

# Features of stone fruit crop pests development in extreme conditions of Karakalpakstan

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**Abstract.** The article presents the results of studying the species composition and bioecological features of the development and dynamics of the number of pest species living on stone fruit crop biocenosis in the conditions of Karakalpakstan. The features of species development living on apricot, peach depending on the elements of biotic and abiotic factors are determined. It was revealed that in this agrobiocenosis, individuals emerge from overwintered eggs of mealy plum aphids, peach aphids, and large peach aphids in March and multiply massively until July, causing damage to crops. To prevent these losses, chemical treatments against the first and second aphid generation are recommended, which provide full plant protection.

## 1 Introduction

The territory of the Republic of Karakalpakstan is located in the northern part of the Republic of Uzbekistan and occupies about 37% of the total area of the Republic, being in a zone of risky agriculture with an extra-arid climate. The natural and climatic conditions of the soil and plant resources of the region differ from other even nearby regions of the Republic of Uzbekistan. It should be noted that in winter the air temperature decreases to -30-40°C. In summer, the increase in air temperature reaches +40-45°C, with a decrease in the minimum limit of relative humidity by 15-20%, which negatively affects existing species of fauna and flora, especially agricultural crops [7, 16, 22].

Considering these features, the agrobiocenosis cultivates early ripening and ultra-early ripening varieties of cotton (*Goosypum hirsutum*), wheat (*Triticum vulgare* L.), rice (*Oryza sativa* L.), sorghum (*Sorghum Pers.*), corn (*Zea mays* L.), vegetables: cucumbers (*Cucumis sativus* L.), tomato (*Lycopersicon esculentum* Mill.), cabbage (*Brassica oleraceae* L. var *capitata* L.), eggplant (*Solanum melongena* L.), carrot (*Daucus sativus* (Hoffm) Roehl.), cucurbits: melons (*Melo orientalis* (S.Kudr) Nab.), watermelon (*Citrulus vulgaris* Sch.), pumpkin (*Cucurbita pepo* L.), a certain area is occupied by various types of fruit crops. Among seed fruit crops, Apple (*Malus domestica* Borkh.), pear (*Pyrus communis* L.), and drupaceous apricot (*Armeniaca vulgaris* Lam.), peach (*Persica vulgaris* Mill.), black cherry (*Prunus domestica* L.), cherry (*Cerasus vulgaris*.) are cultivated [2, 5, 9, 11].

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In recent years, much attention has been paid to increasing the area of stone fruit crops, with the introduction of new technologies for growing various varieties resistant to changing environmental factors in the region. Much attention is paid to increasing the area and yield of dwarf and semi-dwarf varieties of apricot, peach, black cherry, and cherry. Despite carrying out a set of measures to obtain the desired harvest of these types of fruit crops, they did not achieve the desired result until last year. The main negative, actively influencing actions were changes in environmental and biological factors, among which there are resident pests of agricultural crops, both early common and newly emerging species that actively reduce the yield of these stone fruit crops [2, 4, 10, 13, 16, 20].

To identify these negatively influencing factors and develop improved methods of combating these types of stone crop pests, it was necessary to develop new tactics for carrying out protective measures, considering the changing species composition of insects living on the biotope of fruit crops.

## 2 Materials and methods

The types of pests living on fruit trees, their bioecology, development dynamics and abundance were determined by the method of B.P. Adashkevich [3], V.B.Golub, et al [6]. (1980), Sh.T. Khydzhaev [19], the criterion of harmfulness - according to the method of V.I. Tansky [14, 15], the biological effectiveness of the methods used - according to Sh.T. Khydzhaev, [19,2 0], economic efficiency - according to A.F. Chenkina [23], statistical data processing - according to the method of B.A. Dospekhov [8].

## 3 Research results

The highest form of vital activity of plants and insects living in the biocenosis is the combined life of all existing species, especially pests of agricultural crops. In this aggregate, the criteria of elements of abiotic and biotic factors actively influence the appearance and spread in the biotope of each pest species. Abiotic factors for each biotope are both climatic ones (heat, humidity, light, and others), and the force of gravity, atmosphere composition and properties, radioactivity, and environment surface relief, which are provided by the residence of biological organisms, especially the appearance and spread in fields inhabited only by plants of insects. The development of plants and their pests is actively influenced by air temperature, relative humidity, and the amount of precipitation, which determine the development of these species in the agrobiocenosis. It should be emphasized that biotopes of agricultural crops are one of the main factors negatively and positively affecting the development of pests. Therefore, it is necessary to consider the role of these factors for the study of stone crops pests and when applying optimal types of protective measures.

As a result of the research conducted by many researchers, it was found that a complex of pest species of stone crops appear on the fruit biotope. In special cases, some other types of pests that were previously absent or had no economic significance have become more dangerous. Many studies have identified, among such pests, as a dangerous species, massively widespread in many regions, in particular in the territory of Karakalpakstan [1, 13, 17,18, 21].

Despite this, there are still no optimal protective measures that meet modern requirements, which are one of the main directions of our scientific research as actual problems in horticulture in the conditions of Karakalpakstan.

## 4 Discussion of the results

For the scientifically based development of measures to protect stone fruit crops from harmful pest species, comprehensive studies have been conducted in the conditions of Karakalpakstan in recent years. As a result of research, it was revealed that many types of pests are actively spreading to stone fruit crops, such as spider mite (*Tetranychus urticae* Koch.), gooseberry red spider (*Tetranychus viennensis* Zacher.), mealy plum aphid (*Hyalopterus pruni* F.), peach aphid (*Myzodes persicae* Sulz.), large peach aphid (*Pterochloroides persicae* Chol.), olive scale (*Parlatoria oleae* Colvee.), Californian scale (*Diaspirotus perniciosus* Comst.), catalpa mealybug (*Pseudococcus comsrtockii* Kuw.). According to the distribution area and the harm caused, the dominant species were mealy plum aphid on apricot, peach aphids, and large peach aphids, which mainly harm the peach, requiring a complex of protective measures.

As a result of the conducted research, it can be noted that pests overwinter in the egg phase, depending on the species, in different places. The release date of the overwintered generation from the wintering area turned out to be the moment when the air temperature rose to +5-8°C. Mass development is observed during the flowering of apricots, which were possible to predict the development of the pest beginning from the flowering dates of apricot trees. To determine the dynamics of the number of these pest species, apricot tree blooms were recorded annually. It was revealed that in the northern regions of Karakalpakstan, the flowering of early-ripening apricot varieties was observed on April 7, 2014, April 5, 2015, March 12, 2016, April 6, 2017, March 28, 2018, March 19, 2019, March 14, 2020, March 28, 2021, On March 14, 2022, March 15, 2023, and 7-10 days after flowering, young leaves of plants appear.

For the first time, individuals who survived the wintering develop massively with the formation of colonies on the leaves of plants, causing huge damage to crops. A peculiar feature of the mealy plum aphid biology is characterized by a pronounced polymorphism, alternation of virgin generations with bisexual ones, which make it possible for mass reproduction in a short time. When leaving the eggs, overwintered individuals are fattened by germinating seeds and leaves of apricot flowers. The emerging wingless virgin female in subsequent generations massively propagate individuals on apricot leaf bushes. In such places, a large colony is formed within 10-15 days and winged virgins appear among them, whose colonies settle on other plants that strongly oppress plants, as a result of which the subsequent appearance of leaves is delayed. This rate of development continues until the end of May and the beginning of June, aphid individuals migrate from these colonies closer to the vegetable crops, causing damage to crops.

The harmfulness of these aphid species is two-sided, i.e. individuals suck up the cellular juice from the leaves, also pollute the surface of shoots and leaves with sweet secretions, which enable the mass reproduction of soot deew and bacteria, as a result of which the growth of plant development and yield sharply decreases.

Individuals developing in June, from the effect of air temperature increase, enter flight dispausing and, at the end of August or in September, the outgoing virgin migrants return to apricots and the cycle of growing season development ends with the laying of fertilized eggs that overwinter these generations.

To prevent the development of these pests, treatments with chemical preparations were carried out at a number of 58.1-63.5 specimens per 1 leaf on average, as a result of which the biological effectiveness of measures was 91.7-97.6% within 14 accounting days after treatment, as a result, 12.9-23.1 kg of yield from each apricot bush were saved. On the treated fruit crops until the end of the growing season, the number of pests was below the harmfulness threshold, with the preservation of the crop yield, where the developed measures are recommended for introduction to production.

## 5 Conclusions

As a result of the conducted research on the study of the species composition of pests and the peculiarities of distribution to fruit crops, it was revealed that apricot and peach are more attractive plants for the mass distribution of pest species complex. In the conditions of Karakalpakstan, mealy plum aphid propagates on apricot, peach aphid and large peach aphid - on peach, pests that overwinter in the egg phase and leave the wintering area in March, propagate massively on apricot. The main signal of mass development is apricot flowering. To prevent the mass development of pests, it is necessary to carry out protective measures against the first generation using chemicals recommended for fruit crops, considering the above-shown features of pest development.

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