short discussion on (deals firstly with the problem of) ...
2. The first paragraph deals with ...
3. First (at first, at the beginning) the author points out that (notes that, describes) ...
4. Then follows a discussion on ...
5. After that, the author goes on to the problem of ...
6. The author says that ...
7. The next (following) paragraph deals with (presents, discusses, describes) ...
8. The author mentions ...
9. After discussing ... the author turns to ...

10. The author informs us ...

11. Next (further, then) the author tries to... (indicates that, explains that) ...

12. It must be emphasized that (should be noted that, is evident that is clear that, is interesting to note that) ...

13. The facts, names, figures, methods, materials, procedure are the following ...

14. The find paragraph states (describes, ends with) ...

15. The conclusion is that the problem is ...

16. The author concludes that (summaries that) ...

17. To sum up (to summarize, to admit that) ...

18. Finally (in the end) the author admits (emphasizes) that ...

V. Оцінювання статті

In my opinion (to my mind, I think) ... the paper (article/text) is interesting (not interesting), of great importance, valuable (invaluable), up-to-date, useful (useless) ...

TEXT 1

I. Read the text and say if these statements are true or false:

1. Diseases of plants are caused by fungi, bacteria and viruses.

2. Fungi are eukaryotic, spore-bearing, heterotrophic organisms that produce extracellular enzymes to break down plant or animal products to small molecules.

3. Bacteria, differ from fungi in being unicellular prokaryotic organisms, also cause disease by extracellular digestion of plant tissues.

4. Bacteria are highly infectious and are easily spread on seed and by wind-blown rain, irrigation water, and insects.

5. The viruses causing plant diseases are often carried by insects and other pests, as well as by grafting and on cutting tools, machinery, or in seed.

6. Plant pathogenic nematodes are small (approximately 3-millimeter long) wormlike animals that live in soil and feed on plant roots by piercing the cells with a needlelike structure called a stylet through which they suck up the cell contents.

7. Plant pests include the arthropods (such as insects and mites), slugs, and snails.

8. The least conspicuous insect pests are those that pierce the stem or leaf and suck nutrients from the plant.

9. Damage to plants caused by slugs and snails is very obvious, but is generally limited to crops growing in very damp situations and those, such as strawberries, in contact with the soil.

10. Crop management to reduce damage by diseases and pests is based on integrated control strategies involving exclusion, eradication, and protection.

II. Make a summary to the text using the phrases given on page 82-83.

PLANT PATHOGENS AND PESTS

Diseases. Diseases of plants are caused by fungi, bacteria, viruses, mollicutes, and nematodes. Fungi are eukaryotic, spore-bearing, heterotrophic organisms that produce extracellular enzymes to break down plant or animal products to small molecules (for example, sugars and amino acids), which they absorb as nutrients. Fungi may grow as unicellular yeasts, but more commonly they grow as multicellular chains of elongated cells that form threadlike structures collectively called mycelium. Important diseases caused by fungi include Dutch elm disease, apple scab, and wheat stem rust. Fungilike protists (primitive eukaryotic microorganisms) also cause many serious diseases, of which the best known is the late blight of potato, which caused the Irish potato famine in the 1840s. Since the 1980s, late blight (caused by *Phytophthora infestans*) has become the single most important biological constraint to global food production and the cause of one of the biggest uses of pesticides.

Bacteria, although differing from fungi in being unicellular prokaryotic organisms, also cause disease by extracellular digestion of plant tissues. These bacteria are highly infectious and are easily spread on seed and by wind-blown rain, irrigation water, and insects. Fire blight of apple and pear, caused by *Erwinia amylovora*, is a serious problem because the bacterium is so easily spread by rain and insects.

Most bacterial plant pathogens survive as saprophytes living on crop debris and in soil. Mollicutes, which can be described as prokaryotes lacking cell walls, cause diseases of plants by living within the phloem cells from which they obtain their nutrients. Mollicutes are very effectively carried from plant to plant by insects in which they can also reproduce.

The viruses that cause plant diseases are also often carried by insects and other pests, as well as by grafting and on cutting tools, machinery, or in seed. Most such viruses consist of ribonucleic acid (RNA), surrounded by a protein coat (the capsid). A few plant pathogenic viruses contain deoxyribonucleic acid (DNA) rather than RNA. All viruses are intracellular and are obligate parasites as they are dependent on the plant cell for their reproduction.

Plant pathogenic nematodes are small (approximately 1-millimeter long) wormlike animals that live in soil and feed on plant roots by piercing the cells with a needlelike structure called a stylet through which they suck up the cell contents. Nematodes, which may feed from outside or inside the root, cause enormous damage to roots, thus reducing nutrient and water uptake. Root knot nematodes, one of the most damaging pathogens, stimulate division and expansion of root cells to create "galls" in which the female nematodes remain to feed and produce eggs.

Pests. Plant pests include the arthropods (such as insects and mites), slugs, snails, sowbugs, and pill bugs. Only a small proportion of insects are plant pests with the most conspicuous being the butterflies and moths. The larvae (caterpillars) of butterflies and moths cause severe damage by feeding on foliage until they pupate. The adults rarely feed on foliage.

The most common butterfly pest in North America is the cabbage white, which is seen in great numbers in the summer. Beetles also damage plants as both larvae and adults chew on plant tissue. The Colorado potato beetle is the most notorious of these pests. Juvenile (nymphs) and adult grasshoppers are also foliage-eating insect pests. Larvae of flies feed and burrow into roots, bulbs, and stems of plants and thus cause considerable damage.

The least conspicuous insect pests are those that pierce the stem or leaf and suck nutrients from the plant. Nymphs and adults of aphids, leaf hoppers, stink bugs, and plant bugs cause extensive damage in this manner and, as well, they carry plant pathogens, especially viruses, from plant to plant. Insects called thrips also pierce plant parts and are important in transmitting viruses.

Mites differ from insects, as the adults have four pairs of legs (versus six for insects) and lack antennae. Larvae of mites feed and molt to form six-legged nymphs before becoming adults. The mites that feed on plants have rasping and sucking mouth parts that damage plants and they also transmit plant pathogens as they feed. Both thrips and mites are very small

and, as a result, often avoid detection until the plant growth is visibly affected.

Damage to plants caused by slugs and snails is very obvious, but is generally limited to crops growing in very damp situations and those, such as strawberries, in contact with the soil. Slugs and snails glide on an obvious slime trail of secreted mucus and feed at night, or on very cloudy days, to avoid drying out. Also at home in damp environments are the sowbugs and pill-bugs. These oval (pill-sized) bugs have a small head, two pairs of antennae, and seven pairs of legs. These species are more important as decomposers of rotting vegetation than as plant pests.

Control. Crop management to reduce damage by diseases and pests is based on integrated control strategies involving exclusion, eradication, and protection. Whenever possible, growers attempt to exclude the pathogen or pests from their land by purchasing pathogen- and pest-free planting material (seeds, seedlings, grafting material, tubers, and bulbs). When a pathogen or pest is present in fields or orchards, every effort is made to eradicate it by cultivation practices designed to "starve" the organism, for example, by planting a crop on which it cannot obtain nutrients.

When such methods fail, pesticides may be required to reduce pathogen populations; for example, nematocides to kill root-knot nematodes. Many pests and pathogens (for example, apple scab and wheat stem rust fungi, fire blight bacterium) are, however, so widespread and so readily distributed from field to field that exclusion and eradication are impossible. Ideally, for these problems, plant varieties that are genetically resistant to the pathogen or pest are available.

Alternatively, growers may be able to reduce crop losses by cultural practices that make the environment unfavorable for the agent; for example, spacing plants to prevent the high humidity conducive to plant disease. If such methods are unsuccessful, the grower may be required to use biological control (for example, the bacterium *Bacillus thuringiensis* for moth and beetle control) or chemical pesticides (fungicides to control late blight of potato, or insecticides to control grasshoppers). Bioengineering techniques are enhancing researchers' ability to produce genetically resistant crop plants, and this technology will eventually decrease reliance on chemical pesticides.

TEXT 2

I. Read the text and complete the sentences given below with the information from the text.

1. Powdery mildew, is widely distributed throughout the world in…..

2. Mild temperatures, high relative humidity and dense stands ….

3. Powdery mildew results in reduced kernel size and test weight…

4. Greatest yield losses occur when…

5. Powdery mildew is characterized by…

6. As the plant matures, the white powdery growth changes to …

7. The leaf tissue on the opposite side of the leaf from the white mold growth becomes …

8. Wheat becomes infected with powdery mildew in …

9. Autumn infections on newly planted wheat result …

10. The mildew fungus survives over winter…

11. Conidia germinate and infect plants …

12. Optimum development of powdery mildew occurs between …

II. Make a summary to the text using the phrases given on pages 82-83.

POWDERY MILDEW OF WHEAT

Powdery mildew, caused by Blumeria graminis is widely distributed throughout the world, particularly in humid regions. Over the past 20 years, powdery mildew has been the most common disease of wheat in USA. It is most damaging in years with relatively mild weather during April and May. Mild temperatures, high relative humidity and dense stands of wheat favor mildew development. It is most prevalent on the lower leaves of susceptible varieties in late April or early May when wheat is in the joint to flag-leaf stage of development. This disease results in reduced kernel size and test weight, and ultimately lower yield.

The earlier in the spring mildew begins to develop on the plant and the higher on the plant it develops by flowering the greater the yield loss. Greatest yield losses occur when the flag leaf becomes severely diseased by heading. Losses up to 45 percent have been documented on susceptible varieties when plants are infected in April and weather conditions are favorable for spread of the fungus throughout the growing season.

Figure 1. Powdery mildew can be recognized as fluffy white mold growth on leaf surfaces during cool, humid weather

Powdery mildew is characterized by a powdery white to grey fungal growth on leaves, stems and heads. The fluffy white pustules are first detected on the lowest leaves of plants in early to mid April. As the plant matures, the white powdery growth changes to a grey-brown color. The leaf tissue on the opposite side of the leaf from the white mold growth becomes yellow, later turning tan or brown. Small, black fruiting bodies (cleistothecia) develop on leaves as plants mature in June. Cleistothecia are recognized as distinct round, black dots within older, grey colonies of powdery mildew. Cleistothecia contain spores (ascospores) that serve to infect wheat.

Most years, wheat becomes infected with powdery mildew in the fall soon after planting. Autumn infections on newly planted wheat result from spores produced on volunteer wheat plants or spores developing within cleistothecia. The mildew fungus survives over winter as cleistothecia on wheat straw or as mycelium on infected wheat. Conidia produced on wheat plants are wind dispersed. Conidia germinate and infect plants under cool, moist conditions. Infection does not require free water on the plant surfaces, but high relative humidity (near 100 percent) favors infection. Optimum development of powdery mildew occurs between 59 and 71 degrees (F) and is retarded above 77 degrees F.

Under optimum conditions, a new crop of conidia is produced every 7 to 10 days. Mildew is more severe in dense stands of heavily fertilized wheat. Plants are most susceptible during periods of rapid growth,

especially from stem elongation through heading growth stages. Some recommendations to be observed to control this disease.

1. Growing mildew resistant varieties is the most economical way to control powdery mildew. Wheat varieties vary in their resistance to powdery mildew and new races of the fungus develop that attack previously resistant varieties. Therefore, it is important to get current information on the varieties with effective resistance to powdery mildew.

2. Powdery mildew thrives where high rates of nitrogen have been used. Nitrogen not only promotes tiller formation, causing dense stands, but also increases the susceptibility of the crop.

3. In fields with persistent disease problems, the wheat stubble and other residues should be tilled into the soil to permit disease causing fungi to die out before another wheat crop is planted.

4. Fungicides are available that provide excellent control of powdery mildew. Their application is based on scouting fields for symptoms and assessing disease severity from tiller elongation through flowering stages of growth. It is important to keep the top two leaves of the plant as disease free as possible so that the plant can use its full potential to fill the grain. Fungicides can be applied based on the level of disease in the field, the known susceptibility of the variety, and the selling price of the grain.

TEXT 3

I. Read the text and choose the word or phrase you think best completes the sentences:

1. Blackleg, aerial stem rot, and tuber soft rot are … diseases caused by several types of soft-rot bacteria.

a) different
b) various
c) similar

2. Blackleg and tuber soft rot … wherever potatoes are grown.

a) appear
b) take place
c) occur

3. Aerial stem rot is widespread, but is … under sprinkler-irrigation.

a) severe
b) the most severe
c) more severe

4. Blackleg, aerial stem rot, and tuber soft rot … by two closely related bacteria.

a) am caused
b) is caused
c) are caused

5. Moisture and temperature are the two … factors in initiation and development of soft-rot diseases.

a) peculiar
b) critical
c) useful

6. *Blackleg in growing plants … by cool, wet soils at planting followed by high temperatures after emergence.*

a) is caused
b) is favored
c) is brought

7. Blackleg … caused by E. c. atroseptica carried on contaminated seed tubers.

a) usually
b) seldom
c) often

8. Aerial stem rot is usually caused by E. c. carotovora … in infested soil or introduced to the crop by irrigation water, wind-blown rain, and insects.

a) contained
b) found
c) brought

9. *Oxygen depletion in tubers … soft rot.*

a) favors
b) is favoring
c) are favoring

10. When seed pieces in soil or tubers in storage become covered with a film of … , the tissues rapidly become depleted of oxygen.

a) nutrients
b) air
c) water.

II. Make a summary to the text using the phrases given on pages 82-83.

BLACKLEG, AERIAL STEM ROT AND TUBER SOFT ROT OF POTATO

Blackleg, aerial stem rot, and tuber soft rot are all similar diseases caused by several types of soft-rot bacteria (Fig. 2). Blackleg and tuber soft rot occur wherever potatoes are grown. Aerial stem rot is also widespread, but is most severe under sprinkler-irrigation.

Blackleg begins from a contaminated seed piece, but the symptoms can occur at several stages of plant development. In severe cases, entire seed pieces and developing sprouts may rot in the ground prior to emergence, resulting in a poor stand. Blackleg often develops after plants are well up or even in flower. In this case, stem bases of diseased plants typically show an inky-black to light-brown decay that originates from the seed piece and can extend up the stem from less than an inch to more than two feet.

Leaves of infected plants tend to roll upward at the margins, become yellow, wilt, and often die. Aerial stem rot (also called bacterial stem rot or aerial blackleg) is initiated by soft-rot bacteria from sources external to the seed piece. Stem infection can occur through wounds or through natural openings such as leaf scars,

Lesions on diseased stems first appear as irregular brownish to inky-black areas. These enlarge into a soft, mushy rot that causes entire stems to wilt and die. Potato tubers with soft rot have tissues that are very soft and watery, and have a slightly granular consistency.

The diseased tissue is cream- to tan-colored, and often has a black border separating diseased from healthy areas. In the early stages, soft-rot decay is generally odorless but later a foul odor and a stringy or slimy decay usually develops as secondary decay bacteria invade infected tissues. Most internal tuber tissues may be consumed by soft rot organisms, sometimes leaving only a shell of skin remaining in the soil.

Blackleg, aerial stem rot, and tuber soft rot are caused by two closely related bacteria, Erwinia carotovora subsp. atroseptica and Erwinia carotovora subsp. carotovora. E. c. carotovora is very common and has an extensive host range, including most fleshy vegetables. It survives readily in soil and surface waters such as rivers, lakes, and even oceans. These bacteria are capable of multiplying and persisting in the root zones of

many host and nonhost crop and weed species. In contrast, E. c. atroseptica is associated mostly with potatoes. These bacteria do not survive well in soil for more than one year, unless they are contained within diseased tubers or other potato plant debris.

A B C

Figure 2. Inky black to light-brown stem decay of blackleg originating from the potato seed piece and extending abovo ground up the stem. Note witting Icavos of infected plant (A), Irregular, brownish black, soft, mushy stem lesions characteristic of aerial stem rot (B), Potato tuber mostly consumad by soft rot bacteria resulting in a soft, watery, cream to tan-colored decay (C)

Blackleg is usually caused by E. c. atroseptica carried on contaminated seed tubers. Most lots of seed tubers are contaminated to some degree, but the bacteria are usually dormant and do not cause disease unless environmental conditions are favorable. In contrast, aerial stem rot is usually caused by E. c. carotovora contained in infested soil or introduced to the crop by irrigation water, wind-blown rain, and insects. Tuber soft rot can be caused by either of these soft-rot bacteria.

Moisture and temperature are the two critical factors in initiation and development of soft-rot diseases. High soil temperatures and bruising of seed tubers favor seed-piece decay and pre-emergence blackleg. Blackleg in growing plants is favored by cool, wet soils at planting followed by high temperatures after emergence. Dense plant canopies and long periods of leaf wetness favor infection of aerial plant parts. Although tuber soft rot can occur at any temperature above 50 F, disease develops best above 75 F.

Oxygen depletion in tubers also favors soft rot. When seed pieces in soil or tubers in storage become covered with a film of water, the tissues rapidly become depleted of oxygen. This also may be induced by soil flooding or improper drying of washed tubers. If it starts, tuber soft rot can proceed rapidly in storage. We can see that areas that develop in the piled tubers that flow onto ones below, spread the bacteria. Heat, coupled with condensation on tuber surfaces, can further adversely affect storage conditions, resulting in accelerated "melt" of the pile.

TEXT 4

I. Read the text and say if these statements are true or false:

1. The bean leaf beetle is one of the most important soybean pests in the United States.

2. The length of bean leaf beetle is 2 inches.

3. A female beetle is capable of producing 130 to 400 eggs.

4. After hatching from their eggs, bean leaf beetle larvae feed on aboveground plant parts.

5. Depending on the soil temperature, larvae may feed for three to six weeks before pupating in earthen cells.

6. Bean leaf beetle larvae and adults possess chewing mouthparts.

7. Larvae may feed on roots and root hairs but show a preference for root nodules.

8. Defoliation by adult bean leaf beetle is identifiable by the small round holes between the major leaflet veins.

9. Pod damage by adult bean leaf beetles is the most important type of injury.

10. Pod damage can cause complete pod loss when adults feed at the base of the pod.

11.Seeds damaged by these pathogens become shrunken, discolored and moldy.

II. Make a summary to the text using the phrases given on pages 82-83.

SOYBEAN LEAF BEETLE

The bean leaf beetle, *Cerotoma trifurcate*, is one of the most important soybean pests in the United States. It is tied for second among all pest species attacking soybean foliage, pods and seeds.

This small beetle (at least ¼ inch in length) overwinters as adults beneath leaf litter in wood lots adjacent to soybean fields. Once spring temperatures reach 50 to 55 degrees Fahrenheit, adults become active and seek available host plants (such as grasses, soybean plants and other legumes). Adult coloration (red, orange, tan or gray) and markings (dots, strips, or both) may vary among individuals or populations; however, all adults possess a black triangle at the base of their forewings. A female beetle is capable of producing from 130 to 200 eggs. The reddish, spindle-shaped eggs are laid adjacent to plant stems in the upper 5 inches of the soil.

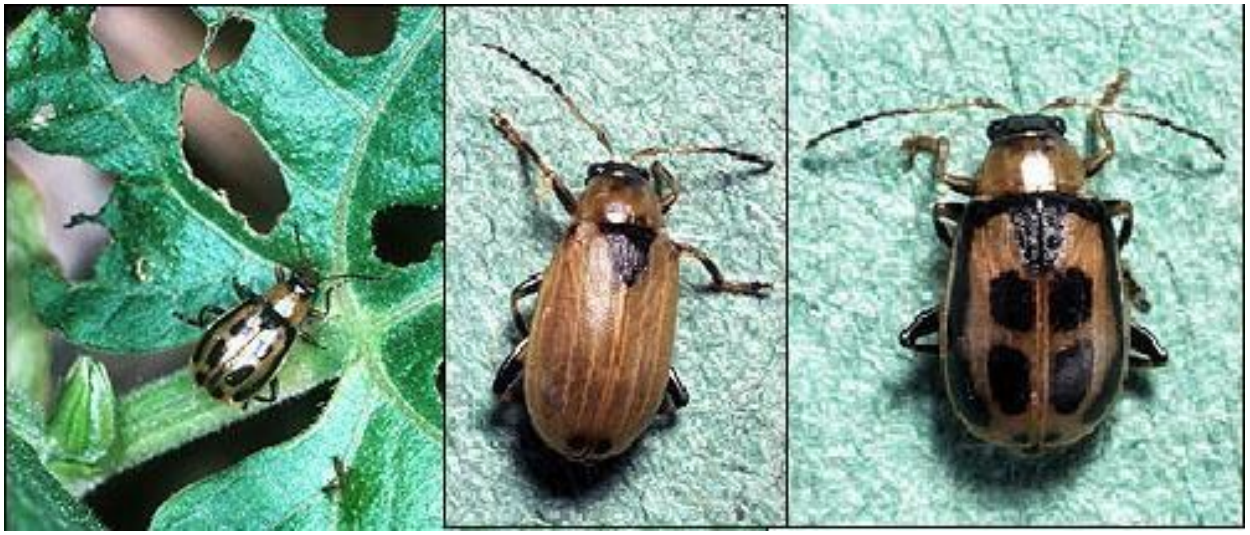


Figure 3. Soybean leaf beetle

After hatching (5–7 days) from their eggs, bean leaf beetle larvae (white, cylindrical with a black head and an anal shied) feed on underground plant parts. Depending on the soil temperature, larvae may feed for three to six weeks before pupating in earthen cells. About a week later, adults emerge (beginning mid-July) to feed, mate and lay eggs. There are two, in-season generations per year the second of which generally emerges in September. These adults will feed on soybean or other host plants before moving into overwintering sites sometime in October.

Both bean leaf beetle larvae and adults possess chewing mouthparts. Larvae may feed on roots and root hairs but show a preference for root nodules. Even though nodule damage can diminish the plant`s ability to fix atmospheric nitrogen, it is the adult feeding damage to foliage and particularly pods that is economically important. Defoliation by adult bean leaf beetle is identifiable by the small round holes between the major leaflet veins. This damage differs from the larger, irregular holes or jagged leaflet margins caused by caterpillars and grasshoppers. Even though

soybean plants may sustain more than 50 percent foliage damage, plants can generally compensate unless damage occurs during the reproductive growth stages.

Pod damage by adult bean leaf beetles is the most important type of injury. This damage can cause complete pod loss when adults feed at the base of the pod. This type of injury is referred to as “pod clipping”. Adult damage to the outer pod wall also leads to the formation of pod lesions. Moisture can then enter through these pod lesions, and this increased moisture level permits the entry of secondary pathogens.

Seeds damaged by these pathogens become shrunken, discolored and moldy. Several primary pathogens (e.g., bean pod mottle, cowpea mosaic and southern bean mosaic viruses) also can be transmitted by adult beetles. Bean damage caused by this beetle leads to the yield reduction. As soon as soybean seedlings emerge, it is important to scout fields weekly for bean leaf beetle infestations. Scouting procedures are targeted at the adult stage because sampling for the larvae is expensive, labor intensive and time consuming.

TEXT 5

I. Read the text and complete the sentences given below with the information from the text:

1. The green peach aphid can be found worldwide and is considered …
2. The green peach aphid will attack plants in the field as well as…
3. It can be found on most vegetable crops, …
4. Aphid feeds on young plant tissues …
5. Over 100 viruses can be transmitted…
6. Temperatures greatly influence the lifecycle of the green peach aphid.
7. Most green peach aphid outbreaks on vegetable crops ….
8. Green peach aphid is resistant to…
9. Biological control plays a major role in …
10. Green peach aphid has numerous natural enemies including …
11. Green peach aphids are often parasitized by …

II. Make a summary to the text using the phrases given on page 82.

GREEN PEACH APHID ON VEGETABLES

The green peach aphid can be found worldwide and is considered a pest of numerous vegetable crops (Fig. 4).

Aphid eggs are yellow or green in color turning black as they develop. They are elliptical (0.02 in. long. and 0.01 in. wide). Eggs are usually laid in crevices or near buds. *Nymphs*. Aphid nymphs are greenish turning yellowish as they grow and closely resemble adults. Nymphs that develop into winged adults may be pinkish. *Adults*. There are multiple forms of adults. The wingless adult (0.07–0.08 in.) is yellowish or greenish with possible medial and lateral green stripes present. Their appendages are pale. The winged adult (0.07–0.08 in.) has a black head and thorax, yellowish green abdomen and large dark patch dorsally. The egg laying form, oviparae female, is pinkish (0.06–0.08 in.).

Figure 4. Green peach aphid

The green peach aphid will attack plants in the field as well as in greenhouses. Their primary overwintering host is *Prunus sp*. (peach trees and their hybrids). However, in the summer, they leave their primary host to feed on a wide range of plants including many ornamentals, weeds, and agronomic crops. They can be found on most vegetable crops, potato, and cucurbits, etc.

Aphids feed on young plant tissues causing water stress, wilting and reduced growth rates. Prolonged infestation may reduce yields. The major concern, however, is the transmission of viruses to the plants through the adults and nymphs. Over 100 viruses can be transmitted by green peach aphid. A few examples are Potato Leafroll Virus and Potato Virus Y to solanaceous plants (pepper, potato, tomato); Cauliflower Mosaic Virus to crucifers, and Cucumber Mosaic Virus and Watermelon Mosaic Virus to cucurbits.

Temperatures greatly influence the lifecycle of the green peach aphid, especially cold winters. In the North, aphids overwinter in the egg stage on *Prunus* trees. Mortality at this stage may be very high. As temperatures warm, the aphid may go through multiple generations while still on the tree, but as densities increase, winged adults are produced. These winged forms colonize nearby plants by depositing daughters on one plant and then moving on to the next plant. Each daughter begins asexual reproduction (parthenogenesis) by rapidly giving birth to new daughters, which often already have a developing daughter inside them ready to emerge in a few days.

As densities increase on the newly colonized plants, and as the plants deteriorate, new winged forms are produced. This cycle repeats as long as the weather is favorable. Eventually, as day length begins to shorten and temperatures change, the winged females search for *Prunus* trees to colonize. Females arrive on the overwintering locations first and give birth to wingless egg laying forms (oviparae), which mate with winged males. These females each lay 4-13 eggs on the overwintering host.

In some parts of the world, where suitable host plants are abundant all year round, aphids do not return to a *Prunus* host plant, but continue to recolonize and reproduce on secondary hosts.

Most green peach aphid outbreaks on vegetable crops are the result of applications of agrichemicals. Green peach aphid is resistant to many broad-spectrum insecticides, and frequent applications of these chemicals (such as pyrethroids) eliminate natural enemies and stimulate reproduction in the aphid.

Aphid densities tend to be higher on plants that are fertilized liberally, thus efficient use of fertilizer can help to prevent large-scale outbreaks. Use of metallized (aluminated) or reflective mulch can help reduce aphid populations on vegetables by interfering with the ability of winged aphids to find plants. In addition, removal of nearby *Prunus* trees may help to reduce the overwintering population of aphids and the source of immigrants to vegetable crops in the summer months.

Biological control plays a major role in the natural suppression of aphids. Green peach aphid has numerous natural enemies including ladybird beetles, lacewing larvae, syrphid fly larvae, and predatory bugs. Green peach aphids are also often parasitized by native aphidiid wasps.

The use of insecticides is only recommended after approximately 50 % of leaves are infested.

TEXT 6

I. Read the text and choose the word or phrase you think best completes the sentences:

1. Cucumber, cantaloupe, winter squash, pumpkin, gourd, summer squash, and watermelon, ... many other species of cucurbits are attacked by cucumber beetles.

a) as well as
b) and
c) but

2. Cucumber beetles ... feed on beans, corn, peanuts, potatoes, and other crops.

a) may
b) must
c) should

3. Cucumber beetles ...four types of damage: seedling destruction, flower and foliage damage, root feeding, and transmission of bacterial wilt disease.

a) injure
b) bring
c) cause

4. Damage from cucumber beetles starts in the spring with feeding by adults on the seedling ... of the cucurbits.

a) stage
b) level
c) period

5. The beetles feed on newly emerged cotyledons and ..., and they have been reported to go below ground level and feed on plants as they emerge.

a) stems
b) leaves
c) flowers

6. The ... damage by cucumber beetles is from transmission of bacterial wilt caused by Erwinia tracheiphila.

a) more serious
b) the most serious
c) serious

7. Bacterial wilt can kill many plants in a field and seriously … the yield.
a) reduce
b) is reducing
c) has reduced

8. The striped cucumber beetle and the spotted cucumber beetle … very similar life cycles and both can carry the bacteria.
a) has
b) have
c) is having

9. The spotted cucumber beetle, also … as the southern corn rootworm, is a general feeder and is a pest on other crops, peanuts and corn in particular.
a) known
b) famous
c) prominent

10. The striped cucumber beetle has a more specific host range and feeds almost … on cucurbits in the adult stage.
a) exclusively
b) mostly
c) especially

II. Make a summary to the text using the phrases given on pages 82–83.

CUCUMBER BEETLES

Cucumber, cantaloupe, winter squash, pumpkin, gourd, summer squash, and watermelon, as well as many other species of cucurbits are attacked by cucumber beetles. Cucumber beetles may also feed on beans, corn, peanuts, potatoes, and other crops.

Cucumber beetles are important pests of cucurbits (Fig. 5). They cause four types of damage: seedling destruction, flower and foliage damage, root feeding, and transmission of bacterial wilt disease. Damage from cucumber beetles starts in the spring with feeding by adults on the seedling stage of the cucurbits.

The beetles feed on newly emerged cotyledons and stems, and they have been reported to go below ground level and feed on plants as they emerge. Adults lay eggs in the soil near the seedlings and larvae soon hatch and begin feeding on roots of the cucurbits. Larvae chew holes and tunnel into the roots. Damage by the larvae, except under dry conditions, is usually considered minor. The first generation of adults emerges in late June and early July to feed on the foliage and flowers. Feeding damage by cucumber beetles to foliage is usually very minor, but severe feeding on flowers can result in poor fruit set. The second generation emerges in September and October.

Figure 5. Cucumber beetles

Probably the most serious damage by cucumber beetles is from transmission of bacterial wilt caused by *Erwinia tracheiphila*. Bacterial wilt can kill many plants in a field and seriously reduce the yield. The striped cucumber beetle and the spotted cucumber beetle have very similar life cycles and both can carry the bacteria, but both are not equally important pests on cucurbits. The spotted cucumber beetle, also known as the southern corn rootworm, is a general feeder and is a pest on other crops, peanuts and

corn in particular. The spotted cucumber beetle, however, is not considered as a serious problem as the striped cucumber beetle.

The striped cucumber beetle has a more specific host range and feeds almost exclusively on cucurbits in the adult stage. The larvae are dependent on cucurbits for development; they cannot live on any other host plant. Both beetles should be monitored where cucurbits are grown.

Cucumber beetles are native insects and occur throughout the United States from Canada to Mexico.

Cucumber beetles bacterial wilt of cucurbits is caused by *Erwinia tracheiphila*. Wilting usually starts with a single leaf and spreads to the entire plant, killing it. A stringy, viscous, white bacterial ooze forming a `string` between cut ends of an affected stem is considered diagnostic for the disease in the field. Bacterial wilt of cucurbits is a serious disease of cucumber and muskmelon, and to a lesser extent, pumpkin and squash. The impact of disease transmission during the growing season is probably the most important aspect of the cucumber beetle’s biology.

There are three strategies for control of cucumber beetles. The earliest method that provided a good degree of control, reported in 1841, was to exclude the beetles by covering cucurbit plants with some sort of cloth cover, such as cheese cloth, that was thin enough to let light in but kept the insects out. This method can still be used.

Now there are commercial row crop covers that will provide protection from cucumber beetles, and in addition provide late frost protection and help in moisture retention. Trap crops may give some degree of control. An early planting of cucurbits can be made in order to attract the overwintering cucumber beetles where they can be destroyed by insecticides. This reduces the numbers of cucumber beetles that could feed on the main cucurbit crop planted later. It is important to pull out and burn the remaining vines of the trap crop after destroying the cucumber beetles. Trap crops should probably not be relied on solely for control.

Chemical control is often needed, particularly in commercial plantings. A soil insecticide is used at planting time for control of cucumber beetles during the seedling stage and foliar treatments are applied later in the growing season as needed.

GLOSSARY OF TERMS

Abdomen – the posterior body portion of an arthropod.

Abiotic disorder – disease caused by factors other than pathogens, such as inappropriate cultural practices or adverse environmental conditions including nutrient deficiencies and pesticide phytotoxicity.

Alternate host – plants not related to the main host of parasitic fungus, where it produces its different stages to complete one cycle (heteroecious).

Annual – a plant that normally completes its life cycle of seed germination, vegetative growth, reproduction, and death in a single year.

Antagonism – the counteraction between organisms or groups of organisms.

Antagonist – an organism that releases toxins or otherwise changes conditions in a way that reduces the activity or growth of other organisms (especially pests).

Antenna (plural: antennae) – the paired, segmented, sensory organs on each side of the head of certain arthropods, such as insects.

Aphid – (family Aphididae), also called plant louse, greenfly, or ant cow, any of a group of sap–sucking, soft–bodied insects (order Homoptera) that are about the size of a pinhead, most species of which have a pair of tubelike projections (cornicles) on the abdomen. Aphids can be serious plant pests and may stunt plant growth, produce plant galls, transmit plant virus diseases, and cause the deformation of leaves, buds, and flowers.

Arthropod – an animal with jointed appendages and an external skeleton, such as a crab, insect, mite, or spider.

Ascospore – a spore produced within the saclike cell of the sexual state of a fungus.

Attractant – a substance that attracts a specific species of a pest.

***Bacillus thuringiensis* (Bt)** – a group of bacteria that causes disease in certain insects. Formulations of several subspecies of Bacillus thuringiensis are used as insecticides, most commonly for caterpillars but for other pests as well (e.g., mosquito larvae).

Bacterium (plural: bacteria) – a single–celled, microscopic organism that lacks a nucleus. Some bacteria cause animal or plant diseases.

Biodegradation – the breaking down of a substance (e.g., a pesticide) by organisms (commonly microorganisms) in the environment.

Biological control or biocontrol – the reduction of an organism's abundance or damage due to a natural enemy, such as a predator

consuming (killing) prey. Biological control may occur naturally in the field or result from introduction or manipulation of natural enemies by people.

Biotic disease – an unhealthy condition caused by a pathogen, such as a bacterium, fungus, phytoplasma, or virus.

Biotroph – a plant pathogenic fungus that requires living host cells i.e., an obligate parasite.

Biotype – a strain of a species that has certain biological characteristics distinguishing it from other individuals of that species. For example, certain populations of horseweed have genetic characters that make them resistant to the herbicide glyphosate; those are glyphosate–resistant biotypes.

Blight – a disease characterized by general and rapid death of plants or parts, such as branches, flowers, or leaves.

Bordeaux mixture – a pesticide made of a mixture of copper sulfate and hydrated lime primarily used as a fungicide.

Broadcast application – the application of a substance (e.g., fertilizer or pesticide) to an entire area (e.g., field or orchard).

Broad–spectrum pesticide – a pesticide that kills a wide variety of unrelated species.

Calibrate – to correct or standardize measuring devices. To properly adjust a sprayer's output.

Canker – a dead, discolored, often sunken area (lesion) on a branch, root, stem, or trunk.

Caterpillar – larva of a butterfly or moth (Lepidoptera). Most caterpillars have cylindrical bodies consisting of multiple segments, with three pairs of true legs on the thorax and several pairs of short, fleshy prolegs on the abdomen.

Chemigation – the process of applying pesticides or fertilizers through irrigation systems.

Chlamydospore – a thick–walled spore formed from the cell of a fungal hypha.

Chronic illness – an illness that will last for long periods of time.

Collateral host – the wild host of same families of a pathogen is called as collateral host.

Colonization – the growth of a pathogen, particularly a fungus, in the host after infection is called colonization.

Competitive exclusion agent – an organism capable of out competing other organisms to such an extent that it excludes the other organisms from the environment.

Complete metamorphosis – a type of development in which there are four main life stages (egg, larva, pupa, and adult) and the larvae generally look distinctly different than the adults.

Conidium (plural: conidia) – an asexual fungal spore formed by budding or fragmentation at the tip of a specialized hypha.

Cornicle – one of two tubular structures projecting from the top rear of an aphid's abdomen.

Crop Damage – it is defined as any reduction in the quality or quantity of yield or loss of revenue resulting from crop injury.

Crop rotation – the practice of purposefully alternating crop species grown on the same plot of land, typically to improve soil conditions or manage pests.

Damping–off – death of seedlings caused by one or more pathogens that weaken the stem or root.

Decontaminate – to remove a degrade, or chemical residue from the skin or on the surface.

Deficiency – abnormality, or disease caused by the lack or subnormal level of availability of one or more essential nutrient elements.

Defoliant – a pesticide used to remove leaves from target plants often as an aid in harvesting a plant.

Dessicant – a pesticide that destroys target pests by causing them to lose body moisture.

Disease – an unhealthy condition (e.g., that caused by a pathogenic bacteria, fungus, or virus) that impairs the function or performance of an organism. In the case of crops, disease impairs a plant's economic value.

Disease cycle – the chain of events involved in disease development.

Disease syndrome – the set of varying symptoms characterizing a disease are collectively called a syndrome.

Dormancy – a period of inactivity or slowed function, such as that seasonally or during periods of adverse environmental conditions. For many tree fruit and nut crops dormancy occurs during the winter.

Ectoparasite – a parasite that lives on the outside of its host.

Endoparasite – a parasite that lives inside its host.

Entomopathogenic nematodes – nematodes that infect and, in combination with symbiotic bacteria, kill insects.

Flag leaf – the terminal leaf of a grass plant. The last emerging leaf below the grain head.

Fumigant – any volatile, poisonous substance used to kill insects, nematodes, and other animals or plants that damage stored foods or seeds, human dwellings, clothing, and nursery stock.

Fungicide – a pesticide used for fungi control.

Fungus (plural: fungi) – a multicellular organism (e.g., mildew, mold, rust, or smut) that lacks chlorophyll and derives its nutrients from other organisms. The fungal body generally consists of filamentous strands called mycelium.

Gall – localized swelling or outgrowth of plant tissue, often formed by a plant in response to the action of an insect, pathogen, or other organism.

Hemibiotroph – a plant pathogenic fungus that initially requires living host cells but after killing the host cell grows on the dead and dying cells.

Herbicide – a pesticide used for weeds control.

Hibernaculum (plural: hibernacula) – a shelter occupied during the winter by a dormant insect, notably peach twig borer, or other animal.

Honeydew – an excretion from insects, such as aphids, mealybugs, soft scales, and whiteflies, consisting of modified plant sap and composed mostly of sugars and water.

Hormoligosis – an increase in the reproduction of an organism that can occur after sublethal exposure to certain pesticides.

Host – an animal, plant, or other organism that provides sustenance for a parasite or pathogen.

Host resistance – the ability of a host plant or animal to ward off or resist attack by pests or to be able to tolerate damage from pests.

Hypha (plural: hyphae) – a filament that is the vegetative, structural unit (mycelium) of a fungus.

Immune – unable to become diseased or infected by a given pathogen.

Incomplete metamorphosis – a type of arthropod development that consists of three life stages (egg, nymph, and adult) and has nymphs that commonly resemble the adults.

Incubation period – the period of time between penetration of a pathogen to the host and the first appearance of symptoms on the plant.

Infection – the entry into a host and establishment of a pathogen.

Infestation – the presence of pests in a field or other area or on a given host.

Inoculum – that portion of pathogen which is transferred to plant and cause disease.

Inoculum potential – the growth or threshold of fungus available for colonization at substratum (host).

Insecticide – a pesticide used for insect’s control.

Instar – one of the larval or nymph stages of an immature insect between successive molts. For example, the first instar is between hatching and the first molt.

Integrated pest management (IPM) – a pest management strategy that focuses on long–term prevention or suppression of pests or their damage through a combination of techniques, such as biological control, habitat manipulation, modification of cultural practices, and use of resistant varieties. Pesticides are used only after monitoring indicates they are needed according to established guidelines if available, and treatments are made with the goal of removing only the target organism or preventing its damage. Pesticides are selected and applied in a manner that minimizes risks to human health, nontarget organisms, and the environment.

Invasion – the penetration and spread of a pathogen in the host.

Juvenile – an immature form of a nematode, insect, or other animal.

Label – the information and directions for use, storage, and disposal of a pesticide, typically found on a pesticide container. The pesticide label is a legal document that users must follow.

Larva (plural: larvae) – the immature form of an insect that hatches from an egg, feeds, and then enters a pupal stage. The first–stage immature of mites is also called a larva, although mites do not develop a pupal stage.

Lepidopterous – of or pertaining to butterflies and moths (order Lepidoptera).

Mandibles – jaws, the forward–most pair of mouthparts of an insect.

Meconium – the fecal pellet excreted by a larva before pupation.

Microbial pesticides – bacteria, fungi, viruses, or other microorganisms that are commercially produced to kill or otherwise reduce the abundance or damage of pests, such as invertebrates, plant pathogens, or weeds.

Microorganism – an organism of microscopic size, such as a bacterium, phytoplasma, or virus.

Micropropagation – generation of new, disease–free plants from tiny pieces of meristem tissue.

Microsclerotia (singular: microsclerotium) – very small sclerotia, such as those produced by Verticillium wilt fungi.

Mildew – a conspicuous mass of white threadlike hyphae and fruiting structures produced by various fungi.

Minituber – a small tuber produced under greenhouse conditions on a small potato plant generated by micropropagation.

Miticide – a pesticide used for mite's control.

Molluscicide – a pesticide for pest mollusks, such as slugs and snails.

Molt – in insects and other arthropods, the forming of a new cuticle (skin) that precedes shedding (ecdysis) of the old skin. Molting is a part of the process of development into a larger and older instar, or metamorphosis into the next life stage.

Monitoring – carefully gathering and recording information on the abundance, development, and growth of organisms (typically pests or crops) or other factors (e.g., crop damage), often utilizing very specific procedures and commonly on a regular basis over a period of time.

Multiple cycle disease (Polycyclic) – some pathogens specially a fungus, can complete a number of life cycles within one crop season of the host plant and the disease caused by such pathogens is called multiple cycle disease e.g., wheat rust, rice blast, late blight of potato etc.

Mutation – an abrupt appearance of a new characteristic in an individual as a result of an accidental change in genes present in chromosomes.

Mutualism – symbiosis of two organisms that are mutually helpful or that mutually support one another.

Mycelium (plural: mycelia) – the vegetative structure of a fungus, consisting of a mass of slender filaments called hyphae.

Mycoplasma – a living organism smaller than a bacterium that has a unit membrane but no cell wall. The newer generally accepted term is phytoplasma.

Mycorrhiza (plural: mycorrhizae) – a fungus that grows in a symbiotic association with the roots of a plant, generally in a way that is beneficial to the plant.

Necrosis – death of a circumscribed area of plant or animal tissue as a result of disease or injury.

Necrotroph – a pathogenic fungus that kills the host and survives on the dying and dead cells.

Nematicide – a pesticide used to control nematodes.

Nonpersistent virus – a virus that is carried on the mouthparts of its vector (e.g., an insect) and is lost after the vector feeds once or a few times.

Nymph – the immature stage of insects (e.g., aphids and grasshoppers) that develop through incomplete metamorphosis. The juveniles that hatch from eggs and develop into adults through a series of molts without passing through a pupal stage.

Oviposit – to lay or deposit eggs.

Oviposition – the act of laying or depositing of eggs.

Parasite – an organism living upon or in another living organism (the host) and obtaining the food from the invading host.

Parasitoid – an insect that spends its immature stages feeding on or inside of the body of a host insect, ultimately killing its host over the course of its development.

Parthenogenesis – a form of asexual reproduction. Development of an egg without fertilization.

Pathogen – an entity, usually a micro–organism that can cause the

Pathogenesis – it is a process caused by an infectious agent (pathogen) when it comes in contact with a susceptible host.

Pathogenicity – the relative capability of a pathogen to cause disease.

Persistent virus – a virus that systemically infects its vector (e.g., an insect) and generally is transmitted for the remainder of the vector's life.

Pest – an organism that interferes with the availability, quality, use, or value of a crop, other desirable plant, or managed environment or resource; an organism that creates a nuisance or otherwise is undesirable.

Pest resurgence – the rapid rebound of pest abundance after the numbers were reduced by management action.

Pesticide – any substance or mixture intended for destroying, killing, preventing, or repelling a pest (including fungi, insects, nematodes, rodents, or weeds) or mitigating problems that pests cause. Also includes any substance or mixture intended for use as a defoliant, desiccant, or plant growth regulator.

Pesticide resistance – a result of genetic selection in which a pest population is able to survive or resist the effects of a pesticide or group of pesticides that formerly controlled the pest, ultimately resulting in the pesticide being less effective or no longer effective.

Pesticide rotation – the practice of alternating pesticides of different modes of action in order to prevent the development of pesticide resistance.

Phenoxy herbicides – a group of herbicides for broadleaf plants derived from phenoxy–acetic acid which include 2,4–D; 2,4–DB and MCPA.

Pheromone – a substance secreted by an organism to affect the behavior or development of other members of the same species.

Physiologic race – one or a group of microorganisms similar in morphology but dissimilar in certain cultural, physiological or pathological characters.

Poison – in biochemistry, a substance, natural or synthetic, that causes damage to living tissues and has an injurious or fatal effect on the body, whether it is ingested, inhaled, or absorbed or injected through the skin.

Postemergence herbicide – an herbicide applied after weeds emerge.

Predator – any animal (including insects and mites) that attacks and kills other animals (prey) and then feeds on them, usually consuming many prey during its lifetime.

Predisposition – the effect of one or more environmental factors which makes a plant vulnerable to attack by a pathogen.

Primary infection – the first infection of a plant by the over wintering or over summering of the pathogen.

Proleg – a fleshy, unsegmented, leglike appendage on the abdomen of certain insect larvae (e.g., caterpillars and sawflies).

Pronotum – a prominent, platelike structure that covers a portion or all of at least the upper surface (dorsum) of the first thoracic segment of an insect.

Protectant fungicide – a fungicide that prevents a plant from being infected by a fungal pathogen as well as the development of a fungal infection.

Prothorax – the first (front) segment of the insect thorax.

Pupa (plural: pupae) – the nonfeeding, relatively inactive stage between larva and adult in insects that undergo complete metamorphosis.

Pupate – to develop into a pupa.

Pustule – a small, blister–like elevation of epidermis from which spores emerge.

Pycnidium (plural: pycnidia) – a small, spherical or flask–shaped structure formed by certain types of fungi, inside which spores are produced.

Quarantine – a period of enforced isolation and restricted movement that is imposed to prevent the spread of pests; the legal enforcement of measures aimed to prevent a pest from spreading or establishing in new areas.

Repellent – a pesticide used to keep target pests away from a treated area by saturating the area with an odor that is disagreeable to the pest.

Rodenticide – a pesticide used to control rats, mites, rodents etc.

Rot – any of several plant diseases, caused by any of hundreds of species of soil–borne bacteria, fungi, and funguslike organisms (Oomycota). Rot diseases are characterized by plant decomposition and putrefaction.

Sanitation – activity that reduces the spread of pathogen inoculum, especially the removal and destruction of infected plant parts and cleaning of equipment and tools; the practice of removing crop debris and weeds from growing areas.

Sclerotium (plural: sclerotia) – a compact mass of hardened mycelia that serves as a dormant stage in some fungi; a fungal survival structure.

Secondary infection – an additional infection facilitated or enabled either by a previous infection caused by another pathogen or a previous injury.

Secondary pest outbreak – an increase in or infestation of a pest (the secondary pest) following a management action (generally a pesticide application) taken to control a different pest, caused either by the destruction of natural enemies that normally control the secondary pest or elimination of the secondary pest's competitors.

Sign – physical evidence of a pest's presence that can be seen on a host or its surroundings, e.g., in plant pathogens, signs can include fruiting bodies and spores.

Single cycle disease (Monocyclic) – this type of disease is referred to those caused by the pathogen (fungi) that can complete only one life cycle in one crop season of the host plant. e.g., downy mildew of rapeseed, club root of crucifers, sclerotinia blight of brinjal etc.

Skeletonize – to remove leaf tissue between the veins, leaving the network of veins intact.

Smut – plant disease primarily affecting grasses, including corn (maize), wheat, sugarcane and sorghum, caused by several species of fungi. Smut is characterized by fungal spores that accumulate in soot–like masses called sori, which are formed within blisters in seeds, leaves, stems, flower parts, and bulbs.

Spiracle – an external opening in the body of an insect or other arthropod that allows air to enter the respiratory system.

Sporangium (plural: sporangia) – a structure in which asexual spores are contained.

Spore – a reproductive structure produced by fungi and other organisms that develops into a new individual under proper conditions.

Sporulation – the production of spores.

Spraying and dusting – (in agriculture) the standard methods of applying pest–control chemicals and other compounds.

Stylet–borne virus – a virus that is carried on the mouthparts of its insect vector and is lost after the vector feeds once or a few times.

Symbiosis – a mutually beneficial association of two or more different kinds of organisms.

Symptom – an outward expression or change in appearance indicating that an organism is unhealthy; in plants symptoms include chlorosis, necrosis and wilting.

Symptom – the external and internal reaction or alterations of a plant as a result of disease.

Target pest – the pest that a management action (e.g., a pesticide application) is intended to destroy or manage.

Teliospore – a thick–walled, dark spore of rust and smut fungi that is able to survive adverse conditions.

Thorax – the second of three major body divisions of an insect. The segments bearing the legs and wings (if present).

Tolerance – in pests, the ability to endure a pesticide without experiencing adverse effects; in crops, the ability of a plant to grow in spite of a pest infestation; in pesticide regulation, the maximum amount of pesticide residue that is permitted on a given agricultural product; in seed certification, the maximum percentage of the crop infested with a pathogen or other pest that is allowed during field inspections for certification of a seed lot.

Toxicity – the potential the pesticide has for causing harm.

Toxin – a poisonous substance produced by an organism, commonly through metabolic processes.

Translocated pesticide – a pesticide that is able to move throughout a plant, such as to roots after being applied to leaf surfaces; a systemic pesticide.

Urediospore – spore produced by a rust fungus that can spread the fungus to infect other

Viroid – a tiny, infectious particle that is smaller than a virus, consisting of single–stranded, ribonucleic acid and not enclosed in a protein coat.

Virulent – capable of causing a severe disease; strongly pathogenic.

Virus – tiny, infectious particle consisting of nucleic acid and a protein coat, which can reproduce only within the cells of a living host.

Wilt – common symptom of plant disease resulting from water loss in leaves and stems. Affected parts lose their turgidity and droop. Specific wilt diseases–caused by a variety of fungi, bacteria, and viruses—are easily confused with root and crown rots, stem cankers, insect injuries, drought or excess water, soil compaction, and other noninfectious problems.

Zoospore – a motile spore.

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