

Article

Scale Insects (Coccoidea) Damaging Pear (*Pyrus Communis* L.) and Their Bioecological Characteristics

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Abstract: This article describes the species composition, bioecological characteristics, life cycle, and level of damage caused by scale insects (Coccoidea) found on pear (*Pyrus communis* L.) trees. Under the conditions of the Fergana Valley, species such as *Parthenolecanium corni*, *Quadraspidiotus perniciosus*, and *Lepidosaphes ulmi* are widely distributed. Information is provided on the phenology, population dynamics, and damage levels of these pests.

Keywords: Pear, scale insects, Coccoidea, bioecology, pest, Fergana Valley, integrated pest management.

Introduction

Pear (*Pyrus communis* L.) is one of the important fruit crops widely cultivated in Uzbekistan, particularly in the Fergana Valley. This plant is distinguished by its high productivity and nutritional value. However, several pests negatively affect pear yield, among which scale insects (Hemiptera: Coccoidea) occupy a special place.

Scale insects are sap-sucking pests that feed on plant juices, causing damage to both vegetative and generative organs of the plant. As a result, tree growth weakens, productivity decreases, and in severe cases, the plant may die. In addition, the honeydew secreted by these pests promotes the development of sooty mold fungi, which interferes with the photosynthesis process[1,2,3,4].

Materials and Methods

In Uzbekistan, the number of scale insect species is estimated to be around 150. According to scientific sources, several species belonging to the Coccoidea group are commonly found on pear trees, and relevant data have been reported.

Researchers such as Loginova, Borchsenius, Danzig, and others have contributed significantly to the study of scale insects. In Uzbekistan, O.T. Sobirov studied the fauna of scale insects in the Fergana

Valley; K.R. Kakhkhorova conducted research on the family Coccidae (soft scales); K. Zokirov worked on scale insects and mealybugs; I.B. Isaqov studied their systematics and distribution; M.F. Khafizddinov investigated scale insects on fruit and ornamental plants; A.T. Ahmedov researched their bioecology; and U.D. Ortikov and A.R. Anorbaev carried out studies on scale insects in orchards of Uzbekistan. Their findings confirm that these pests are widely distributed across Central Asia, including Uzbekistan[5,6].

Results and Discussion

The research was conducted in pear orchards located in the Quva, Quvasoy, and Oltiariq districts. Scale insects were observed on both mature and young pear trees across nearly all study areas. As air temperature increased, the activity of scale insects also increased significantly.

Relative proportion (%) of scale insect species associated with pear



Figure 2. Scale insect infestation on pear shoots and branches.

Images. Coccoidea

No	Species	Family	Proportion (%)
1	Quadraspidiotus perniciosus	Diaspididae	42
2	Parthenolecanium corni	Coccidae	33
3	Lepidosaphes ulmi	Diaspididae	18
4	Other species	—	7

Table 1. Species composition and relative proportion of scale insects on pear[7].

The results indicate that *Quadraspidiotus perniciosus* is the dominant scale insect species, accounting for more than 40% of the total population. This species represents the most significant pest in pear agroecosystems of the studied region[8,9]. In contrast, *Parthenolecanium corni* also shows a relatively high abundance, while *Lepidosaphes ulmi* and other species contribute less significantly to the overall population structure.

Population density of scale insects (individuals per 1 dm ²)			
Months	Q. perniciosus	P. corni	L. ulmi
March	4	4	
April	12	8	5
May	25	18	11
June	48	30	19
July	65	44	28
August	72	51	33
September	60	40	25

Table 2. Population density of scale insects on pear (individuals per 1 dm²)[10].

The results demonstrate that the highest population density of scale insects occurs during July - August. This period corresponds to optimal environmental conditions, particularly high temperatures

and low humidity, which favor their rapid reproduction and population growth[11]. Among the studied species, *Quadraspidiotus perniciosus* consistently exhibited the highest density, indicating its dominant role in the pest complex.

Yield loss depending on infestation level

Species name	Damage level	Damaged tree (%)	Yield loss (%)
<i>Quadraspidiotus perniciosus</i>	Low level	10–20	10–15
<i>Parthenolecanium corni</i>	Moderate level	30–50	25–35
<i>Lepidosaphes ulmi</i>	High level	60–80	40–55

Table 3. Damage levels and yield loss caused by scale insect species on pear[12].

Under severe infestation, yield losses can reach up to 50%, which represents significant economic damage. Based on results obtained from experimental plots, *Lepidosaphes ulmi*, a pest dangerous for pear orchards, has been found to cause the drying and death of young seedlings.

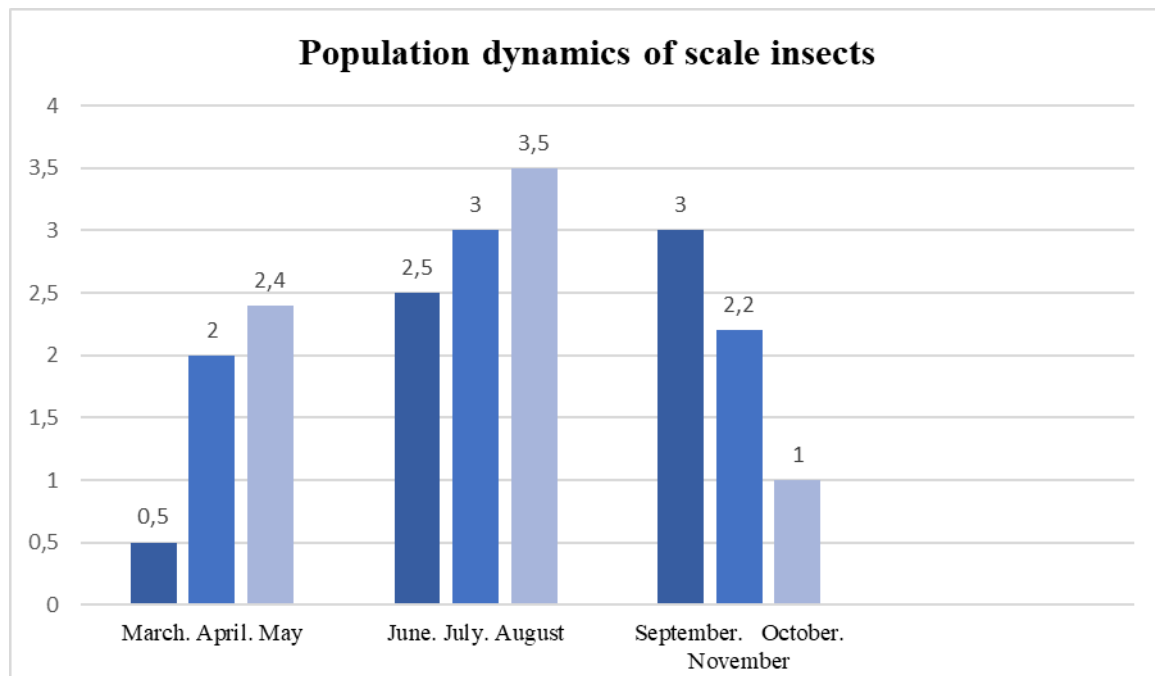


Figure 1. Population dynamics of scale insects during the growing season[13].

Scale insects damage fruit trees, berry crops, shrubs, and ornamental plants. When the California red scale becomes abundant, the bark of trees cracks longitudinally, causing branches and even entire trees to dry out. It sucks sap from fruits, leaving dark red spots. It damages branches, shoots, leaves, bark, and fruits of fruit trees. As a result, trees produce low yields, and young trees may die. The scale cover is round, somewhat flattened, light brown to gray in color, with a diameter ranging from 1.0 -1.5 mm up to 2 mm. The edges of the scale are lighter than the center, and the male has one pair of wings. When young larvae begin feeding, they secrete a whitish substance, which later forms the protective scale[14,15].

During their life cycle, first-instar larvae overwinter under the scale on branches and shoots. In spring, when buds begin to swell, they start feeding, molt, and develop into sexually mature females and males. After mating, the female matures for about one month and then begins to give birth to 100 -120 live larvae. The newly emerged “crawler” larvae leave the scale and disperse over the tree for several hours, attaching to bark and fruits and forming their own protective scale. During feeding, they molt into the second instar and develop into adult males and females, producing the second generation

of crawlers. In this way, they produce 3- 4 generations per year. Usually, a portion of the first-instar larvae from each generation remains to overwinter. They spread from place to place through seedlings and infested fruits.

Conclusion

The obtained results were consistent with data from other researchers. In particular, the high adaptability and rapid reproduction of *Quadraspidiotus perniciosus* confirm it as the main harmful species. The warm and dry climate of the Fergana Valley creates favorable conditions for the development of scale insects, leading to rapid population growth. Under the conditions of the Fergana Valley, three main species of scale insects were identified on pear trees, and their bioecological characteristics were studied. *Quadraspidiotus perniciosus* was identified as the most dangerous species. Scale insects significantly reduce pear yield; therefore, it is necessary to apply an integrated pest management system against them.

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