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BIOLOGY OF CATERPILLAR OF POMEGRANATE SEED MOTH (*Euzophera punicaella Zeller*) AND SPECIFIC FEATURES OF FODDER PLANT INFECTION

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ABSTRACT

The article examines biology of caterpillar of pomegranate seed moth (Euzophera punicaella Zeller) and specific features of fodder plant infection. The authors of the article consider that the pomegranate seed moth Euzophera punicaella Zeller, being the main pest of pomegranate plantations in the Ferghana Valley, causes trees serious damage. The caterpillar phase is harmful. The maximum degree of infection of pomegranate fruits is observed in caterpillars of the fourth age. Infection of a fodder plant has seasonal characteristics. The results will allow us to develop effective protective measures.

KEY WORDS: ***Punica granatum, Euzophera punicaella Zeller, Ferghana Valley, caterpillar, infection, fetus. harmful, protective, develop, crop, subtropical, damage.***

INTRODUCTON

The pomegranate is the most important subtropical crop, which is affected by various diseases and pests every year, causing great economic losses. The pests, affecting the growth and development of the plant's fruit, drastically reduce its commercial qualities. Among pests, the greatest damage to pomegranate plantations is caused by the pomegranate tree seed moth (Euzophera punicaella Zeller), which has multiplied massively in recent years [1,2,4,11,12].

According to conducted studies on the target topic, in Central Asia, the Caucasus, Iran, China, Afghanistan, Turkey, Egypt, the Krasnodar Region of the Russian Federation and other countries where pomegranates are grown, there are many pests of this culture, among which Euzophera punicaella causes the greatest damage [1,3,4]. In Uzbekistan, in regions where pomegranate farming is developed, the systematic organization of biological and chemical pest control has reduced the degree of pest infestation to 20-30%. However, the increase in population density and the impact of the insect during 2018-2019 has again increased the infestation rate of this crop. These changes indicate a lack of study of biology, ecological characteristics and the degree of infestation of Euzophera punicaella in the conditions of Uzbekistan as well as in the Ferghana Valley.

OBJECTIVE

The aim of our research work is to study the biology of Euzophera punicaella and the degree of infestation of this pest in pomegranate plantations in the Ferghana Valley.

RESEARCH MATERIALS AND METHODS

Researches were carried out on pomegranate plantations of farms of Kuva rayon, agrofirm and farmsteads of Ferghana district. Contaminated fruits and flowers of pomegranate, caterpillar, propupa and butterfly Euzophera punicaella Zeller were taken as the material. Methods and instructions of M.V.Akhramovich (1976), A.A.Varshalovich (1978), B.A.Dospekhova (1985), S.A.Mirzaeva (2010) had been used for work and analysis of materials [8,9,10,11].

RESULTS OF THE STUDY AND THEIR DISCUSSION

More than 420 specimens of caterpillars of I, II, III, IV, V ages were collected and studied during the study period of pomegranate fruit biology; more

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than 1000 pomegranate fruits were examined to determine the degree of infection. On the basis of the results of the carried out observations and literature analysis the peculiarities of biology of Euzophera punicaella Zeller caterpillar and infection of fodder plant were revealed:

Pomegranate seed moth is an insect with full development cycle. It develops in four phases: pupa, butterfly, egg and caterpillar. It hibernates in the phase of caterpillars of different age and pupa in fruits left on bushes, in the windfall, under bark of pomegranate bushes, among weeds and in soil cracks [1,2,4,7]. In winter, under unfavourable conditions, many caterpillars die. In addition, in gardens, due to harvesting of the infected fruits left on the bushes and the windfall, the population density of the plant-feeder is relatively reduced, and as a result, at the beginning of vegetation the plant is not observed any appreciable damage from the caterpillars of pomegranate fruit. However, if the infected fruits are not removed, the orchards become the main focus of pest infestation and spread.

In conditions of Tajikistan, butterfly years lasts 58-73 days depending on the temperature [1], in conditions of Fergana Valley - 60-75 days. During daytime hours butterflies hide in shady places under weeds, bark of trees and bushes, under leaves and between pomegranate bush branches. At night from 10 p.m. until 4 a.m. they lead an active life [1,7].

Appearance of the first generation caterpillars falls on the period of pomegranate blossoming. Caterpillars of the first generation, penetrate into buds, flowers, and ovaries, and also cups of a fruit. Feeding inside a cup of perianth, between the pestle and anthers, the caterpillars damage them, causing the flowers not to pollinate, drying out and falling off (along with the caterpillars), or forming ugly fruits [4,7]. Such fruits may amount to 1.5-2%. Caterpillars of the first generation I and II age feed mainly on floema and the damage they cause is insignificant. Caterpillars of III instars of age start to penetrate into inner chambers of fetus, feed on inner tissues and interchamber partitions [1]. Through the holes, fungal, bacterial and viral infections are introduced into the fetuses, causing them to rot, dry out, mummify and fall off. The number of infected fetuses reaches 2-3%. This in turn causes a decrease in pomegranate yields.

Caterpillars of III age feed on grains of fruits of the upper chambers and this is quite enough for their full development. During ripening and increasing number of grains in fruits the number of caterpillars increases.

Caterpillars of IV age begin to eat grains of the lower chambers of the fruit. Infestation of the fruit by caterpillars of the fourth age occurs in June-July, at this time there is a sharp increase in their number. Caterpillars of IV age are the main pests of pomegranate fruits, which infect grains of upper and lower chambers. On one fruit mainly one, sometimes 2-3 and even 18-20 caterpillars are found [1]. This is observed on fruits, which have fractures due to lack of moisture, mechanical damage or fungal infestation (Fergana district, 2018). Fruits infected with fungi become black, and the body of the caterpillars feeding on them also becomes black. Ultimately, the fruits infected by the caterpillars of age IV deteriorate, become infected and are infested by other pests [1,4,7,12]. They create particularly favourable conditions for the life and reproduction of fruit flies and increase the density of their population. All this leads to a decrease in yield and loss of fruit quality.

Infection rate increases by the end of summer season. In August-September there was an increase in the number of heavily infected pomegranate bushes. On the plantations, where chemical treatment was carried out, the infestation of fruits averages 2-3% and is mainly caused by caterpillars of I and II age. On the untreated plantations the infection rate with caterpillars of I age is 3-4%, and with caterpillars of II age it is 4-6%. On the plantations treated with pesticides, the infection rate of the 3rd age caterpillars is 4-6%, while on the untreated plantations it is 15-20%. In fruits weighing 100-150g all chambers are infected with caterpillars of IV age. If there is a lack of food, the caterpillars also feed on embryos and endosperm of seeds. In fruits weighing 300-400g and more, 50% of grains are infected by caterpillars of IV age. In the treated areas, the infection rate with caterpillars of IV age is 5-8%, while in the untreated areas it is 50-60%. On the plantations, where there are many fruits with faults, favorable conditions are created for increasing the pest population density. This situation is observed on 80% of plantations with a high degree of infestation (Kuva, 2018).

In 2019, high seasonal temperatures caused intensive development of the phytophagan. As a result, caterpillar infestation of treated plantations reached 30-40% in August. Caterpillars of V age inside the fruit feed on pomegranate grains, seed coating and interchamber walls, while infecting lower chambers. The degree of infestation of the plantations treated with pesticides was 6-7%, of untreated plantations - 20-40%. This period is not long, the degree of infestation is lower in comparison with the 4th age caterpillars. Caterpillars of V age turn into propupa. In order to do so, the caterpillars come out of the inside of the fetus through 1.5-2.5 cm long passages and 1.5-2.0 mm diameter holes into the cup of the fetus and begin to surround themselves with a cocoon, strengthening it with excrement [12]. In this way, the cocoon is protected from external conditions. Silk separating glands are well developed in V age caterpillars. Sometimes they can, hanging on silk threads, rise or fall by 20-25 cm and with the help of wind move to neighboring pomegranate bushes.

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Infestation of pomegranate bushes has seasonal features. During May-June the caterpillars mainly feed on the flowers and fruits of the upper tiers of pomegranate bushes. In the middle of summer season the caterpillars more infect the middle tier, in the end of August they infect the fruits of the lower tier and start to rise again, as a result of which in August-September the fruits of all tiers are infested. Highly infected fruits show an increase in the number of fungal mycelium and under their influence, blackened pomegranate grains, brown and black spots and rifts on the fruit peel. Infection with phytophagan is firstly observed in such varieties as "jaydari", "cornel bundle", "tuya tish", "Azeri", as these varieties have softer peel, and in the fringe variety - 5-10 days later. The degree of infestation of varieties with soft fruit peel is 5-10% higher than border varieties. Signs and degree of infection of the plants with Euzophera punicaella Zeller pomegranate seed moth are given in Table 1.

Table 1.
Caterpillar infestation of Punica granatum L. pomegranate plants.

Age of caterpillars	Signs of fruit contagion by caterpillars	Degree of contagion, %	
		with chemical processing	without chemical processing
I	The caterpillars feed mainly on floema, the damage is minor. They meet inside a cup of perianth and feed on its tissues. Pestle and anthers are damaged, flowers do not pollinate, they dry out and fall off.	2-3	3-4
II	Are found inside a cup of perianth, eating its tissues. Damage to pistil and anthers.	2-3	4-6
III	By piercing the holes, penetrate into the fetus. Feed on the inner tissues of the skin and interchamber partitions of the fetus.	4-6	15-20
IV	Damage grains of fruit in all chambers. Feed also on germs and endosperm of seeds	5-8	50-60
V	Internally, the fetus is fed with grains, interchamber partitions. Damage the lower chambers of the fetus.	6-7	20-40

CONCLUSION

As it can be seen from the stated results of the research, the pomegranate seed moth Euzophera punicaella Zeller, being the main pest of pomegranate plantations in the Ferghana Valley, causes trees serious damage. The degree of fruit contagion by caterpillars of I, II, III, IV, V age is different. The highest degree of infestation is observed in caterpillars of IV age. Damage to fruits by caterpillars causes their infection with various fungal diseases and other pests. The pomegranate fruits infected with seed moth Euzophera punicaella Zeller are losing their nutritional quality and export properties. The obtained results of the biological research will allow to develop effective protective measures, improve yield and quality of fruits in farms specializing in pomegranate growing.

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