



FRUIT MOTH FAUNA OF SOUTHERN UZBEKISTAN

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Abstract: This article analyzes the fauna, systematics, distribution features, food plants, bioecology and economic importance of the main fruit moths distributed in orchards and pomegranate orchards in the southern regions of the Republic of Uzbekistan, in particular in the Surkhandarya and Kashkadarya regions. The hot and dry climate of the southern regions, the long growing season, and the development of fruit and pomegranate growing create favorable conditions for the formation of populations of some moth species. Based on the analysis of research and literature data, the importance of such species as the apple fruit moth — *Cydia pomonella* (Linnaeus, 1758), the eastern fruit moth — *Grapholita molesta* (Busck, 1916) and the pomegranate fruit moth — *Euzophera punicaella* Mooze in southern agroecosystems is highlighted. Also, the composition of species identified in recent studies of the Tortricidae family in Uzbekistan and their occurrence in the southern regions is analyzed in a comparative manner. The article provides scientific and practical recommendations for monitoring the spread of fruit moths, tracking their phenological development, and improving the integrated protection system.

Keywords: fruit moths, fruit eaters, Lepidoptera, Tortricidae, *Cydia pomonella*, *Grapholita molesta*, *Euzophera punicaella*.

Introduction. Fruit growing is one of the important and promising sectors of Uzbekistan's agriculture. Apples, pears, quince, peaches, apricots, plums, pomegranates, figs and other fruit crops are grown in various natural and climatic zones of the country. In particular, the southern regions of Uzbekistan - Surkhandarya and Kashkadarya regions - are distinguished by their warm climate, long growing season and favorable conditions for fruit growing.

However, favorable climatic conditions create a favorable environment not only for cultivated plants, but also for insects trophically associated with them, including pest moths. As a result of damage to fruits, stems, leaves, flowers and seeds by fruit moth larvae, the quantity and quality of the crop decrease. Some species penetrate the fruit and directly negatively affect the marketability and shelf life of the product.

Globally, a significant portion of food crops have been lost due to agricultural pests and diseases. Modern studies are studying the dynamics of



the spread of insect pests in connection with climate change, international and domestic trade, intensive gardening, and agrotechnology. A 2025 study by the Institute of Zoology of the Academy of Sciences of Uzbekistan identified 26 species belonging to 2 subfamilies, 8 tribes, and 17 genera of the Tortricidae family in the Central Fergana region. This study is an important scientific basis for studying the fauna of fruit moths in the republic using modern methods.

Studying fruit moths is also important in the southern regions. Field studies conducted in Surkhandarya region in 2020–2022 noted the apple fruit borer (*Cydia pomonella*) and the oriental fruit borer (*Grapholita molesta*) as the main pest species in apple and quince orchards.

At the same time, the pomegranate fruit borer (*Euzophera punicaella*) is of particular importance in the Surkhandarya and Kashkadarya regions, where pomegranate cultivation is developed. The sources indicate that this pest first began to cause significant damage in the south of Uzbekistan, including Surkhandarya, and later spread to Kashkadarya and other regions.

In this regard, the study of the fauna of fruit moths in the southern regions is relevant not only for theoretical entomology, but also for ensuring the productivity, quality and phytosanitary safety of fruit products.

Research materials and methods. In preparing the article, scientific articles, dissertation abstracts and phytosanitary sources devoted to the fauna, systematics, bioecology and harmfulness of fruit moths in Uzbekistan and Central Asia were analyzed.

One of the main sources is S.Q. Kimyonazarov's PhD dissertation on the topic "Fauna, ecology and economic significance of fruit flies (Lepidoptera: Tortricidae) of Central Fergana" defended in 2025 is considered an abstract. In the study, 2126 samples were collected in 2022–2024, and the species composition of the Tortricidae family was studied on their basis.

Entomological, morphological, phenological, ecological, molecular-genetic and statistical approaches were used to identify species. Molecular identification was also carried out for some species in this study based on the COI part of mitochondrial DNA.

For the southern regions, the results of observations conducted in the gardens of the Surkhandarya region in 2020–2022, information on pomegranate pests, and modern studies conducted in other regions of Uzbekistan were taken as comparative material.

Surkhandarya and Kashkadarya regions are regions of Uzbekistan with a relatively hot and dry climate. The early onset of spring and relatively long autumn in the region extend the active vegetation period of many insects.

Temperature is one of the main abiotic factors in the development of fruit moths. An increase in temperature can affect the timing of hatching, larval



feeding, pupation, and imago emergence.

Modern studies have shown that climate change affects the geographic range and population dynamics of pest insects. Temperature can be an important factor, especially in the south-north direction.

In addition, the close proximity of intensive gardens, pomegranate orchards, fruit nurseries, and household plots in the southern regions can form a continuous food base for pest insects.

As a result of the analysis of literature data, the following economically important species can be distinguished in the southern regions (Table 1).

1-table

№	Species name	Family	Main food plants	Importance in the Southern regions
1	Cydia pomonella	Tortricidae	Apple, pear, quince, etc.	High
2	Grapholita molesta	Tortricidae	Peach, apricot, apple, pear	High
3	Grapholita funebrana	Tortricidae	Plum and Prunus species	Important
4	Lobesia botrana	Tortricidae	Mainly grapes	Local importance
5	Archips crataegana	Tortricidae	Fruit trees and other	plants Local
6	Argyrotaenia ljugiana	Tortricidae	Various trees and shrubs	Local
7	Euzophera punicaella	Pyalidae	Mainly pomegranate	Very high

The first six species in Table 1 belong to the Tortricidae family, while the pomegranate fruit borer belongs to the Pyralidae family. Therefore, when the term “fruit moths” is used in a broad ecological and economic sense, they can be considered together, but in a systematic analysis, the families are shown separately.

The apple fruit borer (Cydia pomonella Linnaeus, 1758) is one of the most important fruit pests in the world. It belongs to the Tortricidae family and causes serious damage to pome fruits such as apples, pears and quince.



The distribution of this species in Uzbekistan has been known for a long time. The EPPO data indicate that *Cydia pomonella* is a pest present in Uzbekistan. In the 2020–2022 survey conducted in the Surkhandarya region, *Cydia pomonella* was shown as one of the main dominant pests of apple orchards. As a result of its damage, larval passages appear in the fruit, the seeds are damaged, and the rotting process in the affected fruits increases.

The apple fruit borer spends the winter mainly in the mature larval stage. Modern studies in Uzbekistan have observed that in Central Fergana, larvae overwinter under tree bark, in sheltered places and among leaf litter, pupate in the spring, and then emerge as adults. Due to the relatively high temperature regime in the southern regions, it is possible that the development stages of the species begin earlier than in more northern regions. However, phenological observations are required in each district to accurately assess this situation.

The eastern fruit borer (*Grapholita molesta* Busck) is also an important and dangerous representative of the Tortricidae family. It mainly damages peach, apricot, apple, pear and other fruit trees. In Uzbekistan, this species is of particular importance from a phytosanitary point of view. According to EPPO, *Grapholita molesta* is registered as a pest with limited distribution in the country; the species was first recorded in Uzbekistan in 1983.

The official source of the Ministry of Agriculture of Uzbekistan also lists the oriental fruit borer as a pest that causes serious damage to fruit trees. It is noted that it damages crops such as apples, peaches, apricots and pears. Field observations conducted in the Surkhandarya region recorded *Grapholita molesta* as the main pest species in apple orchards, along with *Cydia pomonella*. An important feature of the oriental fruit borer is that its larvae can damage not only fruits, but also young shoots. Therefore, it has a two-fold effect on the growth and yield of affected trees. Although the distribution of the species in Uzbekistan is assessed as limited, regular monitoring of it in the southern regions is important. Because the interregional movement of fruits and seedlings increases the risk of the pest entering new agroecosystems.

Grapholita funebrana is a member of the Tortricidae family that damages plums and other *Prunus* species. In Uzbekistan, this species was recorded among the most common species in recent studies in Central Fergana. The distribution of the species in the southern regions is not as well studied as *Cydia pomonella* and *Grapholita molesta*. Therefore, it is necessary to organize special monitoring in plum orchards in Surkhandarya and Kashkadarya. In particular, monitoring the dynamics of imago flight using pheromone traps in intensive plum orchards allows us to determine the number of generations of the species and the period of damage.

The pomegranate fruit borer occupies a special place in the analysis of the



fauna of fruit moths in southern Uzbekistan. Although it systematically belongs to the Pyralidae family, not Tortricidae, it is considered a fruit pest due to its economic importance and damage to fruit.

Euzophera punicaella is a specialized pest of pomegranate, described in the literature as a typical monophagous and carpophagous. It is characterized by feeding only on pomegranates and mainly damaging the fruit.

There is information that significant damage from the pomegranate fruit fly in Uzbekistan was first recorded in Surkhandarya, and later spread to the Tashkent, Syrdarya and Kashkadarya regions. The development of pomegranate cultivation in Kashkadarya and Surkhandarya provides a favorable food base for the species. Some sources provide information that the pomegranate fruit fly gives 6–7 generations in one season in these regions.

The harm of the pomegranate fruit fly is closely related to pomegranate flowering and fruit formation. Female butterflies lay their eggs in the parts where flowers and fruits are forming, and the larvae that hatch from the eggs enter the fruit and feed on its internal tissues. Therefore, it is important to coordinate monitoring and protective measures against the pest with the phenological stages of flowering and fruiting.

Recent scientific studies on the study of the fauna of fruit moths in Uzbekistan show that the species composition is quite rich. In a PhD dissertation defended at the Institute of Zoology in 2025, 26 species of the Tortricidae family were identified in the Central Fergana region. They belong to 2 subfamilies, 8 tribes and 17 genera.

The study identified six species - *Archips crataegana*, *Argyrotaenia ljunghiana*, *Lobesia botrana*, *Cydia pomonella*, *Grapholita funebrana* and *Grapholita molesta* - as the most common species.

Data on 55 species of the Tortricidae family as of 2024 were summarized for the entire territory of Uzbekistan. This figure indicates the need for separate faunal studies for the southern regions, since the composition of species and their quantitative ratio may differ in different natural and climatic zones of the country.

The life cycle of fruit moths depends on temperature, humidity, phenology of food plants and other environmental factors.

The development of fruit moths includes the following stages:

egg → larva → pupa → imago.

The larval stage is considered a harmful stage. The imago is mainly involved in the process of dispersal and reproduction. In the southern regions, due to the early onset of spring and a rapid increase in air temperature, the development period of the first generation may begin earlier. The number of subsequent generations depends on the temperature combination, food base and



humidity conditions.

For example, in Central Fergana, the first generation of *Cydia pomonella* butterflies was observed to fly out in the first ten days of April. It is not correct to directly accept this process in Southern Uzbekistan as identical to the data from Central Fergana. Therefore, it is advisable to develop a separate phenological calendar for Surkhandarya and Kashkadarya.

In recent years, climate change has become an important ecological factor in the range, population dynamics and seasonal development of insects.

Rising temperatures can:

extend the active period of insects;

increase the number of generations in some species;

bring forward the emergence from hibernation;

change the synchrony between pest and host plant phenology;

create conditions for the expansion of the pest's range.

The southern regions of Uzbekistan require special attention in relation to such changes. Because the Surkhandarya and Kashkadarya regions have high temperatures and a long growing season, which can allow some pest species to produce several generations. Studies published in 2024 also analyzed the relationship between the areal expansion of Lepidoptera species and environmental factors, including the distribution of some Lepidoptera pest species in the Surkhandarya region of Uzbekistan.

Entomophages and entomopathogenic microorganisms are important in controlling fruit moth populations in natural conditions. Recent studies conducted in Uzbekistan have studied entomopathogenic micromycetes associated with *Cydia pomonella*. A 2024 study isolated 30 micromycetes strains from apple fruit borers in Tashkent and Fergana regions, among which the genera *Penicillium*, *Aspergillus*, *Fusarium* and *Alternaria* were recorded.

In 2025, micromycetes associated with *Cydia pomonella* were studied more extensively in Uzbekistan, and 14 species of micromycetes associated with this pest were identified. Among them, the genera *Aspergillus*, *Penicillium*, *Fusarium*, *Alternaria*, *Cladosporium*, *Metarhizium* and *Mucor* were recorded. These data indicate that it is promising to study the natural enemies of fruit moths in the southern regions and develop biological protection agents based on local entomopathogenic strains.

Conclusion. The southern regions of the Republic of Uzbekistan, in particular the Surkhandarya and Kashkadarya regions, are regions with favorable natural and climatic conditions for fruit growing and pomegranate growing. At the same time, these conditions also create a favorable environment for the development and spread of fruit tree pests.

The analysis of the literature showed that among the main fruit pests of



economic importance in the southern regions, *Cydia pomonella*, *Grapholita molesta*, *Grapholita funebrana*, and *Euzophera punicaella* in pomegranate cultivation can be distinguished. In field observations conducted in Surkhandarya in 2020–2022, *Cydia pomonella* and *Grapholita molesta* were recorded as the main pest species of apple orchards.

The pomegranate fruit borer (*Euzophera punicaella*) is of particular economic importance for southern Uzbekistan, and its distribution should be studied in connection with the pomegranate orchards of Surkhandarya and Kashkadarya. The sources note that this species has spread from Surkhandarya to other pomegranate-growing regions.

Modern studies on the Tortricidae family in Uzbekistan show that the fauna is quite rich. The fact that 26 species were identified in Central Fergana and six species were found to be abundant indicates the need to study fruit moths across regions in the republic.

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