
SCALE INSECTS (HOMOPTERA, COCCOIDEA) OF FERGANA VALLEY'S FRUIT PLANTS

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ABSTRACT:

The work is devoted to the study of scale insects of pests - fruit plants, their species composition, distribution, food connections in the conditions of the Fergana Valley. The article presents research materials on the biological characteristics of the violet scale insect.

Keywords: landscape zones, homoptera proboscis, scale insects, larval skins, species composition, biological features, monophage, polyphagus, *Parlatoria oleae* (Colvee).

INTRODUCTION:

Fruit plants of Fergana Valley suffer from the effects of scale insects - specialized insects of the suborder Homoptera Proboscidea. Due to their relatively small size, the presence of a reliable body covers in the form of a shield, a known plasticity, high fertility, methods of dispersal allow them to spread widely, these insects in the Fergana Valley are represented by

a significant number of species and are considered to be quite harmful insects.

The appearance of scale insects varies greatly. The body shape of the female is almost round, with a more or less pointed protruding pygidium. The body of an adult female is covered with a shield that easily separates from the insect. Shield shapes can be round, oval, pear-shaped, comma-shaped. The scutellum consists of two or one larval skin, discarded by the larvae of the first and second instars. The color of the scutes is different, for the most part white, yellow, and brown predominate. The diameter and length of the shields ranges from 0.75 to 3.6 mm. The scutellum of the male nymphs is often elongated.

MATERIALS AND METHODS:

In order to study the species composition and distribution of scale insects, the materials from our long-term studies (2015-2020) were collected in various landscape zones of the Andijan, Namangan and Fergana regions of Uzbekistan, Osh region of Kyrgyzstan. The work was carried out according to the generally

accepted research methodology. Orchards and household plots were surveyed. In the foothills (Khojaabad region, Andijan region, Bazarkurgan region of Osh region) and mountainous regions (forestry Uzbekistan, Arslanbob, Ok Terak tracts), wild fruit plants such as cherry plums, almonds, apple trees, pistachios, etc. were examined. studies used the work of N. Abdurashitova on the method of studying coccidi [1]. Examination began with the trunks, then gradually moved on to the leaves and fruits. Then the total plant infestation with scale insects was assessed on a five-point scale [4]. The biological characteristics of scale insects were studied on individual model trees in the gardens of collective farms in the Andijan region. Separate studies were carried out in the mountain forests of Arslanbob and Uzbek gova (Kyrgyzstan).

As you know, in the conditions of the Fergana Valley, low-lying foothill and mountain geomorphological zones are distinguished. These zones differ in their soil climatic conditions and vegetation. As a result, the uneven distribution of the vegetation cover is traced here. If in the low-lying and foothill regions, exclusively fruit-bearing areas are widespread, then in the high-altitude zones (1200-2000 m above sea level), mainly wild fruit grows, forming natural mountain forests. This uneven distribution of plants also affects the distribution of scale insects, since forage plants play a decisive role in the distribution of these insects.

Scale insects feeding on many species and varieties of fruit and ornamental plants cause significant damage to them. Some species, being dangerous and widespread, significantly reduce the productivity of fruit plants. Sucking out cell juice, scale insects cause tissue necrosis at the sites of sucking. Subsequently, in these places, the bark dies off, the shoots are bent and dry up.

Despite this, the distribution and biological characteristics of scale insects in the Fergana Valley remain insufficiently studied. The available works do not claim to be a complete study of these insects.

RESULTS AND DISCUSSION:

As a result of our research, 10 species of scale insects were found on fruit plants of the Fergana Valley (Table 1). Among these species, polyphages are (pear, Turanian, purple scale insects). Only some species are monophages (jiyd round, pistachio)

The oasis areas are inhabited by *Lepidosaphes mesasiatica* (Borcns.) *Mytilaspis turanica* (Arch.), *Nilotaspis holli* (Green), *Tecaspis asiatica* (Arch), *Tecaspis prunorum* (Borchs), *Parlotoria oleae* (Colvee), *Suturaspis archangelskae* (Lindg), *Diaspidiotus prunorum* (Laing), *Diaspidiotus eleagni* (Borcns).

In the foothill and mountainous regions there are *Pistaciaspis pistaciae* (Arch.), *Nilotaspis halli* (Green.), *Diaspidiotus prunorum* (Laing)

The most serious harm to wild and cultivated fruit species is caused by *Suturaspis archangelskae* (Lindg), *Diaspidiotus prunorum* (Laing) *Parlotoria oleae* (Colvee), infestation of fruit with these scale insects in most areas ranged from two to four points

From mentioned species *Tecaspis prunorum* (Borchs), *Parlotoria oleae* (Colvee), *Suturaspis archangelskae* (Lindg), *Diaspidiotus prunorum* (Laing) develops in two generations per year. Phenology, feeding relationships, fertility, development of particular stages of the above mentioned scale insects' species are researched.

Moreover, it was mentioned that some oasis species come to mountains and foothills along intermontane valleys and floodplains of rivers with fodder plants.

Species composition of scale insects of cultivated and wild fruit plants of the Fergana Valley

Scale insect species	Landscape zones (areas)																				
	Vile																Foothill			Mountainous	
	Andijan's	Akhunbabaev's	Buston's	Baliqchi's	Izbaskan's	Kurgantepa's	Kasansay's	Asaka's	Shahrihan's	Namangan's	Qarasuik, Kyrgyzstan	Paxtabad's	Turakurgan's	Xadjabad's	Chust's	Yangikurgan's	Djalal-abad, Kyrgyzstan	Khanabad's	Bulakbashi's	Arslonbob	Okterak- Uzgen
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
1 <i>Pistaciaspis pistaciae</i> (Arch.)																+		+			
2 <i>Lepidosaphes mesasiatica</i> Borch	+	+	+	+	+	+	+	+	+	+	+	+	+	+		+					
3 <i>Mytilaspis turanica</i> (Arch.)	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	
4 <i>Nilotaspis halli</i> (Green.)	+	+	+	+		+	+		+	+		+	+	+	+		+		+		
5 <i>Tecaspis asiatica</i> (Arch.)	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+		
6 <i>Tecaspis prunorum</i> (Borchs)	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+		
7 <i>Parlatoria oleae</i> (Colvee).	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	
8 <i>Suturaspis archangelskyae</i> (Lind.)	+	+	+	+	+	+		+	+	+	+	+	+	+	+	+	+	+			
9 <i>Diaspidiotus prunorum</i> (Laing)	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+			+	+	+
10 <i>Diaspidiotus elaeagni</i> (Borchs.)	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	

For many years, the distribution and biological characteristics of the above species of scale insects have been studied in the conditions of the Fergana Valley. Below are the materials on the study of the purple scale insect.

Parlatoria oleae Colvee- Purple scale insect.

Parlatoria oleae Colvee scale insect is one of the most important pests of fruit and ornamental plants.

During quarantine examinations of years 1933-1935. purple scale insects were found in almost all regions of Uzbekistan [2].

Due to its widespread occurrence and harmfulness, especially in the valley gardens of Uzbekistan, in particular in the Fergana Valley, it belongs to the most dangerous insect pests.

The larvae and females of the scale insect, sucking out the cell sap from the forage plants, deplete them, and a strong infection causes the leaves to dry and fall off, a strong decrease in the yield and a decrease in its

quality. In the process of feeding, the scale insect's proboscis, immersed in plant tissues, disrupts the interconnection of cells. In addition, the saliva of an insect, entering through the proboscis, leads to a change in the composition of the cell sap in the tissues of infected plants. When saliva interacts with the cell sap of plants, the metabolism of the shoots on the affected parts of plants and fruits deteriorates in the place where the pest feeds, red rounded spots appear, greatly reducing the marketability of the fruits.

According to the observations of B.B.Bazarov and G.P.Shmelev [5, 6.] in the gardens of the southern regions of Tajikistan, heavily infested with purple scale insects, already at the end of June, almost continuous drying of the leaves of cherry plum, prunes and apricots was observed as a result of intensive absorption of their juices by the pest. According to the observations of Z. Sinelnikova and T. Panfilova [14], in Uzbekistan fruit and many ornamental crops

are severely depleted from the continuous sucking of a *Pariatoria oleae* Colvee shield, being more easily attacked by other pests. A.D, Arkhangelskaya [2] rightly points out *Pariatoria oleae* Colvee in 1968 as a pest of paramount importance. It forms red spots on the fruits of apple, pear, peach, apricot. The researcher writes that apple varieties with more than 16 spots are rejected, from 3 to 16 half-grapes, with 1-2 spots are considered the second variety, as a result of which Tashkent farms lost about 50 % of apples exported due to infestation of their purple scale insects.

In the course of our long-term research and observation (2015-2020) in various regions of the Fergana Valley, a purple scale insect was found in all surveyed orchards, household plots, forests, and street plantings. Forage plants are infected with it by 2-4 points [9, 10, 11].

According to B. Bazarov [5], in the conditions of Tajikistan, the purple scale insect sometimes rises up to 2500 m above sea level.

According to our observations, as the height of the terrain in the surveyed areas increases, the number of the pest and the plants infected by it gradually decreases. So, our observations in the foothill regions of Kyrgyzstan (the village of "Charvak" in Bazarkurgan region), in Kampirravat of the Fergana Valley showed that here the infestation of fruit by scale insects usually did not exceed 2 points: damaged (2-3 points) were also pome fruits in personal plots.

In natural mountain-forest fruit tracts (in the Pamir, Pskem, Fergana ridges) at an altitude of 1200-1800 m above sea level. the number of purple scale insects is less or absent. But under the same conditions on cultivated fruit plants in backyard plots, the infestation of plants with scale insects was noted at 1–2 points.

According to the literature, a purple scale insect in the conditions of Armenia [3],

Azerbaijan [8], Tajikistan [5, 6], Kyrgyzstan [1]. In Uzbekistan, according to the works of a number of authors [2], Sinelnikov [14] - two, in particular in the Zeravshan and Fergana valleys - two.

Our observations on the study of the biological characteristics of the violet scale insect showed that young fertilized female scale insects overwinter on the trunks, branches and shoots of fodder plants. Their body is delicate reddish brown. In most hibernating females, a white thin waxy coat forms on the ventral side, the edges of which are in contact with the edges of the scutellum. When the shield is raised, the body of the female is often trapped between it and the wax cover, sometimes this cover breaks or remains in the place of feeding, and the body of the female is exposed.

Hibernating females, when their shields are raised, react to mechanical light stimuli by moving their bodies. In some years, they suffer greatly from the winter cold. According to A.G. Imamkuliev [8], in the cold winter of 1963-1964. in the Lankaran zone of Azerbaijan, the mortality rate of females reached 70%. According to Z. Sinelnikova [14], a drop in temperature to -290 is fatal for them. During the period of our research in the harsh winter of 1968-1969. when the temperature dropped to 280, the pest mortality was very high. As our analyses showed, the percentage of mortality in Boz and Akhunbabaev districts was very significant.

Table-1. Results of the analysis of the death of female purple scale insects in winter of 2017 (February).

Place of analysis	Fodder plant	Total analyzed females, pcs	Of them		Death rate
			living	dead	
Andijan, household plots	Cherry plum	103	48	55	53
Andijan region	Apple	110	37	73	63,5
Uychinsky district Namangan region		100	31	69	69

As you can see from the table. 1.- dead female in the indicated years accounted for 53-69% in some cases (Boz district) - more than 80%.

In the Andijan region, overwintered females began feeding in mid-March (2016)

With the onset of feeding, the body of the females gradually increases, then reddish-purple eggs are formed in the egg tracts. Some of them are oval, red or purple in color, others are rounded, light in color.

Under the conditions of Azerbaijan, the beginning of oviposition was recorded in early May [13], in Armenia - in early April [3] or early May [14], in Eastern Georgia [7] and in South-East Kazakhstan [12] in the second ten days of April, in Tajikistan [5, 6 - in the third, in Uzbekistan, according to literature data [13, 2].

The results of our research have shown that the purple scale insect, depending on the height of the terrain, lays eggs from the second decade of April to May. In the conditions of Namangan, egg-laying in 2006 was recorded at the beginning of the second ten-day period of April; in some orchards, egg-laying was observed at the end of this decade, in 2008, under the same conditions, at the beginning of the third decade of April, and in the mountainous zones of the Fergana Valley (1000-1200 m above sea level) - at the beginning of the second decade May (2016). Thus, under various conditions, the egg-laying of the purple scale insect is 20-22 days late.

As the eggs are laid, the female's body gradually decreases and at the end of oviposition she dies.

Fertility of female purple scale insects according to the data of B.B. Bazarov [6, 7], in Tajikistan it is up to 62 eggs, in Uzbekistan 19 to 70 [13] from 35 to 50 eggs. According to our calculations, carried out in the Fergana Valley, it ranges from 23 to 57 eggs.

The release of larvae from eggs in the Andijan region was pointed at the beginning (2016) or at the end of the first decade of May (2018).

Before leaving the egg, on the head side of the future larva there is a small tuberous area, which, as it were, weakly pulsates, then a longitudinal suture forms on it, gradually opening up. A head appears from the gap, then the entire larva emerges. The whitish ovum remains at the posterior end of its body.

The hatched larvae spread along the branches, shoots and fruits of the forage plants. On fruits, in most cases, they are taken into the petiole cavity, as well as on the calyx. On fruits not affected by the pest, characteristic red spots appear, the sucked larvae are first covered with a whitish tender cover, which changes color and hardens.

In Azerbaijan, the first molt is observed in the first decade of June [8], in Uzbekistan - after 16-18 days [13].

According to our observations, males in the Andijan region appeared in the second (2016) or third decades of June (2018). According to BB Bazarov [5, 6], males fly mainly in calm morning and evening hours.

In the Andijan region, the coming of males of the purple scale insect was recorded by us at the end of the second decade of June or at the beginning of July (2016). Young females in the studied areas appear before the start of the males' flight.

The development of the second generation in Armenia begins at the beginning of July [3]. In Tajikistan, females of the spring generation start laying eggs in mid-July [5]. In Lankaran, mass egg-laying is observed at the end of July [8].

The beginning of oviposition by females of the spring generation in Andijan was observed at the end of the second decade of July (2016)

The hatching of the second generation larvae in the Fergana Valley occurs in the third decade of July (2018). The hatched larvae spread to different parts of the host plant. Plant leaves are especially densely populated by the scale insects. Males develop mainly on the leaves (Table 2).

Table 2. The ratio of females and males of purple scale insects on leaves of forage plants (apricot)

Analysis location	Analysis daye	Leaf samples	Individ. Overall pc.	From them, pc.		% of males
				females	males	
Namangan region, orchards	27.10.2016	1	132	52	80	61
		2	69	13	56	81
		3	161	55	106	66
		4	107	35	72	67
		5	92	29	63	69
Andijan region, orchards	6.11.2016	1	207	28	179	86,5
		2	143	15	128	89,5
		3	284	33	251	88
		4	132	18	14	86
		5	262	37	225	86

Males of the second generation purple scale insects fly out from the third decade of September to mid-November (2016-2018). After copulation with females, males die, females of the second generation remain for the winter.

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