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ENTOMOLOGY

Lecture

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In the lecture notes are considered morphology, anatomy, biology of reproduction and development, ecology and systematics of insects. In a special part contained diagnostic features, distribution within Ukraine are the most important types of harmful insects, the data on their biology, ecology and harmfulness. These accounting methods and limit the number of harmful insects. Special attention is focused on the value and protection of insects.

Lecture intended for training in higher educational institutions of III - IV accreditation from the direction "Agronomics". It may be useful to plant protection specialists, agronomists farms of different ownership and management, students of postgraduate education institutions, to anyone interested in entomology.

CONTENT

PREFACE

Entomology - one of the main agronomic disciplines taught in the third year full-time.

The purpose of discipline is to provide future specialists with the necessary knowledge of agronomy Profile of biology, ecology and systematics of major insect pests of crops. Also, special attention is paid to fundamental measures to combat harmful organisms.

Lectures designed for those who know the basics of biology segmented animals at school and has a common understanding of the environmental issues. It sets out the theoretical basis of morphology, anatomy, ecology, biology of reproduction and development of insect systematics, ethology; also describes widespread pests of various crops and foods, methods of calculation, limit the number and importance of insects and their protection.

Lecture on entomology help students master theoretical material on the use of phytosanitary diagnostics methods, decision-making concerning distribution and forecasting of pests justification alarm timing of protective measures, the use of economic thresholds of harmfulness.

Material lectures combined eight themes. The duration of study each topic is not the same. It depends not only on the individual student, but also the degree of difficulty and the amount proposed for learning.

LECTURE 1. Introduction to entomology. Morphology and anatomy INSECT

Question:
1. The concept of entomology. History of entomology. Sections of Entomology
2. Insect Morphology
3. Insect Anatomy

1. The concept of entomology. History of entomology. Sections of Entomology

Entomology - a comprehensive science (from the Greek. Entomon - insect and logos - word, teaching), which studies the structure and the livelihoods of insects, their individual and historical development, diversity of forms on Earth distribution in time and space, the relationship with the environment and so on. At this time registered and described more than 106 species of insects.

First of all studied entomology arthropods, but gradually, due to the huge number of insect species (exceeding the number of other species of animals, plants and microorganisms combined), limited class of insects; the study also other classes of arthropods was the subject of separate sciences (Arachnology - the science of arachnids, carcinology - the science of shellfish, etc.). A study of insects in rows and separated families within a fractional entomology discipline - koleopterolohiya (beetles) lepidopterology (luskrkryli) myrmecology (ants), and others.

Now there are at least 1,018 separate species of insects. Each year, describing and recording over 7000 new species. Among a million species of insects harmful to man only 15,000 (1.5%).

History of Entomology

Entomology goes back to ancient times and cultures, especially in the context of agriculture. However, research dating back to the 16th century.

Historical Review. Interest in insects originated in ancient times. Man has long faced with damage to insects and beneficial insects used. In the Assyrian cuneiform tablets and Egyptian papyri 3rd millennium BC. referred devastating locust attacks: in ancient Chinese manuscripts of this period are indications of silkworm breeding and the fight against insects - pests gardens. Proceedings of ancient Greek philosopher Aristotle (4 in. BC), which allocated among 'animals without blood "group" entoma ", containing summary of insects. However, only in the 17th century. there entomology science. Fundamentals of Labour laid the Dutch scientist J. Svammerdama on bee anatomy and development (1669), Italian scientists M. Malpighi in anatomy and development of silkworm (1686) and F. Buonanni in structure mouthparts of insects, the German scientist I. Hedarta by type of metamorphosis. In the 17th century. made the first attempt to create a system of insects. In the 18th century. there are multi erection knowledge about insects, "Memoirs of the history of insects" (v. 1-6, 1734-1742), French scientist R. Reaumur, who discovered parthenogenesis in aphids (1737); observations of insects German scientist Alexander von Rezal Rozenhofa "Memoirs of insects" (v. 1-7, 1752-1778); Swedish naturalist C. To Hesra that conducted comparative morphological studies on insect larvae. From the mid-18th century. begins studying entomofauna large areas:

Swedish scientist C. Linnaeus described the entomofauna of Sweden (1746, 1761), a Russian scientist PS Pallas - different provinces of Russia (especially steppe zone) (1771-1776), F. Shrank - Austria (1781), P. Rossi - Italy (1790). Works Karl Linnaeus initiated the foundations of modern taxonomy. In the "System of Nature" (10th ed., Vol. 1-2, 1758-1759) Linnaeus described 1936 species of insects, distributing them to lineages that grouped based on the structure of the wings 9 series, and introduced binary nomenclature, scientific sorting the names of species.

In the 19th century. their system of insects offered British entomologists William Kirby, J. Westwood and John. Lubbock that identified several series. French entomologist Latreyl P. (1831) proposed a system in volume class, which roughly corresponds to the modern. With the work of Darwin "On the Origin of Species" (1859) of insects were built on the phylogenetic basis (Austrian scientist F. Brauer, the American scientist A. Packard and others.). Brilliant research on insect anatomy executed a French scientist L. Dufour, in metamorphosis - JA Fabre in France, in Germany A. Weismann, IA Porchynskyy, AO Kovalevsky in. Russian scientist NP Wagner discovered a type of parthenogenesis - paedogenesis (1862), AA Tikhomirov received artificial parthenogenesis in silkworms (1886); MS Ganin described a new type of Hymenoptera (1869), NV Bobretskyy established features of Diptera (1878) and NA Holodkovskyy - Orthoptera. PI Bahmetev began to study suspended animation (1897), AA Kovalevsky discovered in insects germ layers (one of the most important theoretical generalizations in embryology, 1869-1871); French zoologist P. Marchal - Polyembryony (1898); German scientist F. Graber (1897) and others have made in the construction of embryology of insects. Important research on the physiology of breathing and digestion of insects had French scientist F. Plateau (1870). Throughout the 19th century. big scientific expeditions and individual scientists (in GI Fischer von Valdheymom issuing 5 tons. "Эntomohrafyy Russia", 1820-1851; PP Semenovым-Tyan-Shansky, NM Przhevalsky, V.Y . Roborovskiy etc.) collected materials on Entomofauna many countries and continents, and at the turn of 19-20 centuries. there were fundamental reference summary of insects in Europe ("Beetles of Russia and Western Europe" in. 1-11 vol., 1905-1915), America (40 vol. in the "Central American biology", 1879-1915) Madagascar (6 vols. in "Natural History of Madagascar," 1889-1900), Hawaii (1899-1913), India (1887-1932) and others.

The development of entomology in the 20th century. characterized by the accumulation of vast factual material on global Entomofauna and large scale works on systematics, important discoveries and research in all fields of theoretical and applied entomology. The number of insect species known to science has increased to 1,000,000. Annually open hundreds of new species. Highlight 35-40 series. Rebuilt and improved system of insects (Austrian scientist A. Handlirsh American H. Crampton Soviet paleoentomoloh AV Martynov et al.); proposed new system (MS Gilyarov Soviet ecologist. 1969 Italian entomologist G. Grundy, 1970; Australian scientist Makkeras, 1970, etc.). Traditional taxonomy (comparative morphology) enriched by more subtle methods of investigation (electron microscopy,

kariosystematyka) using a computer. Numeric taxonomy developed areas (American scientist R. Sokal) and taxonomic analysis (Soviet scientist ES Smirnov et al.).

Morphology of insects as a basis for taxonomy entomologists widely studied in many countries; bodies studied in unity with their function (School of American scientist R. Snodhrassa, 1935, Soviet scientist A. Martynova, 1924, 1938, etc.). Actively studied insect physiology: tracheal breathing (Danish scientist A. Krogh), selection (Uihlsuort English scientist VB), especially vision and other senses insects and their ability to perceive polarized light and focus on it (the German scientist Karl Frisch) etc. Important role in the development of insect physiology played fotoperiodyzmu study (Soviet zoologist AS Danilevsky, a Dutch scientist J. de Vilde) disclosure mechanism which will solve many important practical problems (forecast number of insects in nature). In insects were discovered hormonal allocation of central nervous system (Polish scientist S. Kopec, 1917); molting hormones ekdyzony (A. Butenandt, 1954); regulating the development of insect juvenile hormone (K. Williams, 1956) and others. Recently discovered juvenile hormone analogs (vegetable or chemically synthesized) and antyhormony (American scientist W. Bauer, 1976) investigated as promising means of pest control.

In a separate section separated entomology insect biochemistry (especially after the Australian research scientist D. Hilmura, 1961). Opening substances released insects and regulate their behavior (A. Butenandt, Germany, and others.) Intensified study of insect behavior in the writings of the French naturalists R. Reaumur, then JA Fabra. Ethology in the 20th century. was saved from anthropomorphism inherent in the works of 18th century naturalists., and placed on a strictly scientific basis. This led to the discovery in the mid-20th century. "Language of bees" (German zoologist Karl Frisch) Insect ethology has become one of the major areas of research in modern entomology.

Widely developed environmental issues insects (the first major works include American scientists V. Shelford, 1913, R. Chapman, 1931). Exploring the relationship with the environment insects, the German scientist G. Blunk (1922) proved the dependence of their development on the ambient temperature. Complex relationships with insects zapylyuvanymy (entomophile) plants generalized Fehri Norwegian biologist K. (1975). Study aphids connection with plants allowed to resume historical geography of many groups of higher plants (Soviet scientist AK Mordvylko, 1935). It was found insects mentioned symbiosis with some microorganisms (the German scientist M. Buchner, 1912, etc.). A new section Ecology - study of phase variability (morpho-physiological characteristics and behavior of insects vary depending on population density, a Russian scientist BP Uvarov, school French zoologist P. Grasse Soviet scientist Kul AG and others.). In the Soviet Union made generalizations environmental distribution patterns of insects. Established rules of the "zone changes habitats" (GY Bay Biyenko, 1930, 1964) and "change tiers" (MS Gilyarov, 1951). Studying the ecology of insects allowed to light the main directions of their evolution (MS Gilyarov, 1949).

Extensive development has received entomoheohrafiya. In 1936 the Soviet entomologist AP Semenov-Tyan-Shansky studying the habitats of certain types of

insects developed on division Palaearctic zoogeographical province. Later in the same way the boundaries were refined zoogeographic regions of South America (the French scientist C. Delamar Venezuelan scientist and entomologist Rapoport), the Antarctic and Oceania (American scientist L. Hressyt). Swedish entomologist Lindrot K. (1959) investigated the links Entomofauna Eurasia and North America. In the USSR, some details zoogeographical regions characterized by complex insects (eg, Central Asia - OL Kryzhanovsky, 1965).

By the mid-20th century. intensified research on paleoentomolohiyi (in the early 19th century. were only 219 known species of fossil insects). Today, more than 12 thousand. Fossil forms, and paleoentomolohiya is not limited to their descriptions, but also examines the paleoecology of insects. Taxa studied many major changes fauna and insects in different geological era. Larger achieving a Soviet school paleoentomolohiv (AV Martynov, BB Rodendorf etc.). Paleoentomolohiyi data used to establish ways of evolution of insects.

Insects become an important subject of scientific experiments (such as drosophila genetics, flour Khrushchak small in population genetics).

Applied entomology was developed at the turn of 19-20 centuries. Extensive practical value it has long been determined by the presence of a huge number of insect pests, all of which increase as the application information and improvement of methods of struggle led to the division of applied entomology to agricultural (pests of field, fruit and vegetable crops), forest (forest pests) and veterinary medical (blood-sucking insect vectors of infectious and parasitic diseases of humans and animals). The first special work on agricultural and forest entomology emerged in the 19th century. (books German scientists J. Rattssburha of forest pests, 1837-1844; G. Nerdlinhera pests of field, garden, 1869; J. Kaltenbaha of agricultural pests, 1874, Russian scientist FP Keppen pests of agriculture and forestry Economy, 1881-1883). Losses that cause economies insects (especially grasshoppers, phylloxera) have necessitated the centralization of research and development of measures to combat harmful insects at state level. Thus, in many countries there entomological public service to protect plants from pests. In Russia in 1887 was the post of provincial entomologist, organized in 1894 by the Bureau of Entomology at the Department of Agriculture, in 1904 - the first entomological station. In the USSR Plant Protection received scientific and planned basis. In 1929 was established All-Union Scientific Research Institute of Plant Protection of the network of regional stations. In the USSR Ministry of Agriculture organized service accounting and forecasting of pests. Working with agricultural entomology was coordinated scientific councils at the Academy of Sciences and Agricultural Sciences. In place of ineffective mechanical methods to combat pests (protective and catching grooves catching belts etc.) Came more sophisticated - chemicals (pesticides), biological (use of predatory and parasitic insects and entomopathogenic bacteria), agronomic (special techniques of farming that create unfavorable conditions for the development and reproduction of pests) and as a result of their synthesis - integrated combat system. These measures provide significant contributions in applied entomology raising the productivity of agriculture and forestry. Scheduled principles of genetic pest (AS Serebrovsky in the USSR, D.

North in the US). Development of medical entomology began to study mosquitoes - carriers of malaria (Russian scientist VY Danilevsky, 1888, Italian scientist John. B. Grass, 1901). It was clarified the role of blood-sucking insects and other in the spread of many dangerous diseases of humans and animals (data compiled by the German scientist entomologist Martin, 1923, 1941, and others.). In the Soviet Union a greater role in the development of medical and veterinary entomology played labor VN Beklemishevo (by mosquitoes) and EN Pavlovsky. There were the practical measures to protect human and agricultural dangerous animals from diseases carried by insects.
History Entomology after 1900:
1901 - published a classic textbook Entomology AD Ymmsa (Augustus Daniel Imms. "General textbook of Entomology"). 10th audited edition was released in 1977.
1901 - American geneticist Thomas Hunt Morgan (Thomas Hunt Morgan) started genetic studies of fruit flies (Drosophila melanogaster) at Columbia University (The Fly Room at Columbia University).
1902 - Indian doctor and entomologist Ronald Ross Scottish origin (Ronald Ross, 1857-1932) received the Nobel Prize for his discovery of the role of the mosquito as a carrier of malaria.
1905 - published the first three parts (issues 1-3) classic work on the beetles of Russia: "Beetles of Russia and Western Europe." Last 11th edition published in 1915.
1923 - Swiss mirmekoloh Auguste Forel (Auguste-Henri Forel) published a work on ants' social peace walls "(Le Monde Social des Forimis).
1925 - American paleoentomoloh Kaprpenter Frank (Frank M. Carpenter, 1902 - 1994) began to explore the fossil Perm entomofauna (Elmo Permian).
1928 - Italian entomologist G. Grandi (Guido Grandi) founded the Institute of Entomology at the University of Bologna (l'Istituto di Entomologia dell'Universita di Bologna).
1934 - Swedish entomologist Malez Rene (Rene Malaise, 1892-1978) invented a new type of traps for insects (Malaise trap).
1935 - German chemist Gerhard Schroeder (Gerhard Schrader, 1903-1990) discovered the strongest insecticide called organophosphates.
1935 - Walter Rothschild (Walter Rothschild) presented its largest collection of insects (including the world's largest collection of butterflies) London Museum (Natural History Museum).
1949 - published a fundamental guide to insects, edited by P. Grasse (Pierre-Paul Grasse ed. Traite de Zoologie Tome IX. Insectes. Paris, 1949. 1118 p.)
1955 - the beginning of the World Programme for Malaria Control and access basic classification beetles (Roy Albert Crowson. - "The natural classification of the families of Coleoptera").
1966 - published the first international list of rare and endangered insects (Red Lists of endangered species)
1973 - Austrian ethologist Karl Frysh became a Nobel laureate for his research on behavior of insects and speech decoding circular dance of bees.
1984 - the beginning of the release of "Catalogue Palearktychnyh Diptera insects" (Arpad Soos and Lazlo Papp. - "Catalogue of Palaearctic Diptera.1984 - 1992).

1,990th US published the book "Ants" (Holldobler B., EO Wilson, The Ants), later noted Pulytserovskoyu Award (1991).
1996 - French film out of the documentary "microcosm" of insects (Microcosmos: Le peuple de l'herbe; Microcosmos: The grass people). Authors: Claude Nuridsany, Marie Perennou, producer Jacques Perrin. The film won five César awards (Cesars) and a special award at Cannes.
2002 - out of the book "History of Insects" paleontologists Alexander Rasnytsina and DLJ Quicke ("History of Insects". Kluwer Academic Publishers)
History of Entomology in:
1887th was the post of provincial entomologist.
1894th organized Bureau of Entomology at the Department of Agriculture.
1904th Russia and Ukraine organized the first entomological station (in Kiev).
1910 - First organized in the country entomological department at the Agricultural Research Station (in Santiago).
1920th of organized etomolohiyi first department (the Moscow Agricultural Institute, now the Moscow Agricultural Academy. Timiryazev KA).
1929th was established USSR All-Union Scientific Research Institute of Plant Protection - VNDIZR (Leningrad) with a network of regional stations. In the USSR Ministry of Agriculture organized service accounting and forecasting of pests.
1934 - founded the State Plant Quarantine Service; in the land bodies were put staff positions agronomists on plant protection. In agricultural and other colleges were created department of entomology or plant protection.

Institutions, societies, congresses. General problems developed in the USSR entomology at the Zoological Institute of the USSR, the Institute of Evolutionary Morphology and Animal Ecology of the USSR, and zoological institutions in the Union Republics; agricultural problems and forest entomologists - All-Union Institute for Plant Protection and Institute of Plant Protection Union Republics; in sectoral research institutes; Medical Entomology - the Institute of malaria and parasitic diseases Academy of Medical Sciences. From 1859 there, All-Russian Entomological Society. The main periodicals in entomology in the Soviet Union - "The entomological review" and "Labor-Union Entomological Society." World News entomological literature contained in the "abstract journal" Biology ", in« Biological Abstracts »,« Entomology Abstracts », and on practical entomology in« Review of Applied Entomology ». Periodically convened international entomological congresses (1st in 1910 in Oxford, UK; 15 in 1976 in Washington, DC, USA).
Sections of Entomology

Modern entomology - complex science that studies the structure and the livelihoods of insects, their individual and historical development, diversity of forms on Earth distribution in time and space, the relationship with the environment, etc. By its tasks divided into general and applied. Total or theoretical, entomology insects include morphology (external and anatomy, histology and cytology), embryology (study and metamorphosis), physiology, ethology, ecology, entomoheohrafiyu, paleoentomolohiyu and taxonomy. Objects of Applied Entomology - insects - pests of agricultural plants and products, parasites and vectors of diseases in humans,

animals and plants, and beneficial (insects that provide man used products: honey bee - the object of beekeeping, mulberry and oak silkworms - the object of silk, natural enemies of pests, plants opylitelej , hruntoutvoryuvachi). In connection with this distinguished agricultural, forestry, medical and veterinary entomology.

2. Insect Morphology

Insects (Insecta), the largest class of animals, combining more species than all other groups combined. Refers to the arthropod invertebrates. As with all these animals, insects segment segmented body with appendages, covered more or less rigid external skeleton, which includes complex polysaccharide chitin. Characteristic signs of insects - a relatively small size, three pairs of legs (hence their other name - Hexapoda, is six-legged) and two pairs of wings (in several forms, one or two missing).

The body of insects consists of three distinct parts - head, chest and abdomen.

Chairman and its appendages

Head formed by several segments, merged, and carries mouth appendages and sensory organs - the eyes and antennas (antennae or syazhky). There are several areas of the head. Between the eyes and below the antenna is forehead above - crown, behind - neck; the bottom edge of the eyes and mouthparts are cheek. These areas can be divided into different areas, the outlines of which are extremely important for the classification of insects.

The eyes of adult insects is usually clearly visible and many species occupy a large part of the head. They are of two types. Complex or facet eyes consist of separate visual elements, whose number reaches several hundred. Simple eyes (eyes) usually three, they are led by a triangle; sometimes their number reduced to two or are absent. Eyelets distinguish between light and darkness, insects help regulate daily activity, and, flying forms, follow the line of the horizon. Compound eyes give the mosaic image because every facet of their perceived only part of which fell in a field of the object. Adult insects with strongly reduced eyes or no known among ground, cave, or parasitic species living in an environment where vision is not easier orientation.

Antenna - it even structures that can contain from two to more than 60 segments. In form they are quite diverse. Most insect series long antenna that is made up of four or more segments, but exactly-wings and flies them all three. In the latter case, the third segment may be shaped-bristles outgrowth, which consists of several segments merged. Antennas are not just sensitive "palpus": they have sensory hairs and holes, depending on the type able to perceive the smell, sound, gravity, humidity and temperature.

In butterflies are club-shaped antenna (with extended last segment) or hooked-club-shaped; in moths - shaped-bristles, tapering to the end, and covered with hairs and scales, pinnate with two opposite rows of long lateral shoots, or bilaterally short lateral appendages; bees and wasps - threadlike (with the same thickness over the entire length) bilaterally or with one or two long appendages on each segment; in beetles - threadlike, club-shaped or plate, the last segments are connected bases long

blade that can be opened like a fan; some forms of antennas with long branched spikes.

Mouthparts is of two main types - primitive biting, for example, grasshoppers and derivative sucking, for example, butterflies. These types are divided into more specialized options, including piercing-sucking in Horse-fly and mosquitoes, flies in the room or licking-gnawing bees and wasps.

Mouthparts consist of the upper lip, a pair of upper jaws, or mandibles, a pair of lower jaws or, lower lip and (hipofarynksa) located between other appendages. Because most insects mouth directed downwards, "upper" and "lower" parts can be deemed to be forward and back. The lower jaw and lower lip primitive insects are sensory palpus (palpy) to help guide the food in your mouth. In evolutionary developed forms, they can be greatly reduced or absent. Proboscis adapted for sucking liquid food or lick off and bringing the wrong fabric saliva, oral appendages formed different depending on the group of insects. In Diptera, for example, it is of two types - barbed and licking. In the first (mosquitoes) in spiky stilettos converted all of these parts, except for the lower lip that forms around them case. In the room the bulk of the fly proboscis - a derivative of the lower lip that ends the disc with soft wide sucking blades or Labelle. Multiple grooves on the underside of each Labelle, like a sponge, absorb liquid food. In the proboscis bedbugs articulate, and the butterfly is a soft tube resting flat rolled coil in the mouth, and in some its length is several times greater than the rest of the body.

Thoracic and its appendages

Chest or average department insect body, is a place of attachment of locomotor and consists of three segments - peredno-, medium and metathorax. Each of them carries a pair of legs.

Foot insects segmented, with five main parts. Starting from the body, this basin (basal segment) vertluh, hip, leg and foot. Vertluh usually short. At first he was free and form two joints, increased mobility of the limbs, but in modern insects are usually fused with hip. Quotes formed three-five segments, but their number in some insects reduced to two or even one. This part of the foot corresponds functionally almost always ends in one or two is usually and other appendages, such as a flat pad. Some insects are highly quoted on chemoreceptors and sensory organs able to perceive the vibrations of the surface, thereby warning of the danger approaching. Primitive type of insect legs - of walking with an almost cylindrical segments, but the evolution of limbs often modified to perform new functions. Yes, fleas and grasshoppers hind legs greatly elongated and adapted for the high jump; predatory insects front legs sometimes turned into accessories, and in forms that dig, such as beetles, scarabs, they expanded into jagged scrapers. Some species living under the bark (bug) legs widely separated from each other and away from the body not down and to the side, allowing an insect to move in very tight spaces. Sometimes the legs are used to deceive predators; for example, a number of bugs are covered with thorns and enlarged, as this may scare away the enemy, and serve as camouflage, making general outlines of animals. In many flies the front legs and brightly colored, extended forward, reminiscent of the antenna on top of bees and wasps. In flies

widespread and complex ornamentation quotes: of course it is of secondary sexual characteristics used to attract females.

Wings in insects usually two pairs - for medium and metathorax. They go into the top of the side walls of these departments and represent its protrusion. Wings imbued veins (their number and location - systemic signs), which flows. It nourishes wings, delivering nutrients to them, and in addition, it spread pressure allow these structures when they complete their formation in the adult insect. Veins play the role of a rigid frame. Wings are bare (transparent) or covered with hairs and their derivatives. These often microscopic hairs, but butterflies (some Lepidoptera) are transformed into large flakes of various types, which are or contain pigment or by specially Striated surfaces reflect light so that the insect iridescent rainbow colors (for example, the genus Morpho). Flakes are also present on the body and wings of other insects, including beetles and mosquitoes. The wings are modified in various ways. Of course the front larger rear and are used for the flight, and to protect the bottom, but the bugs (row Coleoptera) are converted into hard elytra, performing mainly a protective function, and the beetles dytiscus form on the back of the air chamber that allows this insect long under water. In Diptera rear wings turned into club-shaped short grow - that balance and authorities are working on the principle of the gyroscope, although they do not in flight rotational and vibrational motion. When removing at least one insect loses its ability to fly. Wings and always move in the opposite. In insects front and rear wings through certain devices are connected in flight with each other, so work as a single surface. Some insect wings are sound bodies. The sound is produced by friction of their friend against friend or rear thigh on specific areas of the front wings. Many groups along with insects species are winged forms in which the wing and shortened non-functional or absent due to the fact that during the evolution of the need for them anymore. In some Diptera and wingless butterflies unable to fly or only females. In ants and termites develop wings only sex individuals who shed their marriage after a short flight. On the wings of many species of butterflies (usually only males) attended specialized sensory or odorous areas. Some flies with the wings of a complex courtship ritual can change color and even shape: wavy folds of a male or female vibrates them before, usually sitting in the bright sun, where clearly visible their distinctive features.

Abdomen and its appendages

The abdomen consists of ten or eleven segments. Adult insects their number can not exceed three, as some merge with each other, while others turn to apparatus for the sexual process, but often five to eight segments well marked. They are divided into upper and lower parts, connected by a thin membrane located between the individual segments: it allows you to stretch the abdomen when it ripen eggs or intestines food. Most insects abdomen convex cylindrical or almost flat top and bottom and tapering to the end, but its shape can be very diverse. In ant it is connected to a feeding thin stem of one or two segments, and the bees and wasps separated from it by a narrow constriction. In many primitive insects on the end of the abdomen is a couple-like tails segmented appendages, sometimes with a third "tail" between them.

3. Insect Anatomy

Nervous System

The central nervous system of insects consists of a pair of longitudinal nerve trunks, which run parallel to one another along the ventral surface of the abdomen and chest, and his head split, covering the alimentary canal and connected on the throat, forming a large brain. From his nerves diverging beams to complex and simple eyes, mouth appendages and antennas. In primitive insects almost every segment of the chest and abdomen is one ganglion - ganglion formed by the merger of nerve trunks, but in a more evolutionarily advanced species are usually reduced in number and are concentrated in the front of the body; in some cases is only one celiac ganglion. From scattered ganglia nerves to all organs. Nerve endings that innervate the external sensory organs are extremely sensitive; This is particularly noticeable in the case of the nerves that go from the legs of flies and other species that perceive these fluctuations in small parts of the body surface (danger signals) as well as its "flavor".

Respiratory system

In insects, it is very simple. It has branching tubes called trachea that lead air to all parts of the body, sometimes may expand in air bags and blindly consumed traheolamy thin. Air enters the respiratory system through the holes - spiracles (stigma) - on the chest and abdomen and spreads it by simple diffusion or by means of pumping movements associated with other bodies muscles. In some aquatic larvae spiracles permanently closed and the air passes directly through the body surface and enters the trachea, located immediately beneath it, sometimes within specific outgrowths thin outer wall - tracheal gills. A number of very small forms of less than 2 mm trachea is not at all sufficient for gas exchange and diffusion through the surface of the body.

The digestive and excretory systems

The digestive tube is divided into several sections, each of which performs a specific function. Foregut consists of the mouth, esophagus, craw chewing and sometimes stomach. In the mouth crushed or soaked mouthparts food is mixed with saliva, digestion begins here, culminating in the middle intestine, part of which is called extended glandular stomach. It also, and at the rear intestine is absorption of nutrients. In addition, the back is a place gut absorption of undigested residues of water and the body needs salt. The function of the kidneys do grow in the form of blind tubules on the border between the middle and posterior intestine - Malpighian vessels, the number of which depends on the type of insect. They suck breakdown products from the blood and send them to the intestine, where they are removed as part of feces through the anus.

Circulatory system

Blood in most insects almost does not participate in gas exchange, so have no red blood cells that carry oxygen and pigments; it is colorless, yellowish or greenish and called hemolymph. Its role is limited to the transfer of nutrients, metabolic products, hormones, heal wounds and some other compounds, as well as support water-salt balance of the body. However, with the exception of this rule are known.

Many species of great dissolved in the hemolymph respiratory pigment hemotsyanin - colorless protein Worms combines with oxygen (in this case it is blue) increases its concentration in the circulating liquid, and a very small number of insects, such as mosquito larvae in water blood red by the presence of well-known respiratory pigment hemoglobin.

The circulatory system consists of a single vessel that passes in front of the narrowed aorta tubular heart that lies longitudinally in the dorsal part of the body. Blood is pushed forward by reducing its walls, easily wraps around internal organs and again sucked inside the heart when its walls stretching pterygoid muscle through small holes with valves - Ostia. Blood flow in the veins of the wings, legs and antenna promote more "heart" that are in their basis - pulsating ampoules.

Reproductive system

The system consists of the breeding of insects testes in males and ovaries in females routes linking these with sexual organs hole and adnexal glands and structures to ensure fertilization. External genitalia are quite diverse in structure, but most insects ovipositor females is a simple tube. In males the penis and genital opening are arranged and are surrounded by hard appendages that hold the body together during mating partners.

LECTURE 2. BIOLOGY OF REPRODUCTION AND INSECT. INSECT ECOLOGY

Question:
1. The breeding biology of insects
2. Biology of insects
3. Insect Ecology

1. The breeding biology of insects

Methods breeding insects.

1. bisexual (amfimikt) reproduction.

2. parthenogenesis - development without fertilization of ovules, does not require the participation of males in fertilization of eggs that are able to develop into haploid state or in the simulation fertilization:

a) sporadic parthenogenesis - random (Lepidoptera);

b) continuous parthenogenesis (Hymenoptera)

c) the cyclical parthenogenesis - alternating and parthenogenetic generations (aphids); deyterotokiya (amfitokiya) - parthenogenesis, in which the sex of offspring can be either male or female; telitokiya - parthenogenesis, in which the sex of offspring can only be female; arenotokiya - parthenogenesis, in which the sex of offspring can only be male;

d) paedogenesis - parthenogenetic reproduction larvae (Diptera).

3. live birth (Diptera).

4. Polyembryony (Hymenoptera) phenomenon in which the one rich in nutrients by cell division in the early stages of embryogenesis developing identical twins.

5. Hermaphroditism (Diptera) - the presence of one individual characteristics of both sexes.

2. Biology of insects

1. Embryonic development. It corresponds to the stage of eggs. For insects characterized by relatively large, rich egg yolk. Insect eggs varied in shape and size. The largest of them reach 15 mm in length, and the fine not exceeding 0.05 mm.

Embryonic development begins crushing eggs and the formation of many cells united in blastula. Further there Gastrulation, leading to the isolation of germ layers (ectoderm, mesoderm and endoderm) and embryo begins. Later there are the beginnings of individual organs. Their development and differentiation (organogenesis) continue until the hatching of the eggs. Since the beginning of the free existence during embryogenesis ends and body formed postembryonic entering a period of change.

2. postembryonic development. Corresponds to the larvae stage, begins with the release of individuals with egg and adult onset ends phase. A characteristic feature of the period - growth - expressed in molt frequency and passage of centuries.

Types of metamorphosis (transformation).

Incomplete metamorphosis (heterometaboliya):

1) Palaeometaboliya (have larvae that are different from adults only signs that they inherited from primitive forms primary):
- Epimetaboliya (anamorphosis) - metamorphosis has very limited scope - the emergence of protur three abdominal segments during postembryonic Development (protury);
- Protometaboliya - differs difference - molt into adulthood, and metamorphosis due to the larvae of aquatic way of life is expressed quite clearly (ephemeral);

2) Heterometaboliya (have larvae that are different from adult insect characteristics, resulting embryonic development):
- Hemimetaboliya - characteristic forms of aquatic larvae are characterized by temporary or provisionally - tracheal gills, dragonfly larvae mouthparts (grandmother, freckles);
- Pavrometaboliya - characteristic terrestrial forms, the difference between adults and larvae mainly in the color, shape and appearance of the external genitalia appendages (Orthoptera, Emba, sinoyidy, bugs, Homoptera proboscidea);

3) Neometaboliya (there is some delay in the development of wings):
- Homometaboliya - the beginnings of wings appear only in the last larval age (winged females phylloxera and Hermes);
- Remetaboliya - wings emerging in the last two centuries of larvae (TRIPS);
- Parametaboliya - wings emerging in the last two centuries of larvae (female scale insects);
- Alometaboliya - wings arise under cover just before the final molt (proboscidea).

Full (holometaboliya).

1) hipermetaboliya or complete transformation difficult, characterized by a cycle of larval development of two types. In beetles from eggs obtained kampodeo-similar very mobile larvae (tryunhulin), well adapted to active or passive resettlement. After molting tryunhulin converted into ordinary worm-like larva.
Insect larvae usually attributed to two main groups: adult-like and not-adult-like.

Adult-like larvae, or nymphs, have a great resemblance with the adult insects (the presence of complex eyes, the same type of antennae, mouthparts, legs, this way of life), the difference is limited to smaller body size, presence Krylov germs instead of wings and underdeveloped reproductive organs.

This group is typical for the larvae of insects with incomplete metamorphosis. They also include the larvae of aquatic insects - ephemeral, dragonflies, freckles. In addition to the above features, the larvae of insects differ from adults in that they have some Extraembryonic (temporary, unique to the larvae) organs as tracheal gills, strongly developed lower lip, and others. These larvae are called Naiad.

Not-adult-like larvae are quite similar to adult insects: they lack compound eyes and wings beginnings are often different than in adults, type mouthparts more homonomna structure and other body segments. This group characteristic larvae of insects with complete metamorphosis. Not-adult-like larvae are divided into three main types: worm.

Larvae get their name because of the similarity of the adult insects of the genus Campodea, relating to a number. It is very mobile, often larvae with well separated

prognathous head and three pairs of thoracic legs. Body larvae often flattened, with dense sclerotized covers, often with bristles or even articulated appendages on the back end.

Wormlike larvae characterized wormlike body shape; less mobility, usually with varying degrees of isolation of the main capsule and thoracic legs. Wormlike larvae in turn are divided into three groups: 1) the larvae with well separated head and three pairs of thoracic legs; 2) larvae with well separate head but without thoracic legs; 3) larvae without a separate head and chest with no legs.

Larvae have well-isolated home capsule, 3 pairs of thoracic legs and abdominal 2-8 pairs (false) feet. Depending on the number of abdominal legs larvae are divided into two groups: 1) tracks with 2-5 pairs of abdominal legs; 2) with 6-8 pairs of abdominal legs.

There are three types of dolls: open, covered and hidden.

Open, or free, pupae are available only pressed against the body and limbs imahinalni appendages (antennae, legs, wings). They can easily move a bend or the side needle.

Open insect pupae characteristic related to a number of bugs, scorpions flies, Hymenoptera, fleas, and many members of Diptera and Lepidoptera of certain primitive.

Covered pupae characterized by that body and their limbs are pretty solid transparent membrane that formed fluid freezes. Therefore imahinalni appendages and limbs usually clearly visible from the outside, but held tightly to the body, they can not move my. Covered pupae inherent in almost all Lepidoptera (except most and toothless primary moles), many Diptera, some beetles.

Hidden or pupae are ovoid shape of the body with obscure traces of segmentation and without appendages. The outer cover is hardened pupae and larvae do not reset the last century skins. If unleash outer cover, the inside is usually open pupa. Pupa shell acts as a cocoon and cocoon called fake or pupariyem. Hidden doll is only in the higher Diptera.

In many species of insect pupae are other protective devices - cocoons earthen, rolled sheets.

Cocoons are shell, formed before larvae of certain insects secret of silk glands.

Excavation kolysochky form larvae of soil particles, which they cement excrement.

3. Insect Ecology

Ecology explores the interaction of organisms with the environment and with each other, establishes the general principles of these interactions.

1) Environmental factors

Solar radiation.

The action of light on insects manifested, firstly, through photosynthesis, the process in which organic matter is created; second - because of changes in other environmental factors. However, examples of direct impact on the livelihoods of light insects relatively small. More numerous examples of the impact of light on the behavior and development of insects. Intense ultraviolet light fatal to insects.

Temperature.

Temperature range in which the possible manifestations of the active life of insects, varies from 15 and 38 ° C, and beyond the intensity of life processes naturally reduced.

Insects are divided into stenoterms and evryterms. The first tolerate only limited fluctuations in the thermal regime, the second factor capable of withstanding changes in a wide range. Examples evryterms types: green fly, butterfly-rash, carrying from 60 day to 0 ° C at night.

Insects characteristic own thermoregulation.

Humidity.

Aquatic - a form that always live and die in ponds on land.

Overland divided into insects that live in damp places; mesophillous less demanding humidity of the atmosphere, and xerophile adapted to constant moisture deficit.

Secondary factors.

The strength of the wind, atmospheric pressure ionization atmosphere.

2) The microclimate regulation and life cycles

The microclimate - a climate at the body, the real conditions of existence that define biological reactions insects now in this place.

Conventional agricultural practices change substantially climate of arable land, which becomes more severe after the harvest and plowing.

The most common means of transfer of extreme environmental conditions - diapause - long-term inhibition of metabolism and all kinds of activity in response to the signaling effects of seasonal climate changes. The usual incentive to its development - changing photoperiod astronomically accurate.

At the onset of diapause and temperature, and the amount of feed fully comply with active life support insects, but diapause occurs in response to the shortening of the day - a sign of approaching autumn. If you violate natural illumination mode at the end of the summer, orchard 2 minutes. After sunset, the leaf roller caterpillars harmful Adoxophyies sp. do not fall into diapause and killed by the first frost.

The vast majority of insects are active during the long days and go into diapause while reducing photoperiod. However, even illumination Twilight is perceived as a continuation of the day and prevents diapause. Some inhabitants of the tropics appears photoperiodic response in the extended day and thus to make them.

East moth (Grapholitha molesta Busk.), Refers to species and some of the population falls into diapause in a shortened photoperiod.

3) edaphic factors

The vast majority of insects associated with soil. Heobionty constantly live in the soil on the surface chosen only in search of a sexual partner, with flooding downpours or melt waters. These include and termites, palochnyky, Emba. Heofily in soil are certain phases of the life cycle, these include Orthoptera, Diptera and many beetles. Heokseny - temporary visitors soil, they only covered in soil pores from enemies or chase them their victims.

4) Biotic factors

Intraspecific relations: group effect, mass effect, and examples of intraspecific competition.

The effect of the group. Combining insect groups often contributes to their survival and reproduction. Male mosquitoes swarming a means of attracting females, and rooming larvae of flies on corpses and excrement through their allocated proteolytic enzyme helps the assimilation and dilution substrates. Particularly evident in the effect of phase polymorphism inherent grasshoppers, caterpillars of some butterflies, some beetles, aphids, cockroaches and crickets. Union in the pack often provokes enhance metabolism and activity of insects, promotes their migration and resettlement na new territories, may cause flash mass reproduction of pests.

Mass effect. Unlike the effect of mass effect caused by overpopulation environment often causes reduction of populations. Mass effect can be seen in stocks of pests that inhabit elevators and flour mills that reduce fertility after their population density reaches a certain limit.

Intraspecific competition. Competitive relations between individuals of one species occur in the territorial behavior that promotes uniform use of available resources, hierarchy, as well as in some forms of interaction between individuals.

Interspecific relations. Impacts engaged in various kinds of one another, can be positive and negative, bilateral and unilateral. There are negative forms of interactions between species, which include competition, predation and parasitism and positive forms: mutualism, commensalism, cooperation.

Competition. Competing views opposing each other in the struggle for food, shelter, places eggs. It is necessary to distinguish between direct effects (commensalism) where the presence of one species to another through unbearable allocated to them or metabolites through the form of its treatment of competition or rivalry for livelihoods and play.

Predation and parasitism. In these forms of interaction between populations of predators and parasites aggressiveness ability to confront their victims to defend and enhanced playback.

Superparasitism - infected host many eggs at once - contributes to weakening the protective encapsulation reactions, because in each egg has relatively little hemotsytiv.

Among the entomophagous parasites found hiperparasitism. These terms are phenomenon when the parasite itself is host to another parasite, called sverhparasit first order. It is possible infection but second order are very rare.

One form of parasitic insects - Kleptoparasitism (literally, parasitism thieves). Kleptoparazyt activity other parasite uses for their needs, in particular to facilitate search and infected host. Often it lays its eggs through holes in the cover previously infected host and eliminates parasite larvae in the first interspecific competition.

Mutualism or symbiosis is mutually beneficial, often necessary coexistence of different species. Mutualizmu example can serve as a symbiosis of termites oppose that live in their intestines. Lost symbionts, termites die of hunger without having its own enzymes for digestion of fiber. Most symbionts never can exist in the environment and in the bodies of other insects, except some cockroaches.

Somewhat less dependence manifested in relations aphids and ants. Belly sugary excrement of aphids and protect them from their enemies, the ants carry aphids to feed new plants, promoting the resettlement of harmful species. Ants "care" also jumping plant louse, scale insects and afford while high-carbohydrate foods.

Synoykiyeyu or cohabitation, called the relationship beneficial for one species but indifferent or burdensome for the other. Termitofily and mirmekofily that find shelter in termite and anthills, are they reliable protection from enemies and adverse climatic conditions. These include Diptera, beetles and other insects saprophages that feed on crop residues and mycelium of fungi.

Manifestation - the use of other species for resettlement. For example, choose to transport rodents.

Commensalism - the use of one type of another type of food stocks available in abundance. For example, fly from termites Termitoxenia gets the same food that they share with their relatives.

Insects and plants. Insect Interactions with plants took shape in the earliest stages of evolution further improved in parallel. Plants develop means to attract insects opylitelej and resistance to damage; in turn, improved as phytophagous insects. The most important result of these interactions - modern angiosperm diversity and related insects. In general, these relationships should recognize positive and very important not only for individual biomes, but also for the entire biosphere.

5) Life forms of insects

1. Heobionty - the inhabitants of the soil:
a) ryzobionty - insects related to the root system of plants;
b) saprobionty - residents of organic residues that decompose;
c) syrfetobionty (koprobionty) - residents of manure;
d) botrobionty - inhabitants holes;
e) planofily - insects, which have frequent moving.
2. Epiheobionty - insects that live on more or less open areas the ground surface:
a) psamobionty - insects that have adapted to life on the sandy substrate;
b) petrobionty - residents rocky areas;
c) halobionty - residents saline soil areas.
3. Herpetobionty - insects that live among the vegetation and other organic residues on the soil surface; stratobionty - the inhabitants of the forest floor.
4. Hortobionty - residents grass:
a) ektobionty - held on the surface of plants; divided into herbivores and entomophagous;
b) endobionts - residents thicker leaves, stems, fruits, plant tissue growths (Gallic).
5. Tamnobionty - dendrobionty shrubs and residents - residents of trees.
6. Ksylobionty - inhabitants of dead wood.
7. aquatic - water insects:
a) anhonektobionty - residents short-term accumulations of water;
b) benthos - the inhabitants of the bottom waters;
c) plankton - forms that float passively in the water;
d) subnekton - forms that actively swim in water;

e) supranekton - forms that are kept at the water surface.

LECTURE 3. SYSTEMATICS INSECT

Question:
1. The provisions of insects in the organic world
2. Description of the main series insects

1. The provisions of insects in the organic world

Hexapoda belong to a subtype of type Tracheata Arthropoda. Total sign - thoracic structure, which consists of three segments, each of them are a pair of limbs. Primitive ancestors of insects existed 350 million. Years ago in the Devonian period, and probably even earlier.

In modern fauna least known species of insects 1500000. Hexapoda represented by two classes: Entognatha and Insecta.

2. Description of the main series insects

ENTOGNATHA

The class is divided into three series: Protura, Diplura and Collembola.

1. PROTURA

Very small (0.5-1.5 mm) worm-like insect with a long body. At the head of the missing bodies and antennae. On the sides of the head are called false eye - formation with unclear functions. Abdomen, three pairs of rudimentary feet. Development occurs through anamorphosis in which the number of abdominal segments increases from 8 to 11. In the modern fauna described more than 220 types of series. They live in the soil, forest litter, rotten trunks and stumps in moss. It is believed that protury suck the liquid content of algae and fungi. In Ukraine, found one species.

2. DIPLURA

Small insects a length of 2-8 mm. Body appendix. On the head are antennae. Mouthparts gnawing type, eyes missing. Abdomen couple decorated and well developed TSerk. Postembryonic development: young individuals differ from adults in size, the number of segments of the antennae and TSerk, fewer hat, underdeveloped sexual organs. Shed not only in the larval, but also on imahinalniy phase of development. They live under rocks, in the ground among fallen leaves, under bark and rotten wood, many species - trohlobionty (residents caves). They feed on plant remains, and some species - with mixed power (or herbivorous predators). There are about 400 species. In the CIS extended about 20 species; in Ukraine - the three species.

3. COLLEMBOLA

Insects with elongated or spherical body 0,2-10 mm length. Head prognathous, less hipohnatychna with biting mouthparts type. In the full-time spot in some species is up to eight free located. Abdomen contains three types of appendages: the I segment - up on III - hook and IV - strybalnu plug. At rest strybalna fork bent under the body and kept hooks; while jumping grip broken, cracked plug body and throws up. Transformation - protomorfosis (with imahinalnymy molting, without increasing the number of segments in postembryonic period). Tracheal system developed only in

certain species. Malpighian vessels available. 3500 described species in the CIS - 300 species; in Ukraine registered more than 110 species.

INSECTA

1. APTERYGOTA

1.1. MICROCORYPHIA

The body is cylindrical. The eyes are large, usually affecting one another eye developed. Abdomen with paired the second nine segments. Middle and rear basins often with. Common in warm countries. A number comprises about 250 species. In the steppe Crimea common mahilis multilegged (Machilis polypoda Latr.)

1.2. THYSANURA

The body as the representatives of the previous row or more flattened, lateral thoracic segments grow as directed sides. The eyes are small, located on the sides of the head, consisting of 10-40. Hryfelky on the abdomen developed in the seventh-ninth segments. TSerk longer than paratserk. In a number of known fossil state from the late Cretaceous. Distributed mainly in countries with warm and hot climates. A number of species - ants and termites cohabitants, some species - Synanthropic. A number comprises about 330 species.

2. PTERYGOTA

SECTION I. Insects with incomplete metamorphosis (HEMIMETABOLA)

1. EPHEMEROPTERA

Small or medium size (35 mm) insect body with soft, thin coatings. Head small, with large fasetkovymy eyes. Antennae short. Mouthparts adults do not function. Membranous wings, their one or two couples. At rest, the wings folded vertically over the back. Belly on top of two or three threads. Transform incomplete, with elements. In larvae in the abdomen segments developed external gills. The larvae live in fresh water from 2 months to 1.3 years, 25 times to fade, turn into winged adult immature phase - subimaho that after molting transformed into adults. On stage imahinalniy insects do not feed live from several hours to several days. Lay eggs in water, where developing larvae that feed on organic remains and unicellular algae. In the world described about 1,600 fauna species. In the CIS countries, nearly 200 species.

2. ODONATA

The body is slender. The head is large, mobile, with eyes that take up nearly the entire head; In addition, the head are three simple eyes. Antennae short. Biting mouthparts type. Two pairs of membranous wings with a dense grid of longitudinal and transverse veins. Abdomen thin, consists of 11 segments. Adults and larvae of dragonflies - voracious predators. Adults are terrestrial life, day to hunt insects, grabbing them on the fly. The larvae feed on aquatic arthropods. Booty capture modified lower lip - "mask." Dragonflies common everywhere where there is fresh and brackish ponds. In modern fauna described over 4500 species. Ukraine has registered about 74 species of dragonflies.

3. BLATTOPTERA

Cockroaches - large and medium-sized insects with flattened, soft and buttery to the touch body, long thin antennae, and segmented bend under TSerk wide head.

Leatherback elytra and rear wings folded fan often shortened or completely cut. Of course there are odorous glands that produce sex pheromones and aggregation. Eggs are placed in a capsule - ooteku. Some members of cockroaches possible parthenogenesis. Developing, larva undergoes lynyan 5-9. In the last two centuries separated larval rudiments of wings. Representatives of some very modern thermal and hihrofilni. Mostly nocturnal insects at night and hide under rocks, litter, etc. in. Some cockroaches - Synanthropic live on the premises. In the modern world fauna described more than 3600 kinds.

4. MANTOPTERA

Large or medium-sized insects with incomplete metamorphosis. Biting mouthparts type. Perednohrudy long, articulated with movable. "Arms" praying mantis - grasping front legs, the legs and thighs they have a series of sharp spikes, shin and thigh fit into the groove like a folding blade knife. Two pairs of wings (they can be shortened). Wide rear wings are composed on the abdomen oblong spray under forward. Mantis helio- and thermophiles. Winter in the egg stage, which are deposited in special groups capsules - ootekah. Most species shed 7-8. In the world described by 2000 fauna species. Ukraine has registered 6 species of praying mantis.

5. ISOPTERA

Insects medium size (6-40 mm), with incomplete metamorphosis. Soft Covers, most forms unpainted. Mouthparts gnawing type. Head prognathic. In winged individuals (males and females), two pairs of uniform mesh wings. The legs are short of walking. Abdomen. In digestion play an important role symbiotic microorganisms: ciliates, amoebas and bacteria. Termites - the so-called "social" insects that live in large families, which have different forms: mature individuals who live to 10 years, "working" individuals and "soldiers". The family formed one pair of winged animals. The fertilized queen lays on his life up to 15 million. Eggs. Termites eat wood, dry stems of herbaceous plants, fungi and others. Number of individuals in a mound up to several hundred million. Biomass termites on 1 hectare of rainforest is 4-10 tons. In the modern world fauna described about 2500 species. In Ukraine, found one species.

6. PLECOPTERA

Antennae long. Mouthparts gnawing type, but adult insects do not function. Two pairs of wings, they membranous, shiny, transparent, brownish or greenish. The legs are thin. TSerk, sometimes very shortened. They are characterized life: larvae develop in water (streams of fast currents, rivers), near water fly or crawl on plants grown insects. The development of larvae occurs within 1-3 years, during which time they molt 20-30 times. Nymphs, like adults, have two tail threads phytophages, polifahy or zoofahy. Imago - nektarofahy afahy or usually live a short time. In the world fauna described about 2000 species of freckles, in Ukraine - up to 50 species.

7. EMBIOPTERA

The body is elongated, soft, with a big head. The limbs of walking. The front pair of limbs spinning glands. In the wingless species simplified conversion. The larvae are similar to adults. Herbivorous, in nests always have stocks chewed food. Emba is very demanding to moisture and heat, distributed mainly in tropical countries. In the tropics live in the forests under the bark of trees or in crevices; in

temperate latitudes missing or distributed in most warm countries. In the modern world fauna described 200 species in Ukraine - one species.

8. GRYLLOBLATTIDA

Small wingless insects. Head prognathic, devoid of vision, may occasionally contain simple eyes. Limbs are homogeneous, of walking with paws. TSerk long, flexible, with female ovipositor. In features different series ortopteroyidnyh - they are "living fossil." There is no consensus about the systematic position and phylogeny of insects still there. The development of these insects occurs within a few years. Details lifestyle almost absent. In the modern world fauna described 21 species. In the Far East of Russia extended two types. In Ukraine this series insects are not registered.

9. PHASMATOPTERA

The body is large, much elongated, narrow, rod-shaped or broad leaf. Head prognathic, gnawing mouthparts. Small mobile. The most elongated thoracic. The limbs of walking. Wings in modern species are absent or front shorter than the back pair. Abdomen. TSerk. To this series belong to the largest insects, body length reaches 25-33 cm. They feed exclusively on plant food. Stick insects - insects inactive, able to fall into cataleptic state property. Some species breed parthenogenetic. The larvae are similar to adult insects molt six times. In the modern world fauna described about 2500 species. In Ukraine, stick insects available.

10. ORTHOPTERA

Insects large or medium size, usually elongated body. On the head are two sophisticated eye and one to three simple eyes. Head in most groups hipohnatic. Mouthparts gnawing type. Two pairs of wings, usually they are well developed, with a dense net of veins or not at all. The front wings are mostly elongated, straight, leathery. Rear - webbed. The front and middle legs of walking type (in tops and front - mine type). Rear legs usually type of very elongated thighs and shins. The abdomen has ten segments, with appendages at the end - two TSerk in part - with two in female grasshoppers and crickets - with elongated or curved ovipositor. Have a sound device. Most types is opened, the daily life. Herbivorous and carnivorous insects, many dangerous plant pests. In the modern world fauna described more than 20,000 species. In Ukraine, distributed about 170 species.

11. DERMAPTERA

Insects medium size, with elongated body. Biting mouthparts type. Elytra short, hard. Delicate wings, webbed, with longitudinal veins hidden under the elytra. TSerk as mites. The legs are short, bihalni. Abdomen long, flat and solid. Drive a hidden life. They feed on plant and animal remains, sometimes damage the plants. The female shows care for the offspring, protecting the eggs and young larvae. World fauna vuhovertok has 1800 species. Most species common in the tropics and subtropics.

12. HEMIMERIDA

Wingless parasites of rodents prognathous head is moderately long antennae do not have eyes. Great. The legs are short, specialized, quotes from suckers. TSerk long, soft, covered with hairs. The body length of 8-14 mm. For hemimeryd typical live birth. Hemimerydy only widespread in tropical Africa, where parasitic on

rodents. He lives in hair, quickly moving it like a flea. They feed on epidermal derivatives leather. A number includes 8 species. The most famous Hemimerus hanseni Sharp, distributed in equatorial Africa.

13. ZORAPTERA

Wingless (most species) or winged small (no more than 3 mm) insects with prognathic head and antennae. The bodies of there. Covers poorly pigmented. Well developed. Legs with quotes TSerk short. Ovipositor missing. In some species of wingless species occur cruise with body developed eyes and the eyes. Both forms are capable of breeding and can be likened castes of termites. Reason dimorphism remains unclear. In the fossil state zoraptery not known. In the modern world fauna described about 20 species belonging to the same genus Zorotypus. Distributed exclusively in the tropics. He lives under the bark of trees, rotten wood, plant residues. They feed is likely mycelium spores and fungi, mites. Create clusters of individuals, but no signs of life and social distribution of functions between individuals.

14. PSOCOPTERA

Small (1-10 mm long), fragile insects with long antennae. Head hipohnatic, less prognathous. Mouth of the biting type. Eyes large, winged forms are in three simple eyes. Wings are well developed, short, or not at all. At rest, the wings folded. Limbs homogeneous, elegant, long. Parthenogenesis occurs. Kulihamy lives singly or in trunks, branches and leaves of trees, bushes, forest litter, under stones, in the nests of insects and birds, housing rights. They feed on ground green algae, lichens, separate groups plisnevyh and parasitic fungi sometimes tissues of higher plants. Certain types of stocks harm human damage herbarium and insect collection. In the world described about 2,000 fauna species.

15. MALLOPHAGA

Wingless, small (1-14 mm long) insects that resemble lice, which differ from biting mouthparts. The body is flattened in the spinal ventral direction. The outer cover is often very. The body color from pale yellow to black. Head high, eyes reduced. Breast divided into two or three segments. Wings not. Bihalnoho prehensile legs or type adapted for coupling with a larger surface of the substrate. Lice - permanent parasites of birds and mammals; their lifetime expires body animal host. They feed on the epidermis, feathers, fluff, hair, skin and fatty secretions even blood that speaks wounds. Some species have adapted to internal parasites in the mouth of the owner. Rapid development, ontogeny lasts about 3-4 weeks. Transform incomplete, accompanied by three color resistance. In the modern world there are about 2,600 fauna species.

16. ANOPLURA

Small (0,35-6,5 mm long), wingless insects, parasitic on mammals. The body is flattened in the spinal ventral direction. Head is small and usually much narrower breasts. Antennae short. Mouthparts piercing-sucking type, resting hidden inside the main capsule. Breasts are small, without significant segmentation. The limbs are short, tenacious. Abdomen relatively large. Females attach eggs (nits) to the hair of the host. Course by crawling in contact owners. Nesting continuously lay fertilized

eggs. The transformation is accompanied by a three molt, the duration of the life cycle - from 2 to 4 weeks. Most lice or monofahy olihofahy. They carry pathogens of serious diseases - typhus and relapsing fever, fever Volyn and others. In the world there are about 430 fauna species. In Ukraine 33 common species.

17. HOMOPTERA

Small, medium-sized or large insect with sedentary hipohnatic head. Mouthparts piercing-sucking type, looks like proboscis. Most representatives are complex facet eyes and simple eyes. Antennae tri - or not at all. Representatives of a number have two pairs of membranous wings liquid mesh mainly longitudinal veins. The intestine has a filtration chamber (anterior intestine that connects to the rear) to separate excess water and oligosaccharides, macromolecular compounds fall into the medium intestine for digestion. Converting incomplete. For aphids characteristic polymorphism generations alternation of parthenogenetic aphids bisexual and partially. All herbivorous insects that feed on cell sap of plants. Larvae develop open or live in soil and plant tissues. Lay eggs on the surface or in plant tissue. World fauna includes about 40,000 species in Ukraine - about 1650 species.

18. HEMIPTERA

Body flattened or elongated. Mouthparts piercing-sucking type. Antennae (sometimes consisting of 1-5 segments). Two pairs of wings. The front pair of wings sclerotized, on top webbed. The second pair of webbed. Metathorax course of odorous glands. Foot bihalnoho, swimming, mines, or grasping strybalnoho type. The larvae differ from adults smaller and lack wings. In bedbugs completely absent parthenogenesis. During the period of the larvae molt five times. In bedbugs widespread concern for the offspring. Most species of bugs - thermal and xerophile. Bedbugs live deep in the sand (Cydnidae), swimming in hot thermal waters, unique among insects common in the seas. In biological terms are divided into herbivorous bugs, predatory and parasitic. The modern world fauna has 40,000 species. Ukraine has registered more than 930 species.

19. THYSANOPTERA

Small insects (0.5-5 mm long) with more or less flattened in the spinal ventral direction body covered with small bristles. Mouth of piercing-sucking type, asymmetrical. Complex facet eyes are large, take up half the length of the head. Simple cells usually 3 thoracic segments and are (pterotoraksom: fusion medium and). Wings are often reduced or elongated shape and fringed with long cilia. Foot type. Paws and claws of prysysnym bubbles (aroliumom) at the end. Converting incomplete. They live on the leaves, the flowers, buds, bark in trees, litter. Herbivores and predators. TRIPS act as pollinators of plants. Common thrips on all continents. The modern world has about 4,500 fauna species. Ukraine has registered about 250 species.

SECTION II. Insects with complete conversion (HOLOMETABOLA)

20. COLEOPTERA

Head is well developed, typically round or flattened. Eyes developed. The antennae of different types. Biting mouthparts type. Legs of different types. The front wings are very; webbed hind wings; they may not be. The abdomen grows with

sitting. At the current evolutionary stage - a thriving group of insects. Beetles occur in nature in a variety of conditions, fed a variety of plants, plant and animal residues, many predatory forms. Parthenogenetic development registered in certain types of leaf beetles, weevils. The modern world fauna includes about 300,000 species.

21. STREPSIPTERA

Small insects with sharp sexual dimorphism. The male of free, reduced his front wing, rear - large, fan-shaped, metathorax well developed in the adult phase not eat, mouthparts reduced. The female insect parasite in the body, has a wormlike body, deprived of antennae and movement. Abdomen of females contained in the body of the host, cephalothorax free, above the body of the host site of coupling two of its segments. Transformation - hipermetamorphosis. Usually on parasitic Hymenoptera, Orthoptera, and. In the world fauna described about 300 species.

22. NEUROPTERA

Medium or large insects. Biting mouthparts type. Head mobile, hipohnatic with large faset eyes. Simple eyes are. Antennas various forms. Great moving. Front and rear wings mesh. Bihalni legs, thin, short. Larvae - voracious predators. Sucking mouthparts type (with elongated jaws form two sucking tubes). The larvae have three larval ages. Adult insects living openly in vegetation, most active in the evening times. Some of them are predators, phytophagous other. Most species useful for pest destroys agriculture and forestry. In the world described about 5,000 fauna species. Ukraine has registered 72 species.

23. RAPHIDIOPTERA

Head flattened, prognathic. Mouthparts gnawing type. Antennae short, threadlike. The eyes are large. Greatly elongated, mobile, resembling a camel's neck. The body is slender, elongated. They have two pairs of large (6-15 mm) transparent mesh wings with stacked along abdomen. The female has long ovipositor sharp. The modern world fauna very depleted. Adults live about 2 months. Females ovipositor tree bark, lay their eggs underneath. Larvae live about 2 years under bark or in the soil at the roots of trees. Pupa free. Camel - predators that destroy various forest pests. Camel around a few associated with moist places. In the modern world fauna described about 200 species. In Ukraine, known only 4 species that occur in the spring and summer of deciduous and coniferous trees, common in fruit orchards.

24. MEGALOPTERA

Winged insects medium size. The head is large, flat, prognathic. Biting mouthparts type. Antennae threadlike long. Eyes are well developed. Perednohrudy enlarged, wide. They have two pairs of membranous wings consisting. Adult insects are kept near water, but sometimes they can be found far from water. Flying them very slow. Groups lay eggs near water. The larva shed 10 times. Development usually occurs within two years (1 to 3 years). The larvae live in water, during the first and second centuries are planktonic larval life, then sink to the bottom and burrow into the mud. Breathe abdominal tracheal gills. The larvae are carnivorous. Turn into pupae in the soil and moss near water. Adults do not feed. In the modern world fauna described about 240 species with great.

25. MECOPTERA

Head down and stretched beak looks process, with biting mouthparts parts on top. Antennae threadlike. Legs slender, type. Most of the series has two pairs of well developed membranous wings, some types of wings are underdeveloped. In males, the last segment of the abdomen thickened and folded up, the rear part of the body resembling a scorpion. Larvae and adults - predators or feed on dead insects and rotten vegetable residues. Adult insects are characterized by weak flight, the wings reductions actively running and jumping. In the modern world fauna described about 470 species.

26. TRISHOPTERA

Small or medium size, close and similar to butterflies. Head hipohnatic with filamentary antennae and large eyes. Mouthparts soft, sucking. Chest with two pairs of wings. The trunk and wings are covered with hairs. Adults live near water, do not eat, drink only. Eggs are deposited in water. Larvae - typical inhabitants of freshwater, carnivorous or herbivorous, with biting mouthparts type and three pairs of thoracic legs; tracheal gills breathing or through the skin. Larvae are cancer. With silk larvae prey species hunter build network or funnel. Depending on the speed of current build of vegetable or mineral particles movable cap. Before molt into a pupa imago gnaws cap and the cap comes ashore. Imago active before sunset, flying at night to light. Representatives of several common on all continents. In the world described more than 6,000 fauna species. In Ukraine, the number of studied enough.

27. LEPIDOPTERA

Very different in size and structure of the group insect wings. Usually have two pairs of wings, covered with special scales. Combinations with scales of clusters of different shapes and colors form different figures in different members of the series. Body covered with scales and butterfly. All phases of them quite distinct: inactive pupa does not like any caterpillar or the butterfly. Pupa is often placed in a cocoon. Mouthparts in larvae gnawing it, the butterflies - sucking. Mostly phytophages. There are species that feed on wool, wax, there are carnivorous species, some of imahinalniy on stage is not powered. Among the butterflies are narrow endemic and relict species, but there are cosmopolitan. In the modern world fauna more than 140,000 described species.

28. HYMENOPTERA

Body size number of representatives to large. Head hipohnatic (rarely prognathic). Mouthparts gnawing or biting, licking. Facet eyes well developed, there are 3 simple eyes. Antenna very diverse structure. 2 pairs of wings, they membranous, transparent, heteronomni, little veins. The first segment of the abdomen became part of the chest. Females often have a sting. Larvae - legless or. Pupa free. In modern fauna, most families - cosmopolitans. Reproduction in most cases bisexual. Sometimes there is a development from unfertilized eggs only males (arrenotokiya) or only females (telitokiya), very rare - in 2-3 cases and - from unfertilized eggs are derived and males and females. In gall can be cyclic parthenogenesis (cyclic deyterotokiya - alternating bisexual generations of generations of parthenogenetic females). Some haltsyd and brakonid observed Polyembryony (2000 or more embryos in one egg). Hymenoptera are of great

practical importance as pollinators of plants, parasites and predators of pests agriculture and forestry and honey. World fauna has over 300,000 species. Probably much larger number of species (up to 6,000,000), most of the small parasitic species not yet described. In Ukraine, distributed about 10,000 species of Hymenoptera.

29. APHANIPTERA

Small, flattened laterally, wingless insects are able to make big jumps. Head small, with short antennae. Eyes sometimes absent. Mouthparts piercing-sucking type. Breast clearly are separate segments, with bristles or formation of cloves. The wings available. Best strybalni developed hind legs. Legless worm larvae live freely, feed on various organic residues. Pupa free. The entire cycle of development is completed in 1-2 months. Imago fleas parasitic on warm-blooded animals. Fleas attack any creature (even snakes and caterpillars). Great danger to humans are fleas as vectors of pathogens, such as plague and others. Certain types of fleas - intermediate hosts of helminths. World unites approximately 1,000 fauna species.

30. DIPTERA

The most highly organized series of insects. By a number of characteristic feature is the presence of only one (front) pair of wings. Rear wing converted into a small appendages relevant for the coordination of the flight. The larvae are legless. Mouthparts diverse structure: the mosquitoes, bloodsuckers piercing-sucking type, Horse-fly cutting-licking, most typically flies licking. The representatives of the Contracting nematocera mustaches, long; the representatives of the suborder antennae, short. The degree of reduction heads larvae Diptera share: 1) family with a well developed head biting mouthparts; 2) the group of partially reduced mouthparts and a half main capsule; 3) family of headless larvae. Adults feed on plant sap speakers, nectar, manure, is a predatory insect. Many mammals bloodsuckers, less birds, reptiles and amphibians, common imahinalna afahiya. Reproduction bisexual, rarely parthenogenetic, there are cases paedogenesis. Many species of higher flies developed. There are forms that give birth right doll: the tsetse fly. In the world fauna over 120,000 described species.

LECTURE 4. BAHATOYIDNI pests

Question:
1. Pests series Orthoptera
2. Pests number beetles
3. The number of lepidopteran pests

1. Pests series Orthoptera (Orthoptera)
Families true locusts - Acrididae
In Ukraine, most grasshoppers overwinter in the egg stage and have generation per year. Eggs are deposited in the soil in the form of so-called "Potbelly". Grasshoppers Each type has its own specific form of egg capsules. Renaissance larvae in the spring, and lay eggs - in summer or early autumn. The larvae molt 4-7 times and complete

development of one and a half month. Life grasshoppers is open landscapes, especially a lot of them in the meadows and steppes.

An important role in limiting the number of grasshoppers belongs bio-factors.

1. Prus, or locusts Italian - Calliptamus italicus L. everywhere. Length males - 15-25 mm - 23-41 mm, body color varies and can be brown-brown, gray-brown, brown, yellow-brown or whitish. Larvae. The steppe zone is more common in wormwood and sagebrush-grass steppes, and old fallow. In these places, multiplies and on crops and young forest plantations. With a small population density of larvae and adults are kept separated (phase solitaria), increasing their numbers transferred to the gregarious lifestyle - phase gregaria. Clusters of grasshoppers called. In carry out joint migration, the larvae make joint, and adult insects - flights. Harmed the larvae and adults.

2. migratory locusts, or Asian - Locusta migratoria L. In Ukraine, represented by two subspecies: L. migratoria migratoria L. and L. migratoria rossica. The second subspecies serednoruskoyu locusts. Imago size 29-59 mm, brown or greenish color. Locusts lays egg capsules mainly in stubble and fallow spring crops. In the largest number of Potbelly occur on dry reed islands. Their number usually increases in dry years. Eggs are deposited in the soil is not too hard to the point where kuliha locusts found itself at the time of full ripeness ovaries. Embryonic development gregarious migratory locust phase begins in autumn and ends next spring. Eggs solitary phase under favorable conditions without diapause. Embryonic development in southern in May, depending on temperature and humidity. Larvae in warm years in the third week of May - beginning of June, and in the cold - in the second week of June. Okrylennya in southern begins in early July and females lay eggs begins in mid-August and lasts until October. Two female lays egg capsules. Harmed the larvae and adults.

3. Moroccan locusts - Dociostaurus maroccanus. In Ukraine, widespread mainly in southern Crimea. Colour - yellowish-gray or fawn with gray spots. Males 20-28 mm, females - 28-38 mm. In Crimea revival begins in early May. Adults emerge in early June. Harmed the larvae and adults.

Family grasshopper - Tettigoniidae

4. Grasshopper Green - Tettigonia viridissima L. - everywhere. Imago size 27-42 mm; body and legs are pale green. Hibernate eggs, adjourned the ground in groups of 2-8 pc. They have one generation per year. Harmed the larvae and adults.

Family crickets - Gryllidae

5. steppe cricket - Gryllus desertus Pall. - everywhere, but more numerous in southern Ukraine. Imago size 12-19 mm; body color and black heads. Hibernate under plant debris. During the year, developing one generation. Harmed the larvae and adults.

Family kapustyanky - Gryllotalpidae

6. Kapustyanka usual - Gryllotalpa gryllotalpa L. - common in all areas in the wet well, including lands. Imago velvety brown, yellowish below. Body length - 35-50 mm. Also feeds soil invertebrates. Hibernate adult insects, nymphs and larvae. Full

development cycle kapustyanky usual in steppes of Ukraine lasts about two years, in the northern part - even more. Harmed the larvae and adults.

2. Pests number of beetles (Coleoptera)

By number of pests are beetles families scarabaeidae (Scarabeidoe), beetles (Elateridae), chornyshi (Tenebrionidae), pylkoyidy (Alleculidae) and (Curculionidae).

Family scarabaeidae - Scarabaeidae

1. Tailor - Lethrus apterus - common in the southern part of Polesie, the northern forest-steppe and steppe of Ukraine. Beetle size 15-24 mm, black co-primrose. The massive output adults - from mid-April to mid-June. Winters adults, generating annual. Harmed adults.

Family beetles - Elateridae

2. Kovalik seed - Agriotes sputator - common in Ukraine everywhere. The larvae damage the cereals, tubers, roots beets and carrots, seeds and shoots. Beetle size 6-8,5 mm, dark brown, sometimes light brown. Beetles hibernate in the soil in the pupal at a depth of 100 cm, larvae of different ages - at a depth of 50-80 cm. Adults appear in May and the first occur by mid-June. Mass position years and - at the end of May. Larvae revived in late May - early June. Full development is completed in four years. After completing development, the larva in July - August. Beetles pupal formed in late August. Harmed larvae partially - adults.

5. Kovalik steppe - Agriotes gurgistanus - everywhere. Beetle 10-15 mm; black body with bronze luster. Beetles hibernate in the pupal in the soil at a depth of 10-12 cm and larvae of various ages - at a depth of 5-35 cm. In the ground beetles come in the second half of April. Mass and years - from 27 April to 12 May. Eggs are deposited in the soil. Embryonic development lasts two - three weeks. Larvae revived in late May - in. Developing larvae 2-3 years, some of the - up to 4 years. After completing development, masking in September - October. Duration of - 3-4 weeks. Harmed the larvae and adults.

Family chornyshi - Tenebrionidae

7. Midlyak sandy - Opatrum sabulosum - is widespread, but most numerous in southern steppe zone in Odesa, Mykolaiv, Kherson and Zaporizhia regions. Beetle the size of 7-10 mm, black or grayish-brown crust on the soil. Beetles live 1-2 years, winter of plant residues on the fields and in the upper soil layer. There the ground in the steppe zone in late March or early April. In April, observed mating and late April - early May lay eggs, which lasts until late May - early June. Full development of larvae is completed in 35-40 days; larvae in the soil at a depth of 3-6 cm, pupa development lasts 6-8 days. Adults appear in July and continue to leave the ground during August. The larvae, which revived the later batches, in August - September and beetles remain in the pupal to spring. Imago harmed, in part - larvae.

8. Midlyak corn - Pedinus femoralis. In Ukraine, distributed mainly in southern forest steppe and steppe. Beetle 7.9 mm, black with a bluish tinge. Beetles hibernate and larvae in the soil at a depth of 20-40 cm. Beetles live 2-3 years development is completed in 12-14 months. Adults begin to leave the ground in the second half of April. Oviposition continues throughout the growing season. During the period of life

the larvae (about one year) molt 11 times. Pupal stage lasts 14-18 days. Harmed larvae partially - adults.

9. Midlyak - Blaps lethifera - common in southern forest steppe and steppe. Beetle size 20-27 mm, black. Beetles hibernate and larvae in the soil of all ages. The first adults come to the surface in April; mating and egg laying occurs in the first - the second decade of May. Larvae in late August; of their winters after extra power end of April, and in May there are beetles. Harmed the larvae and adults.

10. Midlyak steppe - Blaps halophila - common in Ukraine steppe zone and Crimea. Beetle 17-23 mm long, dull black. Beetles overwinter under shelter and pupal. The cycle of life and is the same as in the previous species. Harmed the larvae and adults.

Family pylkoyidy - Alleculidae

11. Pylkoyid Dagestan - Podonta daghestanica - in Ukraine the most numerous in the southern strip of steppe zone and steppe Crimea. Damaging wheat, corn, sorghum, soybeans, sunflower. Beetle size 7-9,5 mm shiny black. Hibernate larvae of different ages in the soil at a depth of 40-60 cm. Life larvae - two years. Having completed the power they in the steppe zone in May; beetles emerge in the second half of May; years maximum - in June, the last specimens disappear in early August. Harmed larvae.

Family Weevils - Curculionidae

12. gray weevil south - Tanymecus dilaticollis - common in southwestern Ukraine. Beetles feed on winter, and spring stairs, beet, sunflower, corn, tobacco and various weeds. The larvae feed on corn. Beetle size 6,5-8 mm, black, densely covered with gray scales. Beetles hibernate in the soil at a depth of 40-80 cm. Out of wintering beetles longer than 20 days. Mass oviposition occurs during May. Larvae develop 2-2,5 months. Pupal stage lasts 17-20 days. Beetles appear in week of August and remain in the soil for the winter. This pest develops in one generation per year. Harmed the larvae and adults.

3. Pests number of butterflies or moths (Lepidoptera)

Family scoops - Noctuidae

1. Turnip moth - Scotia segetum - common in Ukraine everywhere. Butterfly size 40-50 mm. The front wings brownish-gray. Caterpillars hibernate sixth age at a depth of 10-25 cm. Lit butterflies in the south begins in mid-April, in the steppe zone - in the third week of May. In most of Ukraine winter scoop developing in two, and in the northern and north-western regions - in one.

2. scoop exclamation - Scotia exclamationis - in Ukraine everywhere. Butterfly size 35-45 mm, front wings of yellowish-gray to, dark brown or dark brown. Caterpillars hibernate sixth century in the soil. Lit Butterfly occurs in the first and second half of June. Need extra power for flowering plants. In Steppe etsya is developing in two generations, but years of low-intensity second generation of butterflies. Caterpillars of the second generation of winter damage.

3. scoops gamma - Autographa gamma - in Ukraine everywhere. With field crops damages flax, hemp, beet, potatoes, and legumes, corn and so on. Butterfly 40-48 mm; front wings of to violet-brown color with spot as Greek "gamma." Winters pupa

in the soil. The cycle of one generation in the summer time is 26-44 days. The steppe zones of Ukraine and scoop-gamma is developing in two year.

4. scoops alfalfa or lonova - Heliothis viriplaca - is widespread. The greatest damage has soya and alfalfa, sometimes damaging cereals and corn. Butterfly size 30-38 mm; front wings greenish-gray with a yellowish tint. Winters pupa in the soil. The butterflies of the first generation fly in May, the second - in June. Embryonic development lasts 5-9 days, the power and the development of caterpillars - 19-33 days. Pupal stage lasts 10-17 days generation. Developed in two generations.

Family moth - Pyraustidae

5. stem (corn) butterfly - Ostrinia nubilalis. In Ukraine, a large zone covering harmfulness and northern steppe zone. Caterpillar damages corn, millet, sunflower. Butterfly size 26-32 mm, front wings brownish-brown males, females wings lighter, whitish-yellow or light brown. Caterpillars hibernate in the stems of plants damaged in mid-May - early June. Lit butterflies coincides in time with the start of the ejection of panicles. Tracks settled on a plant in protected places bite in the middle where the feed. After finishing power, they remain in stem the winter. In the south of the tracks generation immediately, and in August - September second generation.

6. meadow butterfly - Margaritia sticticalis - is widespread. Butterfly size 18-27 mm. The front wings light brown with yellowish-brown patterned with a few strips on the outer edges and bright spot in the middle. Ukraine has developed two generations and one in the south under optimal conditions is three generations. Caterpillars hibernate in cocoons last generation. They in early May began the flight of butterflies. Lit takes one to two months. Butterflies require additional power. Females lay eggs within 5-15 days. Embryonic development lasts from 2 to 15 days. Moths of the second generation fly late - in July. Under favorable weather conditions they lay in July - August, developing caterpillars that winter.

LECTURE 5. pests of crops and GRAIN and its products during storage

Question:
1. Pests cereals
1.1. Pests number
1.2. Pests number
13. Pests number of thrips
1.4. Pests number beetles
1.5. Number of lepidopteran pests
1.6. Pests number of Hymenoptera
1.7. Pests number of Diptera
2. Pests of grain and its products during storage
2.1. Pests number beetles
2.2. Number of lepidopteran pests
1. Pests cereals
1.1. Pests number proboscidea (Nomoptera)
Family leafhoppers - Sisadellidae
1. leafhoppers - Masrosteles laevis - is widespread. Adult body slim, 3,2-4 mm long, yellow-green, with a clear black and patterned on the head shield. Hibernate eggs, pending the fabric sheath leaf winter crops or in the root of the stems. Develops 2-3 generations. Harmed the larvae and adults.
2. Striped leafhoppers - Rsammotettis striatus - is widespread. Imago size 3.5-5 mm, dirty-yellow or brownish color. Hibernate eggs, deferred females cuts the leaves in winter. Develops 1-3 generations. Harmed the larvae and adults.
Family svynyushky - Dephasidae
3. Dark leafhoppers - Laodelphax striatella - is widespread. Imago size 3.5-5 mm; yellow females, males, almost black. Larvae hibernate III-IV centuries on crops of cereals and limits and roadsides. Developing this pest in two generations. Harmed the larvae and adults.
Family afidy - Arhididae
4. Normal Cereal aphids - Schizaphis graminum. In Ukraine, more common in southern steppe in the steppe and the Crimea. Wingless parthenogenetic females founder-size 2,7-2,9 mm, light green, with longitudinal green strip in the middle of the back. Lifecycle monogamous. Hibernate eggs on the leaves and shoots of winter crops of wild cereals. During the growing season can develop in 10-12 gene-right. Harmed the larvae and adults.
5. Great Cereal aphids - Sitobion avenae - is widespread. Wingless founder of size 2.5-3 mm or greenish-brown color. Lifecycle monogamous. Hibernate in winter eggs or wild grasses. Developed in several generations during the growing season. Harmed the larvae and adults.
6. barley aphids - Vrashycolus noxius - everywhere.
Parthenogenetic wingless female - 2.5 mm long, pale yellow in white pollen. In winged head and black antennae and abdomen pale green. Lifecycle monogamous. Hibernate eggs on the leaves of barley and wheat. The duration of larvae to adults in

an average of 8 days. In September - October of sexual generation appears, which fertilized females lay overwintering eggs. Harmed the larvae and adults.

1.2. Pests number (Nemiptera)

Family -shells - Scutelleridae

In the literature, called "grain bugs" combine several types of family-shells, damaging crops. This group includes harmful, Moorish, Austrian and turtle. They are characterized by the presence of large shield that covers the wings and abdomen.

1. Harmful turtle - Eurygaster integriceps - to Ukraine extended the southeast steppe and steppe. Gives one generation overwinters as an adult under state Opal leaves, the remains of different plants, shelter belts and forests, at least - in orchards and other tree plantations. The duration of larval development - 40-50 days. Flight harmful shells in place of hibernation begins in winter collection. Harmed the larvae and adults.

2. Moorish turtle - Eurygaster maurus - to Ukraine extended everywhere. Adults and larvae superficially similar to harmful; differ from it slightly smaller body size (8-11 mm). In Ukraine, the Moorish turtle diffusely distributed, fields cultures tend to happen in small quantities. During the year, gives one generation. Larval development period than harmful larvae turtle. Laying eggs, larvae and departure resurgence of bedbugs in the wintering grounds 7-10 days later versus harmful bug.

Family pentatomidy - Rentatomidae

Cereals sometimes cause significant harm bugs pentatomid family, especially Eliya sharped and nosy. Much less - hostroplechyy Shchitnikov and berry, green palomena and others.

3. sharped Eliya - Aelia asyminata - Ukraine everywhere. Bug egg shape, 7-10 mm long, grayish-yellow color. Adult bugs hibernate in the same place as the harmful alternation-Pasha. Oviposition begins in mid-May and continues until life bugs, which coincides with the phase of completion dairy and wheat ripening. Duration of eggs - 5-10, lychy¬nok - 45-55 days. Harmed the larvae and adults.

4. Eliya nosy - Aelia hosthata - in Ukraine rather in steppe and steppe. The body is yellowish, 10-12 mm long, with tread longitudinal dark bands of light and slightly raised rebryn; the rear flanks one tsyatochtsi. During the year develops in one generation. Hibernate individuals under plant debris. Harmed the larvae and adults.

13. Pests number of thrips (Thusanortera)

Family fleotrypidy - Rhloeothriridae

1. thrips wheat - Narlothrips tritisi - is widespread. Females of 1.3-1.5 mm long, from black and brown to black; males are smaller than occur very rarely. Larva cinnabar red, 1.4-1.8 mm long. Larvae in the surface soil layer on the surface and under the remains. The massive entry of thrips adults coincides with the beginning of winter heading. To wax ripeness stage larvae complete development and go for the winter in the soil. Developing one. Harmed the larvae and adults.

Family elotrypidy - Aelothhiridae

2. thrips oatmeal - Stenothrips graminum. Female 0,9-1,1 mm; color yellow-gray or brownish-gray; larvae are yellowish-gray. Thrips adults hibernate in the soil. Developed a generation. Harmed the larvae and adults.

1.4. Pests number of beetles (Soleortera)
Family ground beetles - Sarabidae
1. dross had meat - Zabrus tenebrioides - common in the steppe. Beetle 12-16 mm long, pitch-black with a faint sheen. All ages larvae hibernate in the soil at a depth of 20-40 cm. Pest develops in one generation. Harmed the larvae and adults.
2. Ground beetles millet - Orhonus calceatus. Distributed in steppe, steppe zone and alive. Beetle 12-15 mm long, black or resin-black, shiny top; antennae and legs are reddish-brown. Larvae hibernate I-II centuries and beetles. Pest develops in one generation. Harmed the larvae and adults.
Family scarabaeidae - Ssarabeidae
3. Kuzka or grain beetle - Anisorlia austriasa. Beetle eating away cereals during the milky stage, and hard knocks of grain on the ground. The larvae damage the roots. Beetle 12,8-16 mm long, bluish black body; elytra dark brown. Lit beetles lasts from late May to early August. It has a two-year development cycle. Harmed larvae (feed on roots) and adults.
4. Beetle Crusader - Anisorlia agrisola - common in Ukraine everywhere. Beetle 10,5-13 mm long, black with a greenish metallic sheen; elytra brownish-yellow with black patterned as. Beetles fly from late May to late July. It has a two-year development cycle. Harmed larvae (feed on roots) and adults.
5. The beauty or chafer field - Anisorlia segetum - is widespread. Beetle 8-10 mm, bluish-black with a metallic luster, abdomen and elytra brownish-yellow, without graphics. Lit beetles in northern Ukraine begins 7-12 June and ends on August 14; in the south - respectively 23 May and 12 July. It has a two-year development cycle. Harmed larvae (feed on roots) and adults.
The family leaf beetles - Shrusomelidae
6. cereal leaf beetle (normal) - Oulema melanorus - is widespread. Beetle 4-4.5 mm, greenish-blue, and feet red. Beetles hibernate in the soil at a depth of 3-5 cm, fields of cereals or herbage. Ukraine has developed a generation of this pest. Beetles and larvae are harmed.
7. blue - Oulema lichenis - to Ukraine extended everywhere. Life is the same as in the red-. Beetles hibernate in plant litter, turf grasses, piles of grass and or in the soil to a depth of 5 cm. During the year develops in one generation. Beetles and larvae are harmed.
8. The striped flea beetles meat - Rhullotreta vittula - everywhere. Beetle 1.5-2 mm, black. Along each shard yellow stripe. Beetles hibernate on the slopes of ravines and gullies, forest edges, in forest soil in the top layer of fallen leaves or under. Gives a generation. Harms adults.
9. Normal stem flea beetles - Shaetosnema hortensis - beetle dark bronze color with a greenish tinge, body to 2.3 mm. Beetles hibernate under plant remains in the fields, in the forest, on the fringes. Gives a generation. Harmed the larvae and adults.
1.5. Number of lepidopteran pests (Leridortera)
Family scoops - Nostuidae
1. South scoop stem - Ohia musculosa - and widespread damage in the steppe zone of Ukraine. Butterfly 25-38 mm long, front wings whitish-yellow with light longitudinal

stripe. Winters formed the caterpillar inside the egg shell. Lit butterflies in June - July. During the year develops in one.
Family leafroller - Tohthisidae
2. Cereal Tortrix - Snephasia pascuana - in Ukraine everywhere. Butterfly 16-18 mm long. Front wings ash-gray, rear - gray-brown or ash-gray. Caterpillars hibernate. Moths fly in June - July. Renaissance caterpillars observed during the third decade of July - early August. Develops in one generation.
1.6. Pests number Hymenoptera (Numenopteha)
Family stem sawflies - Serhidae
1. sawflies ordinary bread - Sephus pygmeus - is widespread in Ukraine. Imago 6-10 mm long, the main color is black. Larvae hibernate in the last century elongated cocoon inside the "stumps" stubble wheat, barley and rye. Develops in one generation.
2. sawflies black bread - Trashelus tabidus - common in the Crimea and southern Ukraine. The size and shape of the body resembles ordinary sawflies, which differs slightly slimmer body and the lack of yellow on the abdomen transverse rings. Adult larvae hibernate in a cocoon inside the "stumps" stubble, often after wheat. Develops in one generation.
1.7. Pests number Diptera (Dirtera)
Family Halytsya - Sesidomuiidae
1. Hesse fly - Mauetiola destrustoh - everywhere. Resembling small midge, dark gray or brownish color. The females abdomen often with a reddish tinge. The body length is 2.5-3.5 mm. Hibernate larvae. In the spring. Calendar time fly flies usually occur in the second half of April - May. The female lives 2-7 days. Embryonic development lasts 4-8 days. In Ukraine, develops 4-5.
2. Mosquito millet - Stenodiplosis ranisi - Ukraine everywhere. Damage the millet. Externally similar to Hesse flies. The body color dark scarlet, vermilion hue. The female size 2-3, - 2 mm. Larvae hibernate in post-harvest debris and grain, as well as weed seeds. Under favorable conditions growing season develops 3-4 generations. REFERENCES first generation of adults - in the second week of June. Lit fourth generation - in early September.
Family opomiza - Oromuzidae
3. Opomiza fine - Oromuza florum - common. Body length 3.5-4 mm, rusty-yellow. Hibernate eggs postponed in the upper soil layer thickness of 3 cm for winter crops. Flies flies June. During the summer months, flies feed on flowering umbrella, aster, legumes and only in September - October, mate and lay eggs. Oviposition lasts until frost. Develops in one generation. Harms larva.
Family cereal flies - Shlohoridae
4. Swedish flies - Ossinella L .: oats - Ossinella frit,
barley - A. rusilla - to Ukraine extended. Barley yellow fly shin different front and middle legs. Pupariyi larvae hibernate or winter shoots inside, grasses and weeds. Departure second generation of flies coincides usually with the phase - flowering plants Kolosov. The development of larvae generation mainly takes place at hulled cultures (oats). The third and fourth generations develop on windfall Kolosov, stairs

winter, Ottawa grasses. Sometimes possible development of the fifth generation. The second and third generations develop normally optional (in part), and in most areas of the steppe and forest steppe in Ukraine years, they did not appear. Oatmeal fly damage rye, oats, wheat, corn, and grasses, and barley - wheat, barley, maize, perennial grasses and weeds.

5. chlorops pumilionis - Shlorors rumilionis - in Ukraine everywhere.

Imago size of 2.5 mm, the main body color yellow triangle with a black spot on the head. Harmed larvae. Larvae hibernate in winter stems (wheat, rye), perennial and wild grass (wheat grass, etc.). Developed in two generations per year.

Family flower (snovyhovi) - Anthomuidae

6. Wheat (black grass) fly - Rhorbia securis - to Ukraine extended everywhere. It often happens with very morphological and biological features Yara fly - Rhorbia genitalis. Some researchers called Yara is the fine fly. Imago 4-5,2 mm long, velvety black. Winters in progress pupariya in the soil at a depth of 2-3 cm or stems of winter cereals. Departure flies begins very early, during the first half of April. The development of the larvae lasts 20-30 days, after which it forms pupariy in the surface layer of soil, occasionally - in damaged. At the end of August - during September pupariyiv departing from most of the second generation of flies. Developed in 2 generations. Harms larva.

7. Fly spring - Rhorbia genitalis - common. Winters in progress pupariya in the soil to a depth of 3 cm. Lit in mid-April - early May and lasts 30-40 days. Developed in 2 generations per year. Harms larva.

8. Winter fly - Leptohylemua soarstata - common in adjacent areas of the steppe and Polesie. Imago size of 8-10 mm, rusty-gray. Leg red and yellow with black legs, body in black bristles and hair. Larvae hibernate in the shells of eggs in the surface layer of soil to crops of winter crops. Departure flies etsya usually taking place during June. Developing one generation per year. Harms larva.

2. Pests of grain and its products during storage

Grain and other agricultural products during their damaging more than 400 species of insects, mites. Of them in Ukraine is the most common and most dangerous 12, including beetles - 9, butterflies - 3. According to American entomologists, annual losses from pests stocks range from 9 to 20%. In addition, potentially dangerous for Ukraine quarantine are numerous species of insects, which often occur in food goods, of South-East Asia, Africa and South America. In addition to direct losses from pests worsen food quality, polluting their excrement, are carriers of the bacteria and cause decrease seed germination.

2.1. Pests number of beetles - Soleoptera

Family weevils - Surculionidae

1. Collar weevil - Sitophilus granarius L. - is widespread. Damage wheat, rye, barley, at least - corn, oats and pasta. Development weevil in mainly period for air in storage not below 12 ° C. During the year, a grain pest occurs at all stages. Number of generations in terms of Ukraine - from two to four depending on the zone.

2. Rice weevil - Sitophilus oryzae L. - everywhere. In Ukraine occurs mainly in the southern regions and in Crimea. First detected in rice grain from which its name.

Adults and larvae damage except rice wheat, rye, barley, maize, flour, crackers, bran, biscuits, bread, dried apples, tobacco. With the development cycle much like a collar long-nose, but more sensitive to low temperatures and at the same time more resistant to dry feed. In temperate latitudes usually develops two generations. In southern Ukraine, under favorable conditions, can give 7-8 generations per year.

Family chornyshi - Tenebrionidae

3. Flour - Tenebrio molitor L. - everywhere. Beetles and larvae damage the flour, groats, bran and cereals, crackers, pasta. Larvae hibernate in unheated warehouses or in vivo. In unheated spaces develop one generation, in heated - less than two.

4. Small flour - Tribolium confusum Duv. - Is widespread. Beetles damage grain meal, bran, semolina, rarely - buckwheat, rice, sunflower seeds, dried fruits.

In unheated rooms beetles overwinter in heated - and beetles and larvae. Under favorable conditions flour developed four generations per year.

5. Bulavovusyy small flour - Tribolium castaneum Hrbst. - Is widespread. It is the homeland of the tropics, where it was introduced in all countries. In Ukraine actively harms in the southern regions, the Crimea, where damage, cereals, bran, flour products, dried fruit, broken peanuts, beans, cocoa beans, peas, linseed. Dry whole wheat and rye almost no damage. In unheated rooms beetles overwinter as growing pest in heated all year round, giving up to four generations. Beetle has a sharp smell of carbolic stable, which is transmitted flour and other products and remain in them for six months.

Family grinder - Anobiidae

6. Bread grinder - Stegobium paniceum L. - is widespread. The larvae damage the grain, bread, different products, many household items, wicker baskets, chairs, pharmaceuticals, Plywood and so on. Beetles are not powered. During the year develops, usually 2-4 generations.

Family hypocrites - Rtinidae

7. hypocrites thief - Rtinus fur L. - common. Beetles and larvae damage the various products and crackers, cereals, grain, stuffed, collections and others. Beetles and larvae hibernate in warehouses. The mass emergence of beetles observed in April. Usually during the year developing a generation. At higher temperatures (25-28 ° C) and crushed development products can develop three generations.

Family ploskotilky - Sucujidae

8. Surinam boroshnoyid - Oryzaephilus surinamensis L. - is widespread, most in Ukraine. Damage the seed germ of cereals, and flour products and dried fruits. Beetles hibernate in warehouses or under the bark of trees. Larvae, destroying other granary pests in stages eggs, larvae and pupae. During the year, in the southern regions is 5 in heated rooms - up to 7 Lives in storage, the confectionery and pasta factories, stores, mills, cereal and feed plants.

Family thyroid - Ostomatidae

9. Moorish - Tenebrioides mauritanicus L. - common everywhere. Beetles are predatory lifestyle. Also destroying insects in storage at the same time causing considerable damage to grain and grain (wheat, barley, corn, oats, cotton seed), dried fruits and vegetables. Give flour. Damaged flour darkens and becomes unpleasant

becomes unusable for other purposes. Developing one - two generations per year. Winters beetle larva or cracks in wooden premises, bags and other shelters. Beetles - predators, feed products in rare cases.

Family false bark or - Vostrychidae

10. The grain grinder (grain pruner) - Rhizopertha dominica F. - is widespread. Damages grain and cereals. Feeding on larvae of the beetle completely eat away the content, leaving the shell and the characteristic mealy dust (muchil), which can detect the pest in grain. Grain thermophilic. In the south can provide four generations per year.

2.2. Pests number Lepidoptera - Lepidoptera

Family moth - Ruralidae

11. Mill moth - Anagasta (Ephestia) küehniella Zell. - Is widespread. Tracks mill moth cereals (especially semolina), flour, bran, rice, grains, various seeds, nuts, dried vegetables, mushrooms, fruits and products. Type thermophilic. He lives in areas where depending on the conditions and the nature of power is developing 2-6 generations per year. In the southern areas in summer outdoors can develop at currents in haystacks. Lit butterflies observed from April to October, and heated rooms - throughout the year.

12. Flour moth - Ruralis farinalis L. - everywhere. Damages flour, groats, meal and bran, mixed fodder, seeds, dried fruits, berries and vegetables, and products. Caterpillars hibernate older ages in the food substrate in a cocoon or chrysalis. Lit butterflies occurs from April to early October. For the year develops two - three generations.

Family moth - Rhycitidae

13. South Collar moth - Rlodia interpunctella Hb. - Is widespread. Damage grain, flour, cereals, dried fruits and vegetables, groceries and pastry, spices, medicinal raw materials. Caterpillars usually hibernate in cocoons. For the year develops from one to six generations depending on the temperature and the availability of food for caterpillars.

Family moth - Gelechiidae

14. Grain moth - Sitotroga cerealella Oliv. - everywhere. Damages grain and grain products in the warehouses, and in the south area - and in the field. Caterpillars damage during grain filling. Laboratory culture grain moths used for mass breeding the parasite Trichogramma. Caterpillars and pupae hibernate in grains. In one wheat or barley is only one caterpillar, and grain - two or three. In granaries can grow to 8 generations per year. In the area to the south to two generations.

Family actual moth - Tineidae

15. Collar moth - Nemapogon granellus L. - everywhere. Damage the products stored grain, dried, dried mushrooms, melons and pumpkins. Caterpillars hibernate the last century. For two years developing in the south - three generations that often overlap.

LECTURE 6. pests of legumes, maintenance and vegetables

Question:
1. Pests legumes
2. Pests crops
2.1. Pests sugar beet
2.2. Potato Pests
2.3. Pests Sunflower
3. Pests vegetables
3.1. Pests of vegetables from the cabbage family
3.2. Pests vegetable of the family Liliaceae
3.3. Pests of vegetables celery family
3.4. Pests of vegetables from the family Cucurbitaceae

1. Pests legumes

Pests number ravnokrylyh proboscidea (Nomortera)
Family afidy - Arhididae
1. Pea aphid - Asurthosiphon risum - is widespread.
Parthenogenetic female (wingless and winged) size 4.6 mm with green. Male - from 1 to 2.9 mm. Hibernate eggs on the basal parts of the stems of perennial legumes. The development of larvae in the summer lasts 8-10 days. During the growing season to 10 generations of winged and wingless parthenogenetic. In late summer and autumn (September - October) there are sex females give birth to larvae, which develop from females and males amfihonnoho generation.
Pests number of thrips (Thusanortera)
Family thrips - Thriridae
1. thrips pea - Kakothrips robustus - is widespread. Imago size 1.4-1.8 mm; body dark brown. Larvae hibernate in the soil at a depth of 20-35 cm. Ukraine pea thrips develops in one.
Pests number of beetles (Soleortera)
Family weevil - Vrushidae
1. pea weevil - Vruchus risorum - everywhere. Monofah. Prejudice peas. Beetle the size of 4-5 mm, black, top covered with reddish-gray hairs. Beetles hibernate in the grain in storage. In southern Ukraine much of their winters in stacks of straw residues of plant under the bark and in soil. Pest in one generation. In the larval excrement contains alkaloid kantarydyn so damaged grain can not be used in food and livestock feed. Harmed the larvae and adults.
2. bean weevil - Asanthoscelides obtectus. In Ukraine, widespread in the area Bean individual local cells. Beetle size 2,8-3,5 mm top and covered with grayish yellowish-gray hairs that form numerous spots. Hibernate inside the grain in storage, in the field - in, soil, under the remains of plants. In warm areas propagated throughout the year, developing in 5-6 generations that overlap. In the field bean weevil develops in one in Ukraine sometimes optional second generation.
3. Striped tubercular weevil - Sitona lineatus - is widespread. Beetle size 3.5 mm; Overall color earthy gray. Beetles hibernate in the top layer of soil and under the

remains of plants in the fields of perennial legumes. For the year developing a generation. Causing harm beetles and larvae.
4. bristly tubercular weevil - Sitona crinitus - distributed mainly in the steppe zone, in smaller quantities - in the steppe. Beetle size 2,8-4,5 mm in the rear half of elytra with long blond bristles. Beetles hibernate in the soil, mainly in the fields of leguminous plants where their food occurred in summer and autumn. Full development cycle is completed in 45-60 days. Develops in one generation. Harmed the larvae and adults.
5. weevil - Tushius quinquepunctatus - is widespread. Beetle size 3.5-4 mm, densely covered with red top-blys scales. Beetles hibernate, sometimes - immature larvae in soil or in plant remains. For the year developing one generation. Harmed the larvae and adults.
Number of lepidopteran pests (Leridortera)
Family leafroller - Tortrisidae
1. pea moth - Laspeyresia nigricana - is widespread. The butterfly has a wingspan of 11-16 mm; front wings dark gray; rear wings brownish with grayish hue on the edge. Hibernate tracks that have completed their development, in soil, on 3-5 cm in dense silky cocoons stuck with soil. In Ukraine, develops one year.
2. biloplyamysta pea moth - Grapholita dorsana - is widespread. Butterfly with a wingspan of 16-18 mm; narrow front wing; the root of the wing olive-brown outer half - brown; on the outside of the front wing ten strokes clear whitish; rear wing greyish-brown. Caterpillars hibernate who complete power in the upper layer of soil in dense silky cocoons. For the year developing one generation.

Family moth - Ruralidae
3. Acacia moth - Etiella zinckenella - everywhere. Butterfly with a wingspan of 22-30 mm; front wings yellowish-gray with and rusty yellow stripe; rear wings are light gray. Hibernate tracks that have completed development of soil in dense silky cocoons. Moth a year gives 2-3 generations.
Family scoops or bat - Nostuidae
4. Pea scoop - Seramisa risi - common. Polifah. Butterfly with a wingspan of 36-42 mm; brown wings with cross. Winters pupa in a cocoon in the soil. For the year develops two generations.
Pests number Diptera (Diptera)
Family Halytsya - Sesidomuiidae
1. Pea Halytsia - Sontarinia risi - everywhere. Midge size 1,5-1,8 mm, pale yellow with dark stripes on the abdomen. Larvae hibernate in cocoons in the soil at a depth of 5-20 cm. The development of the first generation is late - in June, the second - in July - August. Most are first-generation Halytsya. Developed 2 generations per year.
2. Pests crops
2.1. Pests sugar beet
Pests number (Nomortera)
Family tsyksiyidy - Sihiidae

1. The root leafhoppers - Rentastiridius leporinus - everywhere.
Imago size 06/09 mm black shield; light gray wings. Larvae hibernate III-IV centuries in the soil at a depth of 5-20 cm. A year developing one generation.
Family aphids - Arhididae
2. Beet leaf aphid - Arhis fabae - happens everywhere, especially numerous in the western regions. Polifah. Wingless parthenogenetic females is 1,8-2,5 mm oval body, black with a greenish-brown tint. Type migratory. Hibernate fertilized eggs on the shoots at the base of European spindle tree buds, at least - warty, viburnum and jasmine. At the primary forage plants develops 3-4 generations of aphids - until growth of bushes. At beet and other herbal plants of parthenogenetic aphids multiply rapidly until the fall, giving in this time of 8-10 or more generations of wingless and winged aphids. Harmed the larvae and adults.
Family pemfihy - Remrhigidae
3. Beet root aphid - Remphigus fuscicornis - happens everywhere. Parthenogenetic wingless female size 2,1-2,6 mm body has egg shape, yellowish-brown or color. Hibernate wingless parthenogenetic females mature form of special wintering in the soil at a depth of 16-60 cm. During the period from May to October 8-10 evolving generations. Harmed the larvae and adults.
Pests number (Nemirtera)
Family slipnyaky - Miridae
1. Beet bug - Rolymerus cognatus - everywhere. Imago size 3,5-4,6 mm; elytra yellow-brown with black spots sphenoid. Hibernate fertilized eggs in the stems and petioles of leaves of various plants - mostly perennial legumes (alfalfa, sainfoin, clover). During the growing season in the forest-steppe two generations in the desert - three. Harmed the larvae and adults.
Pests number of beetles (Soleortera)
Family weevils - Sursulionidae
1. Normal beet weevil - Vothynoderes punctiventris. High hazard zone takes and eastern forest-steppe and northern steppe. Beetle size 11-15 mm, black, densely covered with short, giving it earthy-gray. Hibernate sexually immature beetles mainly at a depth of 5-10 to 50-60 cm. Full weevil development cycle from egg to adult takes from 65 to 148 days (average 85). In one generation. Causing harm beetles and larvae.
2. Striped beet weevil - Shromoderus fasciatus - happens everywhere. Beetle the size of 7-11 mm, black elytra whitish with dark spots. Immature beetles hibernate in the upper layers of soil. Developing one generation per year. Harmed the larvae and adults.
3. Amaranth stebloyid - Lixus subtilis - happens everywhere. Beetle the size of 8-12 mm, oblong body. Sexually immature beetles hibernate in plant litter in the forest, perennial grasses in crops, fields, overgrown with weeds. Developing one generation per year. In some years marked optional development of the second generation. In this case, hibernate and larvae in the stems. Harmed the larvae and adults.
4. Gray beet weevil - Tanymecus palliatus - happens everywhere. Polifah. Beetle the size of 8-12 mm; Top monotonous dense reddish hairs, sides and bottom of the body

light. The winter in the soil at a depth of 15-20 cm sexually immature beetles and larvae of various ages two adjacent generations.
Generation biennial, but of larvae do not have time to complete the development and second time, completing the biological cycle of three years. Harmed the larvae and adults.
5. Black weevil - Rsalidium maxillosum - common in the steppe and southern forest-steppe. Polifah. Beetle 6-10 mm size, brilliant black. Hibernate new generation of beetles and bugs that remain for the second winter, and larvae that have not completed the development of the autumn, the soil at a depth of 20-40 cm. Beetles live two seasons. Generation biennial. Harmed the larvae and adults.
The family leaf beetles - Shrysomelidae
6. Normal beet flea beetles - Shaetocnema concinna - happens everywhere. Beetle 1,9-2,4 mm in size, dark bronze. Sexually immature beetles hibernate in plant litter in tree and shrub thickets, gardens, roadsides, fields of perennial grasses. One generation per year. Imago harmed; hrechyshnyh harm to the larvae.
7. South beet flea beetles - Shaetocnema breviuscula - in a significant number happen in southeastern Ukraine. Beetle size 1,9-2,3 mm; copper-bronze color with violet or green. Sexually immature beetles hibernate under crop residues in the surface layer of soil in roadside ditches, overgrown Chenopodiaceae weeds in fields, edges of tree and shrub plantings. Developed in two generations. Harmed the larvae and adults.
8. beet - Sassida nebulosa - happens everywhere. Beetle the size of 6-7 mm, rusty-brown on top, sometimes buruva something green with black spots on elytra. Sexually immature beetles hibernate in plant litter, sparse bushes and in tree plantation. Developed in two generations. Causing harm beetles and larvae.
Family - Srurtorhagidae
9. Beet baby - Atomaria linearis - happens everywhere. Beetle size 1,2-1,8 mm, covered with a thin bright fuzz; color from red-brown to brownish-black. Sexually immature beetles hibernate under plant remains in the soil at a depth of 10-15 cm on fields from the vysadok in roadside ditches, forest, slopes of ravines. Developing one generation per year. Harmed the larvae and adults.
Family - Silrhidae
10. mat - Asluraea Horace - happen everywhere. Polifah. Beetle size 10-12 mm, top black, in small hairs that give it a yellow-brown color. Beetles hibernate in the soil, lumps of soil and under different record. Developed two generations per year. Harmed the larvae and adults.
Pests number of butterflies (Lepidoptera)
Family moth - Gelechiidae
1. Beet minuyucha moth - Scrobipalpa ocellatella - occurs in steppe and steppe zones. Butterfly with a wingspan of 12-14 mm; front wings narrow, brownish-gray pattern with yellow and black spots; wings light gray, fringed with long cilia. Winter in topsoil pupae in cocoons and caterpillars of different ages in the debris after harvest. Develops in one generation.
Pests number Diptera (Diptera)
Homeland flower - Anthomyidae

1. Beet fly - Regomyia betae - prevalent in all areas. Imago 6-8 mm in size, belly dark gray, reddish on the sides, covered with dark brown short bristles. Pupariyi larvae hibernate in the soil at a depth of 3-10 cm. Development of one generation lasts 30-40 days. Depending on the area and the weather mode, the fly develops in two - four.

2.2. Potato Pests

Pests number of beetles - Soleortera

The family leaf beetles - Shrusome1idae

1. Colorado potato beetle. Adults hibernate in the soil, often at a depth of 10-30 cm. Developed in two generations a year, sometimes develops optional third generation, the final, however, its development only in certain years. A characteristic feature is biological cycle in its development of several forms of physiological rest: 1) winter diapause which lasts from two to four months of the year, which provides a fuel saving organism substances stored in the warm late summer and autumn to cold; 2) hibernation, which changes the approach of winter diapause during cold season, it lasts until early spring; this time developing recovery processes before the onset awakening; 3) summer diapause, physiologically similar to winter, there is a population of summer, the hottest, lasting up to a month; 4) The old "dream" that covers a substantial population in mid-summer and lasts up to 10 days; 5) tightening diapause, which light texture soils in some species lasts three years and ensures the preservation of the species in active life for periods of time exceeding one year; 6) re diapause, which fall in late August - early September imago that overwintered in the summer and survived the fall. Harmed the larvae and adults.

Pests number of butterflies or moths - Leridortera

Family scoops - Nostuidae

2. Potato or marsh, scoop - Nudraesia misasea - the largest in Polesie and forest-steppe. Butterfly size 28-40 mm, front wings of grayish-yellow to grayish-brown with a reddish tinge, lines brown, round spots and the same color as the background of wings, rear wings those with a dark stripe in the upper third of the wing. Hibernate eggs on a leaf sheath perennial grasses - couch grass, timothy, cocksfoot; they are more likely to 20-60 eggs in one or two rows. Developing one generation per year.

Family moth - Geleshiidae

3. Potato moth - Rhthorimaea orersulella - quarantine pest in Crimea and other regions of Ukraine desert. Butterfly size 12-16 mm, front wings, brownish-gray, with darker edge, yellow scales and dark brown strokes; rear wing with a notch on edge longer than the width of the wings in males at brush edges with long hair, reaching middle wing. Hibernate in the wild caterpillars older ages and pupae in cocoons. In southern Ukraine, potato moth in natural conditions in five generations that overlap because adults observed almost continuously from May to November, the highest number in September - October.

2.3. Pests Sunflower

Pests number of beetles or beetles - Soleortera

Family barbel - Serambusidae

1. barbel sunflower, sunflower or ahapantiya - Agapanthia dahli - common in the Crimea steppe and steppe zones, in the foothills of the Carpathians. Beetle 19-21 mm long, densely covered with reddish-yellow that form three longitudinal strips, and the elytra - spots. Winters larva inside the underground part of the stem below ground level, after closing above course. Developing one generation. Harmed the larvae and adults.

Family Gorbatko - Mordellidae

2. Gorbatko Sunflower - Mordellistena rarvula - everywhere common in Ukraine, especially in the steppe zone. Sunflower. Beetle size 2,5-3,3 mm, black, densely covered with hairs. Eggs lay under a thin skin stem sunflower. The larvae feed on the stem core, narrow passages in which winter. Harmed larvae partially - adults.

Pests number of butterflies or moths - Leridortera

Family moth - Rhutisiae

3. moth sunflower, sunflower or snowstorm - Nomoeosoma nebulellum - common in Ukraine everywhere. Butterfly wingspan of 22-26 mm, front wings yellowish-gray with black spots 3-5 in the middle and a few dots on the outer edge, rear - light gray, translucent. Last year produced a generation, in the south - two, the second optional.

3. Pests vegetables

3.1. Pests of vegetables from the cabbage family

Vegetable cabbage crops damage many types of pests. In Ukraine there are over 250 of them cause significant damage to plants 45 species. Bahatoyidni insects - beetles, chornyshi, shovels, moth, and others. Specialized species - cabbage aphid, cruciferous bugs, cruciferous flea beetles, cabbage moth, scoop, Bilan, flies and others. Plants particularly susceptible to damage in the first period of growth and development.

Several - Nomoptera

Family afidy - Arhididae

1. Cabbage aphids - Vrevicoryne brassisae - happens everywhere. Parthenogenetic wingless female size 1,8-2,0 mm body ovate, pale green, covered with a whitish-gray pollen. Real non-migratory. Hibernate eggs on a cabbage, testes and weeds from the cabbage family. In southern winter can parthenogenetic females. During the growing season gives from 8.10 to 16 generations. Harmed the larvae and adults.

number, or bugs - Nemiptera

Family pentatomidy - Rentatomidae

2. Cabbage bug - Eurygaster ventralis - happens everywhere. Imago size of 8-10 mm, flat body, red with black 6, on the dashboard and elytra pattern of black spots and stripes. Immature bugs hibernate under fallen leaves on the edge, in the forest, gardens, parks, on the slopes of hills, roadsides. Developed in two generations. Harmed the larvae and adults. Cabbage can also damage crops bug - E. ornata and rape - E. olerasea that have much in common in biology and nature of damage to cabbage bug.

A number of beetles - Soleoptera

The family leaf beetles - Shrysomelidae

3. flea beetles wavy - Rhyllotreta undulata - in Ukraine it happens everywhere. Beetle size 2,0-2,8 mm, black, elytra each with a yellow stripe in. Immature beetles hibernate under plant remains or in the surface layer of soil in the forest, gardens, ditches. Annual. Harmed the larvae and adults.
4. Rape flea - Entomoscelis adonidis - common in the steppe and steppe zones. Beetle 7-10 mm in size, elongated-oval; top red with longitudinal black stripes on seam and on elytra. Rape flea overwinter in the egg stage, and sometimes larvae in the surface layer of soil. For the year developing one generation. Harmed the larvae and adults.
Family - Nitidulidae
5. Rape weevil - Meligethes aeneus - everywhere. Beetle 1,5-2,7 mm size flat elongated body, black with green or blue gloss. Adults hibernate in the ground under fallen leaves or remains on the edge, in gardens, parks. During the year, one develops. Harmed the larvae and adults.
Family Weevils - Curculionidae
6. stem cabbage - Ceuthorrhynchus quadridens Panz. - Happens everywhere. Beetle 2,5-3,2 mm sized, grayish-brown, white panel at spot. Immature beetles hibernate under plant remains on, in forest, parks and gardens. Generating annual. Harmed the larvae and adults.
7. Rape or seed, - Seuthorrhynchus assimilis Payk. - Happens everywhere. Beetle size 2,2-3,0 mm, black, covered with bright scales and hairs. Beetles hibernate in the surface layer of soil and under remains in the fields, where they are nourished. For the year developing one generation. Harmed the larvae and adults.
8. Green baryd - Baris coerulescens - happens everywhere. Beetle 3.5-4.5 mm in size, dark blue-green with meta levym reflection on elytra thin grooves, with smooth midline. Beetles hibernate in the soil to a depth of 5 cm, some individuals - up to 8-9 cm. Generating annual. Harmed the larvae and adults.
Several Lepidoptera, or butterflies - Leridortera
Family serpokryli moth - Rlutellidae
9. Cabbage moth - Rlutella maculipennis Curt. - Happens everywhere, cosmopolitan. The butterfly has a wingspan of 12-17 mm, the front wings are narrow, gray-brown on the back edge is white or yellowish stripe that forms when drawing up the wings in a diamond pattern; rear wing silver-gray with long fringe. Winters doll in the south - part butterfly on weeds and debris. In northern Ukraine, cabbage moth has 2-3 generations in the south - 4-5. Generation clearly demarcated because pest on plants at different stages of development simultaneously. Full development cycle cabbage moth lasts 25-35 days.
Family meadow moth - Ruraustidae
10. Cabbage moth - Evergestis forficallis L. - happens everywhere. Butterfly with a wingspan of 24-27 mm, front wings yellow with dark brown twill stroke and fuzzy image, the rear wing yellow-gray. Caterpillars hibernate in cocoons in the surface layer of soil. For the year develops two generations.
11. (burnt) moth - Evergestis extimalis Scop. - Happens everywhere. Butterfly with a wingspan of 20-28 mm; front wings wide yellow with two dark brown lines and dark fringes; rear wing yellow-white with dark brown fringe. Caterpillars hibernate in

cocoons in the soil to a depth of 15 cm. Etsya has developed two generations per year.

Family Bilan - Rieridae

12. Bilan cabbage - Rieris brassisae L. - everywhere. Butterfly with a wingspan of 55-60 mm, dark at the base, the top of the front wings with a black sickl; on the front wings female two round black spots the upper and lower sides of the male from the lower side; bottom rear wings greyish-yellow, with a thick black. Hibernate pupae attached to the substrate using belt (on tree trunks, dry stems, bushes, buildings). In Ukraine, develops 2-3 generations. In cold and wet years pupae of summer generation could fall into diapause until spring next year.

13. Ripne Bilan - Pieris rapae L. - happens. Butterfly with a wingspan of 35-40 mm, Bilan similar to, but smaller; a female on the front wings two spots in males - one; top rear wings are white with a black spot at the leading edge, bottom yellowish. Hibernate pupae attached spider belt, dry plants, the branches of shrubs, tree trunks buildings. In northern Ukraine Ripne Bilan has two generations in the south - four.

Family scoops - Nostuidae

14. Cabbage scoop - Mamestra brassisae L. - happens everywhere. Butterfly with a wingspan of 40-50 mm; front wings dark brown with yellowish-white wavy line that forms the middle of the wing of two teeth, turned out in the form of the Latin letter «W»; two spots located at the front edge, reniform spot bordered white or partially white herself; rear wings gray, with darker edges. Pupae hibernate in the soil at a depth of 8-12 cm. Allows two generations per year.

Several Hymenoptera - Numenoptera

Family sawflies real - Tenthredinidaeae

15. Rape sawflies - Athalia rosae L. - everywhere. Imago 6-8 mm in size, bright orange, shiny black head and antennae. Larvae hibernate who completed power in a cocoon in the soil at a depth of 7-15 cm. We develop two generations a year .. In Crimea, partly in some years developing the third generation of the pest.

Several Diptera - Diptera

Family- mosquitoes - Tirulidae

16. Harmful - Tipula paludosa Mg. - Occurs sporadically in Polesie, forest-steppe and western regions of irrigated lands in the steppe zone. Komar with a wingspan of 32-38 mm, brownish-gray; pair of membranous wings brown with dark brown trim around the front edge. Age larvae hibernate in the surface soil. Annual.

Family flower flies - Anthomyidae

17. The spring cabbage fly - Delia brassisae Bouche - happens everywhere. The male size 5-5.5 mm, ash-gray. Female - 6-6,5 mm, light gray. Pupae hibernate in false cocoons in the soil at a depth of 10-15 cm. In most of the Ukraine is developing two generations in the south - three.

18. Summer cabbage fly - Delia floralis Fallen - happens everywhere. Imago size of 7-8 mm, yellow-gray, wings transparent, yellowish-brown with yellow veins. Winters pupariyi pupa in the soil at a depth of 10-30 cm. Generating annual.

3.2. Pests vegetable of the family Liliaceae

With crops onion family (Alliaseae) Trophic connected and specialized pests. Among damage caterpillars scoop, meadow butterfly and, larvae of wireworms, false wireworms.

A number of thrips - Thysanoptera

Family thrips - Thripidae

19. Tobacco thrips - Thrips tabaci Lind. - Ukraine everywhere. Fine, length 0,8-0,9 mm insect body color - from yellow to almost black. Hibernate adults, preferably females, soil and plant debris at a depth of 5-7 cm, in greenhouses, greenhouses, shelters under dry onions. Full cycle of one generation is 15-30 days. In Ukraine, tobacco thrips develops in 3-6 generations in greenhouses gives 6-8 generations. Harmed adults and larvae.

A number of beetles - Soleoptera

The family leaf beetles - Chrysomelidae

20. Onion - Lilioceris merdigera - in Ukraine it happens everywhere. Beetle - orange or red, tendrils, knees, legs and bottom body black 6-8 mm. Beetles and larvae live in the wild and cultivated lily and sometimes damage the leaves, flowers and stems of onion, garlic, asparagus. The secondary pest small economic importance.

Family weevils - Surculionidae

21. Onion - Seuthorrhynchus Schultze - in Ukraine it happens everywhere. Beetle 2-2.5 mm long; elytra dark brown. Hibernate immature adults during plant, lumps of soil on roadsides, in ditches, forest belts. Generating annual. Harmed adults and larvae.

Several Lepidoptera, or butterflies - Leridortera

Family - Asrolepiidae

22. Onion moth - Asrolepiopsis assectella Zell. - Ukraine happens everywhere. Wingspan 13-16 mm; front wings dark brownish-gray with a white pattern and a sharp wedge bright spot before the middle of the rear edge of the wing; rear - colored, light-gray. Pupae hibernate, rarely butterflies under plant debris. In Ukraine, develops 2-3 generations.

Several Diptera - Diptera

Family flies - Agromyzidae

23. Onion fly - Liriomyza (Phytobia) cepae - to Ukraine extended everywhere. Body length 1,7-2,5 mm, yellow head, shield and abdomen black with gray bloom. Winters in pupariyi pupa in the soil. Developed in two - three generations.

Family - Syrphidae

24. Onion - Eumerus strigatus Fll., Knobby ubiquitous in Ukraine. Imago medium size (5-10 mm) body bronze-green, with metallic luster. Winters third age in larva bulbs, debris, soil, at a depth of 5-8 cm. Ukraine onion give two generation, the second generation of larvae in late August fall into diapause and overwinter in this state, in the Crimea is developing two full generations larvae third are for the winter.

Family snovyhy (flower) - Anthomyiidae

25. Onion fly - Delia antiqua Mg. - To Ukraine extended everywhere. Fly size 5,5-7 mm, yellowish-gray. Winters doll in pupariyi at a depth of 5-20 cm. Ukraine is developing two generations.

3.3. Pests of vegetables celery family

Celery vegetable crops (carrots, dill, celery, parsley, etc.). Damage and a number of specialized pests, especially frequent carrot jumping plant louse, moth umbrella, pale meadowy moth, carrot fly.

Several - Nomoptera

Family - Triozidae

26. carrot jumping plant louse - Trioza aplicalis - happens everywhere. Imago size 2,6-2,9 mm, light green flesh. Hibernate adults mainly on coniferous trees that grow on plantations. Generating annual.

Several Lepidoptera - Leridortera

Family moth - Oecophoridae

27. umbrella moth - Depressaria depressella Hbn. - Happens everywhere. Butterflies hibernate in the bark crevices, cracks buildings and other shelters. For the year developing one generation.

Family meadow moth - Ruraustidae

28. Pale meadowy butterfly - Sitochroa palealis Den. et Schiff. - Happens everywhere. Hibernate tracks that have completed the supply in the soil. For the year developing one generation.

Several Diptera - Diptera

Family holotilky - Rsilidae

29. Carrot fly - Rsilla rosae F. - happens everywhere. Pupae hibernate in soil layer and in soup. For the year develops two generations.

3.4. Pests of vegetables from the family Cucurbitaceae

Several - Nomoptera

Family aphids - Arhididae

30. melon aphid - Arhis gossypii Glov. - Happens everywhere. Polifah. In amages melons, eggplant and other crops and weeds. Parthenogenetic wingless female size 1,2-2 mm; has three color forms - green, yellow and black and green. Wingless parthenogenetic females hibernate and larvae in basal parts of perennials - plantain, milkweed and more. During the season can develop 9-15 generations.

Several Diptera - Diptera

Family (flower) - Anthomyiidae

31. sprout fly - Delia platura Mg. - everywhere. Fly size of 3-6 mm, yellowish-gray. Pupae hibernate in false cocoons in the soil at a depth of 7-10 cm. We develop three generations per year.

LECTURE 7. pests of fruit and berry crops and vines

Question:
1. pests of fruit crops
1.1. Pests number proboscidea
1.2. Pests number beetles
13. Number of lepidopteran pests
1.4. Pests number of Hymenoptera
1.5. Pests number of Diptera
2. pests berries
2.1. Pests strawberry and raspberry
2.2. Pests currants and gooseberries
3. pests vine

In Ukraine observed about 400 species of insects that damage fruit plantations. Composition harmful entomofauna depends on the age and physical condition of fruit trees, and from zone.
The seedlings in the nurseries of fruit damage mainly pests (beetles, shovels etc.). With the growth of trees gradually occupy specialized sucking and leaf-eating pests. Since the beginning of fruiting species composition entomofauna numerically increased with the introduction of pests buds, flowers, fruits (apple blossom weevil, sawflies, moth). Old weakened damage carpenter ant.
1. pests of fruit crops
1.1. Pests number proboscidea - Homoptera
Family jumping plant louse - Psyllidae
1. apple jumping plant louse - Psylla mali - the largest in Polesie and in the north-western regions of Ukraine. Monofah. Imago size 2.5-3 mm, immediately after bluish-green, later - straw-yellow. Hibernate fertilized eggs on the shoots. Develops in one generation. Harmed the larvae and adults.
2. pear jumping plant louse - Psylla pyri - in the steppe, and forest steppe Crimea. Monofah. Imago size 2.5-3 mm, body color from orange-red (form) to dark brown. Hibernate adults. In the steppe zone pear sucker developing in the south - in five generations, imposed one on. Harm caused to the larvae and adults.
Family aphids - Aphididae
A large group of small insects with soft integument. Cycle of aphids is diverse and is characterized by seasonal alternation of parthenogenetic generations and both genders, some species also change fodder plants. Aphids has the ability to reproduce, settling colonies leaves and shoots. Growing season of 7-10 or more generations. Sucking juices and enter into the fabric of poisonous saliva enzymes to plants leads to deformation of leaves, distortion and shoots. When powered aphids allocates a significant amount of sugary liquid that pollutes the leaves, stems and fruit. These divisions, you settle saprophytic fungi, plants covering sooty coating, which makes it difficult processes of respiration and photosynthesis. Sweet allocation attract ants that protect the aphids from predatory arthropods. Some aphids transmit viral diseases.

Most species of aphids living on fruit trees, fodder specialization. The worst affected by aphids trees in nurseries and young plantings. In damaged trees do not fruit buds are laid, reduced winter hardiness, yield and deteriorating quality.

3. Green apple aphid - Aphis pomi - happens everywhere. Apple tree damage, at least - pear, quince, hawthorn, mountain ash, cotoneaster, irhu. Parthenogenetic wingless female to 2 mm long, greenish, with brownish yellow head. Hibernate fertilized eggs on young shoots at the base of buds. During the growing season gives aphid in the northern zone of 6-8, the forest - 9-13 in the south - 14-17 in generations. Harmed the larvae and adults.

4. or gray apple aphid - Dysaphis devecta W. - happens everywhere. Damaging apple. The female-founder of size 2 mm almost; from dark gray to dark green with dense white. Hibernate fertilized eggs under bark scales backward and skeletal branches. During the season develops 3-4 generations. Harmed the larvae and adults.

5. Brown pear-louse umbrella - Anuraphis pyrilaseri Shap. - Happens everywhere. Damage the bulb. The female-founder of size 2.6 mm, dark brown. Hibernate fertilized eggs in bark crevices. Harmed the larvae and adults.

6. obpylena Plum aphid - Hyalopterus pruni - happens everywhere. Damage plum, plum, apricot, peach. Female founding of 2.5 mm, elongated-oval, light green. Hibernate fertilized eggs near the buds or on their surface. During the spring and summer growing season 8-10. Harmed the larvae and adults.

7. Cherry aphid - Myzus cerasi F. - happens everywhere. Damages cherries and sweet cherries. The female-founder and parthenogenetic wingless female 2-2,4 mm long, widely shapes, brilliant black top and brown below. Hibernate fertilized eggs at the base of buds. During the spring and summer growing 9-12 generations wingless parthenogenetic females. Harmed the larvae and adults.

8. or peach, aphid - Myzodes persicae - happens everywhere. Peach damage and some hybrids of peach with almonds. Considerable damage has tobacco, potatoes and plants in greenhouses.

Family pemfihy - Pemphigidae

9. Blood aphid - Eriosoma lenigerum - inhabits southern and western regions of Ukraine. Natural habitat type limited the January isotherm -3 ...- 4 ° C. Apple tree damage, at least - pear, quince, irhu, mountain ash, cotoneaster. Parthenogenetic wingless female length 1,8-2,5 mm ellipsoid shape, reddish-brown, covered with white waxy threads. Hibernate larvae of the first and second centuries on the roots and in crevices of bark trunks and skeletal branches. During the growing season gives blood aphid 8 to 12 generations that overlap. Harmed the larvae and adults.

Family Quadraspidiotus perniciosus - Diaspididae

10. Apple komopodibna Quadraspidiotus perniciosus - Lepidosaphes ulmi - happens everywhere. All damage fruit juice, her various deciduous, sometimes herbal plants. Prefers apple and poplar. The female size 1,1-1,5 mm, transparent-white yellowish without legs, antennae and eyes, brown shield, extends to the end elongated, curved in a coma. Hibernate female guards the eggs under the bark on trunks and branches. Developing one generation per year. Harmed the larvae and adults.

11. California Quadraspidiotus perniciosus - Quadraspidiotus perniciosus - occurs in southern and south-western regions of Ukraine. In fruit and berry crops damages 200 species of forest and ornamental plants. Shields females round, 2 mm in diameter, brown-gray. Hibernate larvae of the first and second centuries under the plates on the bark of trunks and branches. Developed in two generations. Harmed the larvae and adults.
12. False California Quadraspidiotus perniciosus - Quadraspidiotus ostreaeformis - happens everywhere. All damages juice, lots of forest and ornamental species. The body of the female to 1.5 mm long, greenish-yellow; Shield females - 2-2,3 mm, round, brownish-gray. Winged, yellow-orange. Hibernate second age larvae, rarely in females plates on the bark of trunks and branches. For the year one generation. Harmed the larvae and adults.
1.2. Pests number of beetles - Soleoptera
Family - Rhynchitidae
1. Bukarka - Coenorrhinus pauxillus Germ. - Happens everywhere. Damages apple, pear, quince less, cherry, blackthorn, hawthorn, rowan, bird cherry. Beetle 2.5-3 mm long, blue with steel shine. Immature beetles hibernate in the top layer of soil. Generating annual. Causing harm beetles and larvae.
2. Goose - Rhynchites bacchus L. - happens everywhere. Damages apple, plum, rarely pear, apricot, peach, blackthorn, cherry, sweet cherry. Beetle length of 4.6 mm, 7.10 mm, crimson-red with violet-green sheen. Larvae hibernate in the soil and immature beetles in cracks and under fallen leaves. One part goose must first year, the second - two-year generation. Harmed the larvae and adults.
3. hawthorn - Coenorrhinus aequatus L. - happens everywhere. Damages apple, pear, plum, cherries, cherry, blackthorn, rowan, hawthorn. Beetle length 2.5-5 mm; head and lower body with bronze metallic luster. Immature beetles hibernate and larvae in the soil. Generating annual. Harmed the larvae and adults.
4. Large pear - Rhynchites giganteus Kryn. - Happens in the steppe and forest steppe of Ukraine. pear, apple, plum, cherries, apricot, hawthorn. Beetle 7-10 mm long, crimson-red with a greenish gloss. Beetles hibernate and larvae in the soil. The development of large completed two seasons. Beetles damage the buds, leaves, flowers, green shoots and fruit. The larvae feed on seeds and fruit pulp.
5. cherry - Rhynchites auratus Scop. - Happens everywhere. Damage cherries, cherry, apricot, hawthorn, blackthorn. 6-8 mm long beetle, green with crimson metallic luster; covered with thick blond hair. Immature beetles hibernate and larvae in the soil at a depth of 10-15 cm. One of a pest-year, the second - two-year generation. Causing harm beetles and larvae.
Family weevils - Surculionidae
6. Grey nephritic weevil - Sciaphobus squalidus Gyll. - Numerous in Polesie and forest-steppe, steppe zone in habitats with high moisture. All damages, berries, grapes and wild species. Beetle 5.7 mm in length, covered with copper-pink and gray scales. Immature beetles hibernate in the soil and. The development of renal gray lasts two years. Basic beetles cause damage.

7. apple blossom weevil - Anthonomus pomorum L. - happens everywhere. Damaging apple. Beetle size 3.5-5 mm, dark brown, covered with thin gray hair. Immature beetles hibernate in cracks and crevices of the bark, in the soil around the root collar at a depth of 2-3 cm, under fallen leaves. Everywhere developing one generation. Causing harm beetles and larvae.
8. weevils, fruit bark beetle - Magdalis ruficornis L. - happens everywhere. Damages apple, quince, plum, plum, cherry, blackthorn, rowan, rose. Beetle 2-3.5 mm long, black, oblong body. Hibernate larvae have completed power within branches at the end of the course. For the year developing one generation. Harmed the larvae and adults.
Family Jewel - Vuprestidae
9. Jewel black - Capnodis tenebrionis L. - in Crimea steppe areas and places in the forest-steppe. Damage plums, cherries, peaches, apricots, almonds, blackthorn and hawthorn and pear. Beetle 27-29 mm long, black, matt. Hibernate larvae completed development, in wood oval cells located near the root collar. Winters also a small number of bugs in the surface layer of soil. Biennial. Harmed the larvae and adults.
Family bark - Irad
10. The bag - Scolytus mali Bechst. - Happens everywhere. All fruit damage, preferring apple. Rarely happens on hawthorn, dogwood, elm. Beetle 3-4 mm long, dark brown, shiny. Middle-aged larvae hibernate in the ducts. Generating annual. Larvae and beetles only feed on living tissues weakened trees - bast and sap conductive layers.
13. Pests number Lepidoptera - Lepidoptera
Family leafroller - Tortricidae
1. codling moth - Cydia pomonella L. - common in all regions of apple cultivation. Besides damaging fruit apple pear, plum, apricot, quince, walnut. Butterfly with a wingspan of 18-22 mm, front wings brownish-gray with a violet gloss, with numerous transverse wavy lines. Caterpillars hibernate who completed the supply of spider backward in bark crevices thereof, in the packaging container premises, mummified fruit, plant debris and other places. In the forest-steppe and Transcarpathia in the second generation of caterpillars goes 30-40%, and in steppe zone and Crimea - 60-80%. 2. East moth - Grapholitha molesta. Homeland is Asia, where it was imported to the United States, and in southern Europe. Today is a serious pest in western, southern and central regions of Ukraine. Damage the shoots and fruits of apple, pear, apricot, plum, quince, medlar, shoots, cherries, almonds, laurel. Butterfly with a wingspan of 11-15 mm; overall color gray, inside the inner edge of two pairs of wings whitish intermittent oblique lines in a sling; mirror is weak; on top of the wing is a thin black velvet; rear wings lighter than the front, brown-gray with an iridescent sheen; fringe light brown with a silvery tint. Hibernate tracks that have completed development in dense silky cocoon in plant debris in radius trunks circles cracks in the bark, soil, mummified fruit, container and other shelters. In southern Ukraine developed four generations that overlap. Leaf roller-filofahy

The large group, numbering 400 species in Ukraine. Butterflies or medium size, with a wingspan of 8-25 mm. Forward as a or narrow, oblong. Eggs flattened, or oval, with a transparent shell. Tracks are hidden lifestyles, inside developing buds, buds, flowers, leaves minimized. Dolls belong to the primitive type nominated to exit cocoons of butterflies. Many species are pests fruit, berry and forest plantations.

3. hawthorn leaf roller- Archips crataegana - happens everywhere. Damages apple, pear, stone fruit, rowan, hawthorn leaf and forest species. Butterfly with a wingspan of 19-26 mm; basic color of the front wings brownish-gray; a female broad reddish-brown, the male velvet dark brown spots; rear wings brownish-gray, in females with reddish bloom near the top. Hibernate eggs in cavities ramifications bark and branches. Generating annual. 4. leafroller- Exapate congelatella - a large number happen in alive. Apple, pear, mountain ash, hawthorn, blackthorn, blackberry, raspberry, oak, birch, poplar, elm, willow, buckthorn, lilac, yellow acacia. In butterflies sexual dimorphism. -Female butterfly with a wingspan of 8-11 mm, wings, pointed, silver-gray with patterned with dark spots along edge; rear wings are underdeveloped. The male with a wingspan of 21-25 mm, front wings brownish-gray back - brownish-gray. Hibernate eggs postponed alone or in small groups on the bark of thin branches. For the year developing one generation.

5. Rozanov Tortrix - Archips rosana - happens everywhere. Damages apple, pear, quince, cherries, cherries, apricots, plums, blackthorn, walnut, oak, elm, elm, linden, birch, willow, poplar, and other hardwoods. Females with a wingspan of 18-22 mm, males - 15-19 mm; front wings golden color with darker transverse stripes and wavy several spots; rear wing gray with a tinge of yellow at the base. Hibernate eggs on the bark of trunks and branches. Generating annual.

6. leafroller colorful fruit - Acleris variegana - happens everywhere. Damages apple, pear, quince, cherry, cherry, plum, plum, apricot, hawthorn, blackthorn, dog rose, maple, elm, hazel. Butterfly with a wingspan of 14-20 mm, half of the main wing yellowish-white, foreign - a reddish-brown or purple-brown, yellow crossed a narrow strip; wings brownish-gray. Hibernate eggs singly or in groups of 3-6 near the kidneys. Developed two generations per year. 7. leafroller variable fruit - Hedia nubiferana - happens everywhere. Damages apple, pear, plum, plum, cherry, cherry, apricot, mountain ash, hawthorn, blackthorn and other Rossane. Butterfly with a wingspan of 17-21 mm, the front wing of the basement of the brown-brown with a bluish tint and white near the inner edge, apical part of the bluish-gray or black strokes; rear wings gray-brown. Caterpillars hibernate third age in the cocoon cracks in the bark, branches and forks in the dry leaves. Developing one generation per year.

8. currant leaf roller - Pandemis ribeana - happens everywhere. Damages the berries, currants advantage, all the fruit, rowan, blackthorn, hawthorn, oak, birch, linden, maple, poplar, ash, barberry, buckthorn, hazel, spruce, larch and others. Butterfly with a wingspan of 16-24 mm; front wings yellow or light brown; foundation wings mid of sling spots and brown, fringed brown lines; rear wings dark gray with a yellowish front edge. Third Age caterpillars hibernate in dense silky cocoons at the base of buds, in cracks and under bark scales in branches during dry leaves attached to cobweb. Allows two generations per year. Leaf roller-xylophagy

9. subcrustal Tortrix - Enarmonia formosana - happens everywhere. Damages apple, pear, plum, cherry, cherry, apricot, peach, mountain ash. Butterfly with a wingspan of 15-18 mm; front wings with bright patterned with stripes and spots, alternating. They consist of topics-no-brown, orange-yellow and metallic-shiny scales; land on seven clearly visible yellowish-white strokes; near the middle wing - orange spot with scales; rear wings brownish-brown with yellow shiny fringe. All ages caterpillars hibernate under the bark of fruit trees. For the year developing a generation.

Geometridae

Butterflies medium size with a thin body and slim triangular front wings, and a variety of picture. The rear wings are rounded. Females of some species reduced or vestigial wings and strongly developed legs. Proboscis with types that appear in early spring in the adult stage. Track length up to 65 mm, with three pairs of thoracic and abdominal two pairs of legs located on the 6th and 10th segments. Therefore, during the movement of caterpillars do loop-shaped movement. At rest caterpillar pull body up, holding the substrate hind legs, mimicking the shape twig or leaf petiole. Outdoor lifestyle. Dolls smooth, reddish-brown, in soil or in plant debris. Butterflies fly in night. Females lay eggs on branches, trunks and fodder plants. More than 40 species of moths are pests and forest trees.

10. Winter moths - Operophthera brumata. Mass reproduction - Woodlands, forest-steppe, mountain Crimea. All fruit and oak, elm, maple, willow, hornbeam, ash, cherry. Butterfly with a distinct sexual dimorphism. The male with a wingspan of 20-25 mm; front wings brownish-gray with dark wavy transverse lines; rear wings lighter-colored; female brownish-gray, with long legs and antennae, short Krylov 2-3 mm long appendages that reach the first segments of the abdomen; abdomen Nadu, a small black dot, body - 10.8 mm. Hibernate eggs on the shoots at the base of buds. Annual.

11. moths moth- Licia hirtaria - happens everywhere. Polifah. Damage the plants from 43 families - all the fruit and forest species. Butterfly with a wingspan of 35-40 mm; basic color wings yellow-gray or ash-gray with brown stripes and black spots between the veins outer edge of the wing, on the edge ocher-yellow; brown fringe; antennae females, males - cirrus. Pupae hibernate in the soil, the ground at a depth of 8-15 cm or in the surface layer of soil under fallen leaves. For the year developing one generation.

12. moths plum - Angerona prunaria - happens in. Damage plum, plum, apricot, cherry, sweet cherry, hawthorn, buckthorn, honeysuckle, berries. Butterfly with a wingspan of 40-50 mm; female wing color light vohryane male - bright orange; picture wings numerous dark brown transverse dash, fringe light orange or yellow. Caterpillars hibernate third - the fourth between the ages entwined web of leaves. For the year developing one generation.

Family - Lasiocampidae

13. ringed moth - Malacosoma neustria - happens everywhere. Damage fruit and oak, poplar, elm, linden, many bushes. Prefers apple and oak. The front wings of the butterfly yellow or brick-brown with two transverse bands; rear wings lighter; a female wingspan is 40 mm male - 32 mm; body covered with yellow hair; the male

tassel at the end of the abdomen hairs; mustache comb; mouthparts underdeveloped. Hibernate almost fully formed egg to caterpillar. Generating annual.

Bear Family - Arctiidae

14. American white butterfly - Hyphantria cunea. Pest Homeland - North America, where it was introduced to Europe. Dangerous pest and Western Ukraine. Damaging more than 140 species of shrubs and. Species which prefer - mulberry, maple, walnuts, fruit trees. Butterfly with a wingspan of 40-50 mm; wings with white gloss; body covered with thick white hair; antennae black with white bloom, thread-like in females, the male cirrus. Pupae hibernate under the bark of dead trees during plant remains in cracks and crevices fences, under eaves and in other protected places. In areas pest develops in two generations.

Family Bilan - Pieridae

15. Bilan nervate - Aporia crataegi - the most numerous in Ukraine in Polesie, forest-steppe, Carpathians and Crimea. Damages apple, pear, plum, apricot, hawthorn, blackthorn, rowan, bird cherry, cherry and less cherries. Butterfly with a wingspan of 60-65 mm; Wings white, scaly weak, causing the wings translucent females, males scales absent only on the periphery of the wings; the female wing veins are brown, black males. Caterpillars hibernate second - third centuries in winter nests with dry leaves threads to the branches. Generating annual.

Family - Lymantriidae

16. gypsy moth - Ocneria dispar - It happens everywhere. Damaging more than 300 species of plants. However, despite the prefer oak, poplar and fruit. Females with a wingspan of up to 75 mm; abdomen thick, massive, covered with dense brown hairs; wings with black lines; antennae black. The male with a wingspan of up to 45 mm, thin abdomen, antennae brown, feathery; wings with transverse stripes, rear wings lighter brown with fringe. Formed caterpillars hibernate in egg shells. Generating annual.

17. - Euproctis chrysorrhoea - It happens everywhere. Damage over 50 types of hardwood: oak, apple, pear, apricot, blackthorn; less - elm, maple Tatar, white acacia and other hardwoods. Butterfly with a wingspan of 30-40 mm; wings, breasts and abdomen color; at the end of the abdomen bunch of golden (females) or brown (males) hairs; mustache comb. Caterpillars hibernate second - third centuries in winter nests of leaves, tightly bonded webs at the ends of shoots. Generating annual.

Family scoops or bat - Noctuidae

18. scoop - Diloba coeruleocephala - happens everywhere. Butterfly with a wingspan of 30-45 mm; front wings gray with a touch of Fiol, round and kidney-shaped spots close together and form a pale yellow stain; lines across the dark brown, sprocket, rear wing light gray, their darkened rear corner. Hibernate eggs on the bark of branches and tree trunks. Developing one generation per year.

19. The yellow-brown early scoop - Orthosia stabilis - happens everywhere. Damages apple, pear, cherry, plum, peach, raspberry, blackthorn, many species of forest species. Butterfly with a wingspan of 32-35 mm; front wings brownish-yellow, with transverse wavy whitish stripe; rear wings gray with white fringe. Pupae hibernate in the soil in earthen at a depth of 5-7 cm. A year one generation.

20. Garden shovel - Panolis flammea - everywhere. More numerous in areas of sufficient moisture. Damages apple, plum, cherry, cherry, apricot, black some field and vegetable crops. Butterfly with a wingspan of 36-40 mm; front wings gray-brown with indistinct transverse lines; wedge-shaped black spot, round and slightly lighter kidney-shaped spots on the main background; rear wing gray. Pupae hibernate in the soil in ground at a depth of 2-5 cm. Developed two per year.

1.4. Pests number Hymenoptera - Hymenoptera
Family sawflies real - Tenthredinidae
1. Apple fruit sawflies - Hoplocampa testudinea - happens everywhere. Imago 6-7 mm in length; dark-brown, yellow below; black top, bottom, reddish-yellow, yellow foot; two pairs of transparent wings with dark veins. Larvae hibernate in cocoons in the soil at a depth of 5-10 cm, rarely at a depth of 15-20 cm. Generating annual. Up to 15% pests in soil and overwinter twice, and 3-5% - three times, making a kind of reserve population.
2. Pear fruit sawflies - Hoplocampa brevis - happens everywhere. Imago 4-5 mm in length; reddish-yellow color with a slight blackening in the upper chest and abdomen. Larvae hibernate in a cocoon in the soil at a depth of 5-15 cm, some individuals - up to 20-25 cm. Generating annual.
3. black plum sawflies - Hoplocampa minuta - happens everywhere. Imago length of 4-5 mm, body black. Eonimfy-larvae hibernate in the soil at a depth of 3-10 cm (dry land - up to 15 cm). For the year developing one generation.
4. Cherry slimy sawflies - Caliroa cerasi - happens everywhere. Female 5-6 mm long, male - 4.5 mm body brilliantly. Eonimfy-larvae hibernate in earthen cocoon in the soil at 6-15 cm. In Polesie and northern forest steppe zone develops in one generation, in the southern forest steppe and steppe - in two.
Family sawflies-weavers - Pamphiliidae
5. sawflies Pear-weaver - Neurotoma saltuum - everywhere. Imago length of 11-14 mm, black head and chest, abdomen red or brownish-yellow. Eonimfy-larvae hibernate in cocoons in the soil to a depth of 20 cm. A year developing one generation. Larvae to two years.
Family - Eurytomidae
6. Plum - Euruiota amygdali End. The zone of high harmfulness - steppe and northern steppe of Ukraine. The body of an adult slim, black, with prominent breasts, 5-6 mm long female, male - 4-5 mm. Hibernate larvae completed supply within the pipes. Generating annual. Much of the larvae (50%) falls into diapause and hibernates again (for a small number of individuals possible and wintering third).
1.5. Pests number Diptera - Diptera
Family - Tephritidae
1. Cherry fly - Rhagoletis cerasi - everywhere. Fly dark brown, almost black; Wings transparent, with four transverse stripes; 4-5,3 mm length female, male - 2,9-4 mm. Pupae hibernate in false cocoons in the soil at a depth of 3-5 cm. A year developing one generation. In some populations of diapause pupae may take two or even three years.

Family Halytsya - Cecidomyiidae
2. pear fruit Halytsia - Contarinia pyrivora - happens in Crimea. Imago size of 3-4 mm; dark gray. Winters pupa in the soil at a depth of 5-10 cm. A year developing one generation.
2. pests berries
2.1. Pests strawberry and raspberry
Several - Homoptera
Family afidy - Aphididae
1. Malynna pahonova aphid - Aphis idaei - happens everywhere. Damage raspberries, blackberries and rose less. Parthenogenetic female 2,3-2,5 mm long, dark green with brown spots. Hibernate fertilized eggs near the buds. During the season develops 8-12. Harmed the larvae and adults.
A number of beetles - Coleoptera
Family - By Turidae
2. beetle - Byturus tomentosus - everywhere. Damage raspberries, sometimes marked on the blackberry, Rubus saxatilis and fruit trees. Beetle 3.5-4 mm long, elongated-oval, grayish-black, covered with rusty yellow or gray hairs. Beetles hibernate in the soil and in fodder shrubs to a depth of 20 cm. The generation of mostly one-year and two-year part. Harmed the larvae and adults.
The family leaf beetles - Chrysomelidae
3. Strawberry flea - Pyrrhalta tenella - in Polissya and Forest. Cultural damage, and wild other herbaceous and shrubby plants of the family Roseanne. Immature beetles hibernate under plant debris. Developing one generation per year. Harmed the larvae and adults.
Family Weevils - Curculionidae
4. weevil - Anthonomus rubi - happens everywhere, numerous Polissya and Forest. raspberries, blackberries, strawberries, rose hips. Immature beetles hibernate in the surface layer of soil under fallen leaves. Generating annual. Harmed the larvae and adults.
5. Gray, or earthy, root weevil - Sciaphilus asperatus - happens everywhere. Damage strawberries, raspberries and other crops. There are only females; parthenogenetic breeding. Sta¬tevonezrili beetles hibernate in the surface layer of soil during dry Do-styam in the bushes of strawberries. Can larvae spend the winter in the soil at a depth of 4-10 cm. Generating annual. Harmed the larvae and adults.
Several Lepidoptera - Lepidoptera
Family sklivky - Sesiidae
6. Malynna sklivka - Pennisetia hylaeiformis - happens everywhere. Damage raspberries. Caterpillars hibernate second - third centuries in moves in the roots or within the stem near its base. Develops in one generation.
Family Mino-cap (iridescent) moth - Incurvariidae
7. renal moth - Lampronia rubiella - happens in Polesie and in the northern steppes. Damage raspberries, blackberries less. Caterpillars hibernate I-II centuries in white cocoons under bark backward at the bottom of the shoots, in crevices of bark, stumps and stripped of plant residues. For the year developing one generation.

Several Hymenoptera - Hymenoptera
Family sawflies real - Tenthredinidae
8. Strawberry sawflies - Allantus cinctus - happens everywhere. Damage strawberries, rose, rose, raspberry less. Eonimfy hibernate in a cocoon inside the stems and fallen leaves in the surface layer of soil. In Ukraine, develops 2-3 generations in Crimea could be the fourth.
9. Malynnyy sawflies - Priophorus morio - happens everywhere. Damage raspberries, mountain ash. Hibernate eonimfy in a thin two-layer light brown cocoon in plant debris, sometimes in the soil at a depth of 5-7 cm. For the year develops two generations. In the southern regions is third.
10. Malynnyy sawflies - Metallus pumilus - happens everywhere. Damage raspberries and blackberries. Larvae hibernate in a cocoon in the soil at a depth of 5-7 cm. Finished supply false caterpillars of the second generation moving into the soil where the cocoon remain until spring.
Several Diptera - Diptera
Family Halytsya - Cecidomyiidae
11. Malynna pahonova Halytsia - Thomasiniana theobaldi - happens everywhere. Damage raspberries blackberries. Adult larvae hibernate in cocoons at the base of the shoots of raspberries. In the spring, when regrowth shoots zalyalko¬vuyutsya. The larvae, which completed power fall to the ground and a layer kokonuyutsya Returning Nebo. Departure second generation occurs in July - August. In the south may be the third generation. Raspberry and blackberry damage other two types Galyts.
12. leaf Halytsia - Dasyneura plicatrix. Winters larva in the soil. Flies in May - June. Lays eggs on the shoot tips. Larvae that were reborn, feed on leaves. Damaged leaves twisted, median.
13. stem Halytsia - Lasioptera rubi. Larvae overwinter in Halacha. Lit in May - June. The female lays eggs on young shoots in groups of 8-15 pieces. Larvae that were reborn, penetrates the bark and shoots juice plants. On shoots formed Gauls spindle length 30 mm and width 20 mm. Damaged shoots die.
Family (flower) - Anthomyidae
14. fly - Pegomya rubivora - Polissya and Forest. Damage raspberries, blackberries, meadowsweet. Larvae hibernate in cocoons false in the surface layer of soil. Generating annual.
2.2. Pests currants and gooseberries
Several - Homoptera
Family afidy - Aphididae
1. Arrusova aphid - Aphis grossulariae - everywhere. Damage gooseberries, red, gold, black currant and other. Lifecycle monogamous. Hibernate fertilized eggs on the bark of branches at the base of buds. During the growing season develops 8-12 generations. Harmed the larvae and adults.
2. puff or aphid - Cryptomyzus ribis - happens everywhere. Damage gooseberries, black, white currants, rose. Hibernate fertilized eggs on young shoots of currants. Because of the power of aphids on the upper side of leaves formed cherry-red Gauls.

In addition to the types of currants and gooseberries can damage.
A number of beetles - Coleoptera
Family Jewel - Buprestidae
3. Jewel - Agrilus ribesii - happens everywhere. Damage the black and red currants. Hibernate larvae of different ages within shoots, mostly in the lower part thereof. For the year developing a generation. Harmed the larvae and adults.
Several Lepidoptera - Lepidoptera
Family moths - Geometridae
4. Arrusovyy moths - Abraxas grossulariata L. - happens everywhere. Damage gooseberries, currants, rarely - apricot, peach, cherry. Caterpillars hibernate II-III age spider cocoons on the fallen leaves. For the year developing one generation.
Family moth - Pyraustidae
5. Arrusova moth - Zophodia grossulariella - common in Polesie and in central Forest. Damage gooseberries and currants. Pupae hibernate in cocoons spider in the top layer of soil in cracks and under bushes and gooseberry currant. For the year developing one generation.
Family - Sesiidae
6. - Aegeria tipuliformis - happens everywhere. All kinds of damage currant, euonymus, gooseberries, sometimes hazel, hornbeam. Caterpillars hibernate inside shoots: younger ages - in shoots the last century - a perennial branches. Tracks that reach to the fall of the last century, complete development in one year remaining on developing a two-year cycle, experiencing two wintering.
Family Mino moth-cap - Incurvariidae
7. Smorodynna renal moth - Lampronia capitella - happens everywhere. Caterpillars hibernate first age in dense white cocoons under the bark at the base of backward shoots and old stumps. Generating annual.
Several Hymenoptera - Hymenoptera
Family sawflies real - Tenthredinidae
8. yellow black currant sawflies - Nematus leucotrochus - Polesie happens in steppe Carpathians. Damage red and white currants, gooseberries. Eonimfy-larvae hibernate in cocoons in the soil at a depth of 5-8 cm at the base of the bushes. In Ukraine develops three, sometimes four generations. With new generation of individuals is able 1-2 years.
9. Arrusovyy sawflies - Prisfiphora pallipes Lep. - Happens everywhere. Damage gooseberry, red, white and golden currant. Eonimfy hibernate in dark brown shiny cocoons in the soil depth of 2-3 cm, usually between the thick roots at the base of the bush. In Ukraine, develops 3-4 generations. In the 2-3 th generation of larvae falls into diapause.
Several Diptera - Diptera
Family Halytsya - Cecidomyiidae
10. stem Halytsia - Thomasiniana ribis - happens in Polissya and Forest. Damage currants. Larvae hibernate in a cocoon in the surface layer of soil on 1-8 cm, at least - under the bark of shoots in places of power. Developed in two generations.

11. leaf Halytsia - Dasyneura tetensi - happens in Polesie Forest. Damage Chor well currants. Imago length of 2 mm, brown. Larvae hibernate in cocoons in the soil under the bushes currant. For three generations growing season.
12. floral Halytsia - Dasyneura ribis - happens in Polissya and Forest. Black currants damage. Imago 1.6-1.7 mm long, yellow and pink belly. Larvae hibernate in cocoons in the soil. For the year developing one generation.
3. pests vine
Grapes in Ukraine damaged more than 50 types of harmful animals - insects, mites. Especially harmful, there are 35 species. Most of them - polifahy and only 15 species are mono- and developing mainly on the vine. The roots feed the larvae of beetles, scarabaeidae. Young shoots, buds, leaves damaging caterpillars scoop, larvae grasshoppers, crickets and others. From coccidia dangerous mealy cochineal, a number of scales and false scales. Especially dangerous grape phylloxera, leafroller.
Several - Homoptera
Family phylloxera - Phylloxeridae
1. Grape phylloxera - Viteus vitifolii - happens in Ukraine in the Crimea, southern and western regions. Damage the grapes. In Europe it was imported from America in the 60s of last century, where it quickly spread, causing considerable damage to vineyards. Depending on your lifestyle and harmfulness phylloxera has two forms: the root and leaf. The female form root 1-1.2 mm long, elongated-oval, greenish or brownish-yellow. Female leaf or root-knot, forms a rounded, yellow-green. Larvae hibernate first, second and ever less on the roots. During the season the soil develops.In Ukraine 5-8 leaf form of phylloxera gives 5-7 generations. Harmed the larvae and adults.
Family mealy scale insects - Pseudococcidae
2. Grape mealybug - Planococcus ficus - occurs in the area of the southern coast of Crimea. Damage grapes, figs, olives, citrus and many other subtropical crops. Female widely-oval, 3.5-4 mm, yellowish-brown, heavily-covered for on the edge of the body are 18 pairs of thin waxy filaments that to end of the body. Hibernate females who did not complete development, under bark, in crevices of bark and other protected areas near the plant. Developed in three generations. Harmed the larvae and adults.
A number of beetles - Coleoptera
Family scarabaeidae - Scarabaeidae
3. Marble chafer - Polyphylla fullo - happens. Polifah. Wanted for young plantations. Beetle 28-32 mm in length; elytra yellowish marble pattern. Hibernate larvae of different ages in the soil at a depth of 30-50 cm. Revived three larvae. Harmed the larvae and adults.
Family Weevils - Curculionidae
4. Skosar Crimean - Otiorhynchus asphaltinus - It happens in Crimea, especially in areas southern coast. Damage grapes, less fruit trees and berry bushes. Beetle 8-11 mm long, brilliant-black top. Hibernate immature beetles and larvae that have not completed development of soil and under plant debris. Beetles live 2 - 3 years.

Harmed the larvae and adults. In the Crimean vines damage several other types: skosar grape - O. vitisGyll., Small black skosar - O. ovatusL. etc.
Family trubkokruty - Attelabidae (Rynchitidae)
5. or pear - Byctiscus betulae - happens everywhere. Damage grapes, pear, at least - plum, yablu-nude, rowan, quince, cherries, raspberries and other deciduous. Beetle 6 - 9 mm long, with mazarine gloss. Immature beetles hibernate in the soil at a depth of 5-10 cm, Neve of individuals - under plant debris. For the year developing one generation. Harmed the larvae and adults.
The family leaf beetles - Chrysomelidae
6. dark - Adoxus obscurus - happens everywhere. Beetle length of 6 mm, black, elytra reddish-brown. Hibernate larvae completed supply in the soil. For the year developing one generation. Harmed the larvae and adults.
Several butterflies or moths - Lepidoptera
Family leafroller - Tortricidae
7. Hronova Tortrix - Lobesia botrana - occurs throughout the industrial viticulture. Butterfly with a wingspan of 11-13 mm, front wings broad with dark touches. Pupae hibernate in white silky cocoon in bark cracks in dried grapes, fallen leaves and other places. Developed in three generations.
8. leafroller dvolotna - Eupoecilia ambiguella - happens everywhere, especially in the Crimea and southern regions of Ukraine. Damage the grapes can on currants, viburnum, dogwood, blackthorn, buckthorn, spindle tree, maple and other trees and shrubs. Butterfly with a wingspan of 13-16 mm, the front wing of trapezoidal with border on the sides, rear wings are light gray. Pupae hibernate in dense white cocoons in the axils of the shoots, cracks, crevices, under bark backward in residues material. For the year develops two generations.
Family () - Zygaenidae
9. grape - Theresia ampelophaga - common on the southern coast of Crimea. Butterfly with a wingspan of 22 - 25 mm, top or blue-green. Caterpillars hibernate II-III centuries backward in cocoons under bark, the grains of sand on the trunks and stumps of grapes, at least - in plant debris. For the year developing one generation.
Family moth - Heliozelidae
10. Grape moth - Holocacista rivillei - happens in Crimea. Hibernate tracks that have completed power under the bark on the trunk backward sleeves and grapes. On Southern Crimea grape moth develops in three generations.

LECTURE 8. LIMITATION OF LECTURE NUMBER AND MONITORING INSECT. VALUE AND PROTECTION OF INSECT

Question:
1. Phytosanitary monitoring. Methods of accounting insects
2. Methods of protecting crops from insect pests
3. The value and insect protection

1. Phytosanitary monitoring. Methods of accounting insects

Phytosanitary Monitoring (phyton - plant, sanitas - health, monitoring - monitoring) - a set of measures aimed at monitoring and forecasting of organisms (pests, diseases and weeds) in agrocenoses.

Types forecasts

Use three types of bets: Long, long term and short term.

Long-term forecasts developed scientific institutions for a term not less than five years.

Long-term projections are developed for the coming year or season. Long-term projections develop scientific institutions with operational service protection products.

Short-term forecasts up to a period of several days to a month for pests and diseases that spread rapidly. They are specifying and systematically used for these objects. Short-term forecasts developing operational service of protecting plants and scientific institutions.

Phenological forecasts determine the date of occurrence of phenological events - stages of ontogeny in pests and plants, as well as their likely pace of change in the prevailing environmental conditions. They develop for a period not exceeding the duration of one generation phase of planting (planting) or calendar for up to a month.

Weather harmfulness designed for the expected loss of harvest and the establishment of the basis of feasibility protective measures, taking into account expenses for their conduct. This forecast was inhabited for each type of harmful crop becomes necessary when the indicators come phenological timing of protective measures.

In pest includes 5 main phases of population dynamics.

Phase depression occurs due to prolonged extreme state of energy resources and climatic factors. The population of small and stored only in places reservation - habitats with relatively favorable at this time feeding grounds and microclimate.

Settlement phase (lifting strength) in populations that are in a phase of depression occurs due to the formation of optimum fodder and favorable combination of climatic factors in places Reservation and beyond. Consequently, the began intensive breeding, is settling and increase the number of species, compounded by population structure (spatial, age, morphological), their increased resistance to factors of mortality.

Phase mass comes with further maintaining favorable fodder and optimal condition outside climatic factors include the reservation. In these circumstances

there is the highest density populations that reach extremely complex structure, characterized by high intensity of reproduction and the most complete survival. Intraspecific and interspecific relations do not limit growth numbers, seal populations and the expansion of territories populated. These populations have increased resistance to pesticides with the greatest endurance stock to temporary adverse factors, increased resistance to pathogens.

Phase peak numbers occur as a result of the deterioration of the state of fodder and climatic factors, especially in the temporarily occupied habitats. Reproduction fades and does not ensure growth of population, and the mortality rate is increasing because the amplified effect on the population of interspecies relations (predators, parasites, pathogens), reduced the total stock of resistance to unfavorable factors.

Phase strength decline comes as a result of the ongoing state of extreme environmental conditions. Temporary settlements formed outside seats reservation dying. Stock endurance population to adverse factors is minimal. In particular, dramatically narrows the range of optimum temperatures for her protection. Saved population only in places reservation; eventually there comes depression phase.

Methods of accounting insects

Accounting pests living in the soil

Pests living in the soil, take into account the method of excavation sites. Apply small (10 cm), medium (45 cm) and deep (more than 45 cm) digging. The size of plots is 0,125 m^2 (25 × 25 cm) or 0.25 m^2 (50 × 50 cm). Number of sites (samples) depends on the destination account. Normally pa every 5 hectares aligned field (habitat) are 1-2 areas, 100 ha - 20 plots. Place the sample was evenly covering the edges and the middle. Often attributed diagonal field at regular intervals.

The sample insects makes manually by sieving or washing the soil. Use a set of soil sieve with holes of different diameters.

Accounting pests that live in the ground

To account for pests that live in the ground, using ground traps. Traps are half-liter jars, buried in the ground level with the top edge. On the banks set cover. To fix the insects that fall in banks, using 2.4% solution of formalin. This method of accounting is used to catch weevils, ground beetles.

Number ground traps should be 1-2 for every 5 hectares surveyed habitat. They examine the daily morning and evening. On examination drew caught insects and their total count for each habitat.

You can apply a test area. They limit the square box with sides of 50 cm or 1 m. The imposing frame to the ground, count the number of individuals in its range. Counts conducted in the morning when insects are less mobile. For every 5 hectares of habitat are one trial, 100 hectares - 20 samples.

Accounting pests that live on plants

Use counts at sites (0.25 m^2). Square frame with sides 50 centimeters put on the ground so that it covered by plants typical of this habitat and aisle. Counts all individuals of this species on plants within the frame. At the same time count value ontogenetic stages. This method is used to account for harmful shells, grain beetles, grain adult ground beetles, caterpillars butterfly meadow, cabbage shovels, weevils,

Colorado potato beetle. Take a sample of five hectares of crops. Counts conducted in the morning and set the average density of individuals in biotope per 1 m^2.

Small and jumping insects (flea beetles) take into account on plants and soil surface using box Petlyuk. It consists of wooden slats as a quadrangular truncated pyramid whose walls (height 40 cm) tight double layer of cheesecloth. Below the lower base, which has a size of 50X50 cm (0.25 m2), the pyramid is set on the ground. It intends to cover and crop lines and rows. Counts spend cool days or in the morning. The number of samples - one in five hectares of crops.

Accounting for small forms or (earth flea beetles, bugs, flies, egg scoop bugs), with row crops conduct on the segments of the line length from 25 to 100 cm. Along the line put line given length and then proceed to a thorough consistent inspection of plants and counting the objects detected. The distribution of samples and their number is the same as for other forms of counts.

In row crops in accounting sedentary forms take 10 samples of 10 plants or 20 samples in 5 plants in the field. Establish the number of individuals per 100 plants. If you know the number of plants per 1 ha, respectively, then you can count the number of individuals per 1 hectare. Samples are placed evenly diagonally field. The methods used to account and caterpillars scoop, meadow butterfly.

For some species that are not exposed to visual records, used a method of shaking their plants. With low field crops insect net to shake. For this stems of plants tilted over the net and gently shaking. With this method, are 5 plants in 20 locations off. Count the number of individuals per 100 plants and the ratio of ontogenetic stages. The method is applicable to rape blossom weevil and some entomophagous.

In assessing the density of settlement small plant pests (aphids) used percentage-point scale: 1 point - poor occupancy (in some instances there are plant pests without creating colonies, inhabited or less than 25% of the leaves); 2 points - Average occupancy (marked 1-2 on the plant colonies, inhabited by 26 or 50% of the leaves); 3 points - strong occupancy (found on the plant more than two colonies, inhabited by more than 50% of the surface of leaves). In the absence of pests on the plant is 0 point.

Accounting pests that live inside plant

To account for pests that live inside plants spend the last section. The method used to identify the larvae of flies cereal, stem flea beetles, caterpillars stem butterfly larvae stem grain sawflies. Since each field take 10 samples of 0.25 m2, distributing them evenly over the area. Plants within each sample cut or dig, collected and then analyzed in the laboratory. In the analysis reveal the stems, leaves and other plant parts needle and identify: 1) the percentage of occupied pest plants; 2) the average number of individuals per plant or inhabited by 100 plants; 3) the nature of the injury and the plants damaged (leaves, branches, stems); 4) the ratio of ontogenetic stages (in percentage).

For the detection of stem pests in fruit plantations (carpenter ant, bark) conduct inspection trunks and skeletal branches. In establishing the injury take into account the depression in the presence of dry tree branches. Counts carried out on a route that crosses the garden on two diagonals, inspecting every 4th tree.

Accounting pests using nets

Accounting pests using small nets used for heat-loving insects that live on the surface of herbaceous plants. Enjoy standard entomological net hoop with a diameter of 30 cm, a depth of 60 cm and bag handle length 1 m. Nets hold the same type of movements, including left to right and right to left then a quarter circle. Drive net so that the open part in contact with the surface vegetation. Movement should be uniform, slowly, but not so slow to keep up insects jump or fly from it. These operations are called cutting. Each step over strokes forward 1 step.

One test is based on the activity of the facility from 10 to 20 conducted without interruption strokes net. This move by 10 or 20 steps in a straight line. After each test objects with nets removed and placed in Stains. Take 5-10 samples, all of which is 100 strokes net. To identify the phenology of pests cutting net systematically carried out every 3, 5 or 10 days. When processing data calculated the average number of individuals per 10 or 100 strokes net, and specify data and phenological stages of ontogeny value.

The method of cutting net phenology and take into account the number of sawflies bread, cereal flies.

Automated accounting methods

Among automated accounting methods included techniques based on the detection of an object using automatically operating devices. For butterflies from the family using food bait scoop made from molasses, wandering. It is poured into metal container size 50X30 cm and 6 cm depth. Containers exhibit in the box and fixed on stands at a height of 50 or 100 cm from the soil surface typical crops. 5-10 tanks was distributed at equal distance from each other, but not closer than 50 meters. The day they cover, and the evening open.

Scoop-gamma, alfalfa shovel, butterfly flying and other readily to light. These species are caught with light traps. In order to attract insects use conventional electric lamps or lamps with ultraviolet radiation. Insects fly into the light, hit about bulb falling into the funnel and then in a bank collector.

We have created a trap without fixing liquid. Lamp surrounded them bare wire. Pheromone traps are also used. These traps caught males to determine breeding phenology and part numbers of the pest. They are used for apple, plum, eastern American white butterfly and others.

In the garden Pheromone traps are placed at a distance of at least 100 meters from each other.

2. Methods of protecting crops from insect pests

1. Overview of security methods

Modern methods of plant protection and covering the following methods:

• Agrotechnical - use aimed at increasing plant productivity as a factor that changes the conditions

Life pests;

• Breeding and Genetics - the creation and implementation varieties and crops that are genetically protected from pests, pathogens and weeds;

• biological - the use of parasitic or predatory animals

(insects, mites, birds) and microorganisms - pathogens
insects to limit reproduction of pests;
• Bio - use chemical features insects, biochemical mechanisms of reproduction and genetic;
• entomological quarantine of plants - a set of measures to prevent delivery and penetration into the country from new types of pests;
• Chemical - the use of toxic substances for pest which,
falling in different ways in the body of harmful objects
cause their death.

1. Land Treatment method

The purpose farming practices - facilitate the greatest performance plants by improving soil fertility and crop resistance against the harmful effects of negative. Protective function farming practices detected in intensive reproduction of many pests and implementing high-quality properties and plant resistance their ability to use nutrients and. Farming practices ensure the formation of high economic, economic and environmental efficiency of specialized, including biological, genetic selection and management of chemical plant protection.

The main role in creating unfavorable for life pest management and the dynamics of their populations especially growing crops in crop rotation, tillage, fertilization, irrigation, preparation, sowing.

Crop rotation. The scientific principle of organization is optimal differentiation in space and time related nutritional value for pests to crops.

The system of cultivation in crop rotation. Key features ground - weeding, preparing field for sowing, water treatment, storage and accumulation of moisture in layer, reproduction of soil fertility, affects the development of many pests. Great importance has deep wrapping post-harvest plant residues, which are wintering pests.

Fertilization. Some importance in enhancing the sustainability of crops against pests is introducing E-eral fertilizers, balanced on phosphorus and potassium. High doses of nitrogen promotes regeneration of damaged mass of plants and reduce crop losses of many kinds of pests.

Preparation of seed. A very important role in limiting weeds have seed cleaning by a system machine while removing the seeds, which distributed some pests. Well-sorted seed provides friendly development ladder, improves the stability of complex crops against adverse factors.

Irrigation. While there is increasing irrigated surface air humidity and topsoil; climate change in a favorable direction for hihrofilnyh kinds of pests: wireworms, Swedish and Hesse flies, aphids, stem butterfly, reduced harmfulness chornyshiv, sawflies, wheat thrips.

Terms sowing. To limit many species of insects, life cycle adapted to phenological phases of the plants need to disrupt the synchronization of herbivores and crops. Sowing agricultural practices is an effective management of population dynamics, especially pests cereals, against which the use of chemicals ineffective.

Terms harvesting. Optimal timing of collection number of pests. At first crops harvested crop on areas with high numbers chinch, Hesse flies, grain sawflies, thrips, cereal scoop. This adversely affects the pests, leaving them without food.

2. Selection and genetic method

Reliable method of plant breeding are genetically protected from pests varieties and hybrids of crops that are able to adjust the size of a long period of pests. This regulation is associated with an adverse effect on fertility pests.

Various forms of resistance: from no affection (absolute immunity) to identify weak resistance.

3. biological method

This method of plant protection is based on the use of living organisms or their metabolic products in order to reduce the number and harmfulness of pests and creating favorable conditions for beneficial species in agrocenoses.

The main uses of biological method:

• preserving and improving the efficiency of natural resources parasites and predators (entomophagous)

• enrichment agrocenosis beneficial organisms. This by seasonal colonization, introduction and acclimatization entomophagous;

• The use of pathogens (viral, fungal and protozoal); at their base now created a number.

4. Bio-method

The method is based on biologically active substances that ensure the growth and development of insects and information transfer between organisms (chemical). Mechanism of action Biotechnical method can be divided into three groups: 1) regulation of behavior of insects; 2) violation of the growth and development of insects; 3) violation of the genetic structure of populations.

Regulation of behavior of insects. Main language insects communicate with one another and with other organisms - chemical. The exchange of information is through the provision and acceptance of specific chemical compounds or mixtures in well-defined ratios. This type of interaction between living organisms called chemical chemoreceptor. In the insect chemoreceptor fully ensure vital functions: search of food, meeting papers, identification of individuals in their family of social insects.

Chemoreceptor by using attractants - signaling compounds perception which makes them move individuals to the source of the smell. These include pheromones - providing intraspecific communication, alomony - substances that control the behavior - substances that predator to find his victim. Repellents - substances that cause the movement of animals in the opposite direction from.

Defensive plants gained wide use sex - complex chemical compounds, providing meeting papers. Now established synthetic analogues of pheromones for most species of insects. There pheromones of various purpose: sex pheromone, or sex attractant, provide chemical articles in insects; aggregation - determine the reaction of anxiety in many Hymenoptera; trace - point the way to the colony, they found in termites, ants, bees.

The most studied pheromones are known to insects of the Lepidoptera series, beetles.

Violation of growth and development of insects. In the regulation of insect metamorphosis hormones leading role. Insect hormones substances released directly into the hemolymph ductless or endocrine glands that their growth and development. In insects, produced three hormones: juvenile, ekdyzon and brain. Most attention attracted researchers juvenile hormone.

Juvenile hormone analogues - violate development of insects and cause their death or infertility. Non-toxic or low-toxic for insects, they are relatively slow. These substances enable increase the number of insects in the next generation.

Now in practice using no more than ten. Synthesis of chitin - hormone-like compounds that inhibit the development of insects and disrupting the formation of the cuticle during. Chitin synthesis inhibitors are effective against the larvae of younger ages.

- substances that prevent the normal secretion of juvenile hormone biosynthesis and break it. Causes premature formation of non-viable individuals. Substances that mimic the action of hormones larvae and - substances that stimulate molting process in insects. And in fact, in the second case this leads to their death.

Violation of the genetic structure of populations of insects. Currently, developing and testing the genetic or avtotsydni, means that plant-protective mean: the introduction of a pest population or unfertilized nonviable individuals in populations of male dominance, pests that usually develop in two or more and vice versa, the use of cytoplasmic incompatibility, populations get more.

Sexual sterilization is insects that feed on artificial breeding a large number of insects harmful species. Then perform sexual sterilization of males ionizing certain doses. A similar effect can be achieved in feed chemical. Release of large quantities of sterilized males in pest population leads to a sharp decline generation pest because females after mating with lay viable eggs.

5. entomological Plant Quarantine

The current state Plant Quarantine of Ukraine acting under the Law of Ukraine "On Plant Quarantine", which highlights its main objectives:

• protecting the country from entering or independent penetration from abroad or from the quarantine area quarantine facilities;

• timely detection, localization and liquidation of quarantine objects and prevent their penetration into the regions of the country where they no;

• state control over the observance of special quarantine mode of action of plant quarantine in growing, harvesting, exportation, importation, transportation, storage, processing, sale and use of regulated objects. To achieve these objectives an extensive service internal and external quarantine, acting under special national and international regulations and approvals.

6. The chemical method

The chemical method is the use of pesticides (plant protection chemicals), which, depending on the destination share on (against insects), acaricides (against mites) (both against insects and mites), fungicides (against fungal diseases) , herbicides (against weeds), nematocides (against), rodenticides (against rodents). This method is based on the use of toxic substances entering the body insects cause their death. Insecticides applied to food, the body of insects, they in the cell sap of plants or apartments in the environment (soil, plants, etc.). The death of poisoned insects is violation of physiological functions.

Insecticides are made in the form of powders, wettable powders, emulsion concentrates, pellets. The choice of route of administration depends on lifestyle, place of residency, character pest.

Methods of application of insecticides, spraying, making preparations in granular soil, seed treatment, poisoned baits.

Advantages chemical method:

• High performance, efficiency and;
• multiple payback.

Disadvantages chemical method:

• insecticide toxicity to humans and warm-blooded animals;
• residues in plant and animal products;
• violation biocenotical relationship;
• emergence of resistant pest populations;
• negative genetic effects, especially in regions of intensive use of pesticides.

Disadvantages chemical method can greatly reduce, following requirements:

1) apply insecticides only if no replace them with other safe methods (means) with all regulations and above economic thresholds of harmfulness;
2) should be preferred less toxic to humans and animals insecticides;
3) to prevent resistance to insecticides populations Pests avoid regular treatments cultures one and the most drug (or drugs one chemical group).

3. The value of insects

1) Insects - members of food chains
2) insects - pollinators of plants
3) Insects - (insects destructors, circulation of nutrients)
4) Insects - entomophags (predators, parasites, means weed)
5) Insects - food for man
6) Insects - medicine
7) Insects - the source of various substances and raw materials (dyes, silk, honey, wax, shellak,)
8) Insects - laboratory animals
9) Insects have great recreational and aesthetic value
10) Insects - pests of agricultural crops and forest species
11) Insects - vectors of pathogens

Insect Protection

Vulnerability insects is determined: a narrow range, the inability to migration, aggregation trends or ephemeral affinity to rare places in food or monofahiya rare plants, aquatic life.

1) Inventory types
2) The reserves and other protected areas
3) Create
3) Breeding insects
4) Educational work to protect insects

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