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STUDY OF INSECT PESTS OF GRAIN CROPS IN THE FERGANA REGION AND THEIR CONTROL MEASURES

Khalimova Mokhigul Rustamovna
Teacher, Kokand State University

Rakhimova Mokhirabonu Marat kizi,
Teacher, Kokand State University

Ergasheva Charoskhon Erkin kizi
Student, Kokand State University

Abstract: This article examines insect pests of grain crops. Grain crops play a vital role in the agriculture of the Republic of Uzbekistan, forming the basis of the country's food security. The study of insect pests of grain crops is a key area of modern agricultural science. Pests cause significant damage to grain yield and quality, leading to economic losses in crop production. Controlling pest populations with entomophages is one of the most environmentally friendly and effective methods of biological plant protection.

Key words: Insects, crops, population, ecosystems, biodiversity, anthropogenic factors, natural ecosystems, environment

Аннотация:В данной статье рассматривается, насекомых-вредителей зерновых культур. Зерновые культуры занимают важное место в сельском хозяйстве Республики Узбекистан, являясь основой продовольственной безопасности страны. Изучение насекомых-вредителей зерновых культур является важным направлением современной сельскохозяйственной науки. Вредители наносят значительный ущерб урожайности и качеству зерна. Их деятельность приводит к экономическим потерям в растениеводстве. Контроль численности вредных насекомых с помощью энтомофагов является одним из наиболее экологически безопасных и эффективных направлений биологической защиты растений

Ключевые слова: Насекомые, зерновые культуры, популяция, экосистемы, биоразнообразие, антропогенные факторы, природные экосистемы, окружающая среда.

Introduction. Grain crops play a vital role in the agriculture of the Republic of Uzbekistan, forming the basis of the country's food security. However, insect pests cause significant damage to crops, reducing yields and degrading grain quality. The spread of pests is particularly pressing in the Fergana region, where climatic conditions favor their rapid reproduction. The Furkat district is characterized by developed grain production, but is also susceptible to various types of harmful insects, such as aphids, thrips, grain beetles, and others. Insufficient knowledge exists regarding their species composition, biology, and developmental dynamics. Therefore, studying insect pests of grain crops in the Furkat district and developing modern methods of control is a pressing scientific and practical challenge.

The methodological basis of the study consists of: The methodology for collecting and storing insect materials is a system of scientifically sound techniques and rules aimed at obtaining reliable data on the species diversity, abundance, morphological and ecological characteristics of

insects, as well as their long-term preservation for subsequent study. Insect collection is carried out taking into account the objectives of the study, the characteristics of the species under study and the environmental conditions. Various methods are used for this. One of the most common is manual collection, in which insects are collected from the surface of plants, soil or other substrates using tweezers, a brush or simply by hand. This method allows for the precise selection of objects, but requires care and experience [4]. For the capture, storage and preparation of an insect collection, it is necessary to have special equipment, which is divided according to purpose into field and laboratory. The methodology for collecting and storing insect materials includes a set of methods for capturing, fixing, processing and storing samples, as well as documentation and compliance with scientific and ethical standards. A properly organized process allows for the preservation of valuable biological materials and their use in scientific research, education, and environmental monitoring [10,12].

Analysis and Results. A total of 118 insect species belonging to 7 orders have been identified in Uzbekistan: 49 species of Orthoptera, 4 species of Homoptera, 6 species of Hemiptera, 41 species of Coleoptera, 14 species of butterflies, and 2 species each from the order of Termites and Earwigs. Of these, approximately 20 insect species are considered the most dangerous and harmful. The classification of the main pests of grain crops is based on their systematic position, the nature of plant damage, feeding habits, and the developmental stages that cause the greatest damage. Grain crops (wheat, rye, barley, oats, corn, etc.) are susceptible to a large number of insect pests, which can significantly reduce yields and degrade product quality. Systematic classification involves dividing pests into insect orders. The taxonomy of insect pests of cereal plants includes representatives of several main orders that damage different parts of the crop. One of the most significant groups is Coleoptera (beetles). These include grain beetles (such as the black-headed scaly-headed beetle), whose larvae damage the root system of plants, while the adults feed on grain in the ears. Wireworms—the larvae of click beetles—damage seeds and roots, especially in the early stages of plant development. Coleoptera pests cause both underground and aboveground damage. The next important group are Lepidoptera (butterflies), whose caterpillars cause damage. These include various species of cutworms, which damage the leaves, stems, and ears of grain crops. Caterpillars can gnaw through stems, leading to lodging of plants, or eat out grain in the ears, reducing yields [1, 2, 5]. The order Diptera (flies) also includes dangerous pests of grain crops. For example, grain flies lay eggs in plant tissue, and their larvae develop inside the stem, causing damage and death. This leads to the so-called "white ear"—a lack of grain in the ear. Hymenoptera pests include, for example, grain sawflies. Their larvae develop inside the stems, destroying internal tissue, leading to stem brittleness and crop loss. Among the Homoptera and Hemiptera (e.g., aphids and bugs), sucking pests stand out. They feed on plant sap by piercing tissue. Aphids not only weaken plants but can also transmit viral diseases.

The common tortoiseshell (Eurygaster integriceps) damages wheat, rye, and, less commonly, barley and other cereals. They constitute a large group of phytophages. The bug has a body length of 10-13 mm, a width of 6.8-8.8 mm, and a large, convex, broadly oval shield covering the wings and abdomen. The color is sandy-yellow, black, or uniform. The larvae are similar to adult bugs and develop for 35-40 days, feeding on the juice from the stems, leaves, ears of plants and the nutrients from the grain.

The shield bug (Aelia melanota Fieb.) is considered a pest of wheat and barley. It grows to 1 cm in size and is widespread. Adults overwinter among plant debris. It appears on wheat and barley in the second half of April. Adults and larvae feed by sucking the sap of leaves and ears. If severely damaged, the stem becomes thin and does not form ears.

The mountain cicada (Dolycoris penicillatus Horv.) inhabits wheat, barley, husks, and alfalfa, causing damage. It is common in Central Asia, southern Kazakhstan, Iran, and Afghanistan. Mature forms are yellowish-gray. The first half of the shield is wide, the second is narrow, the tip is thin, and the body length is 10-12 mm. Mature individuals overwinter in high mountains. In late March - early April, they fly to the plains and begin laying eggs. The mountain cicada, like other cicadas, feeds on the sap of plant stems and leaves.

The common grain aphid (Schizaphis gramina Rond.) inhabits Southern Europe, Western, Central, and Central Asia, North and South America, East and South Africa, and Japan. The highest numbers of aphids on grain crops are observed in late May - June [8, 11]. The life cycle alternates between sexual and asexual generations. In areas of greatest damage, mass hatching of wingless parthenogenetic female larvae from eggs is usually observed in late April - early May.

Large grain aphid - Sitobion avenae F. This insect is widespread in Europe, Central Asia, and East Africa. The body of wingless virgins is spindle-shaped, 2.5-3 mm long, greenish or yellowish-brown, with long legs and antennae longer than the body, black sap tubes, and a light green tail (the sap tubes are 1.5 times longer than the tail). Winged females have a reddish-brown thorax and a green abdomen.

Diuraphis noxia Mord. - Barley aphid. Although called a barley aphid, it causes the greatest damage to wheat. Rye and oats are also damaged. It feeds on 47 wild grasses. The wingless females are 1.5-2.5 mm long and spindle-shaped, yellow-green in color, with abundant waxy pollination.

The corn root aphid (Anuraphis maidi-radicis) forms galls on the upper side of elm leaves in the spring from aphid stings. Parthenogenetic females live within the galls. In the summer, the females emerge to disperse and colonize various cereals (corn, barley, wheat, and grasses) (Fig. 13).

Wheat thrips (Haplothrips tritici Kurd.) causes significant damage to wheat, especially spring wheat, with which its life cycle is most closely linked. It is less harmful to winter rye, barley, and other cereals. Both adults and larvae (the latter are usually more damaging) cause damage, causing partial or complete whitening of the ears, drying of the apex of the sheath leaf, grain erosion, and shriveling of the grains.

Common grain ground beetle (Zabrus tenebrioides Goeze.) It causes the greatest damage to winter wheat in the steppe zone, but also damages other grasses: rye, barley, less commonly some varieties of oats, and sometimes corn. Among wild plants, it prefers couch grass, but also feeds on bluegrass, wheatgrass, timothy grass, foxtail, and other plants.

The impact of pests on grain yield and quality is a key issue in agriculture, particularly in the cultivation of grain crops (wheat, barley, corn, and rice). Insect pests can cause significant economic damage, reducing both the quantitative and qualitative aspects of the harvest. Pests primarily have a direct impact on yield. Many insect species damage the vegetative and reproductive organs of plants. For example, stem pests (cereal flies, stem sawflies) damage stems, disrupting the transport of water and nutrients. This leads to slower plant growth, weakening, and even death. Leaf-feeding pests (aphids and thrips) reduce the area of photosynthetic activity, which leads to decreased accumulation of organic matter and, consequently, reduced grain weight. Grain pests (such as the common tortoiseshell bug and grain beetles) damage grain during its formation, significantly reducing the yield. Pests also affect the structure of the crop. Damage to flowers and ovaries leads to a reduction in the number of grains per ear, while damage to caryopses leads to a reduction in their weight. This results in a decrease in the overall grain yield per unit area. In some cases, yield losses can reach 20–50%, and even more during a pest infestation.

An experiment conducted on wheat crops in the Furkat district showed that the biomethod cost 20,000 soums per hectare, while the chemical method cost 70,500 soums per hectare (Table 1).

The cost of using the biological method			
№	Useful resources	Amount million.	Plot
1	Trichogramma	10,383	1 гек.
2	Gabrabracon	10,117	1 гек.
	Total:	20,000	1 гек.
The cost of using the chemical method			
1	Pesticides (hexochlorane, metphos, chlorophos)	20,850	1 гек.
2	Insecticides	40,650	1 гек.
	Total	70,500	1 гек.

Table 1

Pest control measures for grain crops and their application methods are based on organizational, economic, agronomic, chemical, biological, and physical-mechanical methods.

Conclusion

A study of insect pests of grain crops in the Furkat district of the Fergana region revealed that the region's agrocenoses are characterized by a significant diversity of harmful species that negatively impact grain yield and quality. The most common pests include aphids, grain flies, tortoise bugs, thrips, and click beetles. Their development and numbers are directly dependent on climatic conditions, agronomic practices, and crop condition. Analysis revealed that the greatest damage occurs during periods of active plant growth, especially under favorable temperature conditions and inadequate agronomic practices. It has been established that failure to implement protective measures in a timely manner contributes to the mass proliferation of pests and increased crop losses. The study revealed that effective protection of grain crops is only possible with an integrated approach.

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