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Armored scale insects (Hemiptera: Diaspididae) and lecanium (Hemiptera: Lecaniidae) damaging subtropical plants in Azerbaijan

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Abstract

The species of Diaspididae and Lecaniidae families damaging subtropical plants in Azerbaijan has been studied in this article. 22 types of pests have been defined, in which 14 species are armored scale insects and 8 species are lecanium. Trophic relations and pest features of these pests with the plants have been identified. The spread of phytophagous in Azerbaijan and worldwide is also mentioned.

Keywords: Armored, insects, Hemiptera, Diaspididae, Hemiptera, Lecaniidae

Introduction

The phytophagous from of this group are the most dangerous pests of fruit trees and park - decorative plants. In particular, these pests emerge in subtropical hot zones, on the bodies, leaves, and even on the fruits of the plants, leading to the drying of the branches and the weakening of plants. Pests damage the surface area of the plants, especially the young branches, infected leaves. In some cases, armored scale insects cover the body of plants in the form of whole colonies, causing great damage. As a result of infection, the growth and development of the branches weakens, stops, the decorative beauty of green plants disappears, and in most cases the plants dry. There are many spots on the fruits that are damaged by the armored scale insects, the fruits are shriveled and their taste is very bad. Pests suck plant juice and nutrients and destroy plant seeds. Their type of polyphagous and oligophagous, high egg-laying ability and adaptability to every condition make it even more common for pests. Some species are cosmopolitan.

Subtropical plants are cultivated in Lankaran district and Absheron peninsula of Azerbaijan. The vegetation period is long in the Lankaran district as it is the humid subtropical zone and in Absheron peninsula with dry subtropical climate. Thus, the development of plant pests is stronger here. Subtropical plants include tea, tangerine, lemon, orange, grapefruit, palm, fig, pomegranate, pistachio, olive, bamboo, eucalyptus and palms of different types.

Fauna of Azerbaijan's armored scale insects and lecanium has been studied very little. The first information about these pests was given in the studies of E. Arutyunova^[9] and B. Rusanova^[22]. A. Imamguliev^[12,13] studied armored scale insects and lecanium of subtropical plants in Lankaran-Lerik region and he reported their entomophagous. A. Safarov^[23, 24] mentions the bioecological features of *Parlatoria oleae* as one of the olive pests. Azerbaijan's armored scale insects and lecanium has been studied by G. Mustafayeva^[7, 18].

L. Rzayeva^[20], V. Yasnosh^[21], G. Mustafayeva^[4], G. Mammadli^[5], Z. Mammadov^[8], I. Mustafayeva^[1] were shown armored scale insects and lecanium as the hosts of various species of Chalcididae family in their researches. G. Mustafayeva^[2, 3, 6, 14, 15, 16] provides information on bioecological features of some armored scale insects and lecanium. G. Mustafayeva^[17] and others report about bioecological features of two species of armored scale insects in the North East Azerbaijan. Some species of armored scale insects and their entomophagous are described by I. Mustafayeva^[19] in Absheron peninsula. There is no comprehensive information about armored scale insects and lecanium damaging subtropical plants.

Materials and Methods

The entomological materials were collected for the identification the species of these pests.

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Entomological materials have been collected on the commonly accepted methodology (Tryapitsin, Sapiro, Shepetilnikov, 1982) [25] in natural and cultural cenoses. The collection samples and their elaboration was carried out according to the method of A. Borxsenius [10, 11]. Collected materials were stored in cotton or in 70% alcohol. The samples of armored scale insects and lecanium were kept together with the cut pieces of the plant. The research was carried out in both field and laboratory conditions. Spreading of pests, their fodder crops and damaging feature has been studied. Studies were conducted mainly in spring and summer, but biological characteristics of pests and their entomophagous were studied during autumn and winter. The preparing of the material was carried out at the Institute of Zoology. Pests are kept on leaves, branches and sprouts. The type of fodder crop was identified. Species with high content are marked with * in the table and in the text.

Results And Conclusion

As a result of research, armored scale insects and lecanium which harms subtropical plants have been defined. Pests damaging the subtropical plants are the following species:

Armored scale insects (Hemiptera: Diaspididae)

Genus: *Parlatoria* Targioni – Tozzetti, 1868

1. Species: *Parlatoria oleae* (Colvee, 1880)*

It is widespread in all natural cenosis of Azerbaijan. It is a polyphagous and damages olive trees.

Distribution: South and North America, Western European states, Asia Minor, Australia, North Africa, Russian Federation - Krasnodar Krai, Central Asia, Georgia.

2. Species: *Parlatoria ziziphi* (Lucas, 1853)*

It significantly damages citrus plants in Lankaran district. It lives on the body, stems, leaves and fruits of lemon, cucumber and oranges and sucks their juice. Infection rate in subtropical and citrus plants was up to 3 points.

Distribution: South America, Europe, East Asia, Turkey, Syria, Iran, Australia, North Africa, Northern Abkhazia, Acaristan and at the greenhouses of Himalayan region.

Genus: *Lepidosaphes* Shimer L, 1868

3. Species: *Lepidosaphes gloverii* (Packard, 1869)*

It lives on citrus plants (lemon, orange and tangerine). It is widely spread in different regions of Azerbaijan, mainly in the Lankaran district. In the case of mass reproduction, its pest feature is high.

Distribution: North and Central America, South-West Europe, Asia Minor, East Asia, Hawaii, Australia, North Africa, Coast of the Black Sea of Caucasian.

4. Species: *Lepidosaphes ficus* Sign, 1870

It is a monophonic and found only in the hilltop part of the young branches of the fig tree.

Distribution: USA, South-West Europe, Mediterranean Sea, Asia Minor, North Africa, Argentina, Abkhazia, Acaria, West Georgia

5. Species: *Lepidosaphes granati* (Koroneos, 1934)

This species lives on the young branches of the pomegranate. It is mono phagous.

Distribution: Bulgaria, Hungary, Morocco, Iran, Turkey, Greece, Italy, Ukraine, Georgia.

6. Species: *Lepidosaphes pistaciae* Arch.

This species is a monophagous and damages pistachio trees. It is the random species.

Distribution: Asia Minor, Central Asian Republics, Iran.

Genus: *Cornuaspis* Mac Gillivray, 1921.

7. Species: *Cornuaspis beckii* (Newman, 1869)

In Lankaran district, it lives on the citrus fruits, especially on the leaves, fruits, horns and branches of narcissus and harms these plants. The homeland is tropical America, from where it was spread all over the world.

Distribution: America, Europe, East Asia, Asia Minor, Africa.

Genus: *Pseudaulacaspis* Mac Gillivray, 1921.

8. Species: *Pseudaulacaspis pentagona* (Targioni-Tozzetti, 1885)*

In recent years, it has been widely spread in Azerbaijan, and it is a polyphagous pest. It also harms the citrus fruits, the fruit trees, and the trees planted for decorative purposes.

Distribution: USA, Japan, China, Korea, Indonesia, Syria, Israel, Tanzania, Mexico, Argentina, Brazil, Australia, Turkey, Spain, Portugal, France, Italy, Yugoslavia, Greece, Hungary, Bulgaria, Austria, England, Switzerland, Sweden.

Genus: *Chrysomphalus* Ashmead, 1880.

9. Species: *Chrysomphalus dictyospermi* (Morqan, 1889)*

It is poly phagous, specially harms the citrus in Lankaran district. It is a powerful pest of these plants. In Absheron peninsula, cause a great damage to plants which cultivated open and greenhouse conditions. It has been widely spread in greenhouses.

Distribution: India, Malaysia, Australia

Genus: *Kuwanaspis* Mac Gillivray, 1921

10. Species: *Kuwanaspis howardi* (Cooley, 1898)

It lives on the stump of large leaves of bamboo and in the coagulated part of the branches. It sometimes causes damage. It is a mono phagous. Spread in Lankaran district. Homeland is China. Distribution: Caucasus, South Caucasus.

Genus: *Aonidiella* Berlese et Leonardi, 1895

11. Species: *Aonidiella citrina* (Coquillet, 1891)*

It lives on horns, stalks, leaves and fruits of pest control. In the Lankaran district, it has a great impact on citrus fruits. It was widely spread in greenhouses.

Distribution: North, South America, East Asia, coast of the Black Sea of Caucasus, Crimean greenhouses.

Genus: *Aspidiotus* Bouche, 1833

12. Species: *Aspidiotus nerii* Bouche, 1937*

It lives in the south of Lankaran district on citrus fruits, spread on their branches, leaves and fruits. This is a poliphagous and was widely spread in Lankaran district and Absheron peninsula. It damages most plants, especially olive trees and decorative ornamental plants. Oleandr, ordinary bay, lynx, lime, jasmine, palm and other ornamental plants are the dominant species of fodder crops.

Distribution: Central Asia, the Black Sea coast of the Caucasus, the Crimean province.

13. Species: *Aspidiotus destructor* (Signoret, 1869) *

It harms citrus fruits and *Laurus*. It is a polyphagous species and can be considered a very powerful pest of citrus plants.

Distribution: The western part of the South Caucasus.

Genus: *Lopholeucaspis* Balachowsky, 1953.

14. Species: *Lopholeucaspis japonica* Cockerell, 1897*

L. japonica is a polyphagous species. It infects citrus plants and fruit trees - *Populus* L., *Salix*, plums, dates, shawls, jams, and hives. It damages the decorative plants such as pomegranates, *Mimosa tenuiflora* (Willd.) Poir, *Laurus*. It is a Palearctic species.

Distribution: China, Japan.

Table 1: Genus and species belonging to armored scale insects (Hemiptera: Diaspididae) and lecanium (Hemiptera: Lecaniidae) damaging subtropical plants in Azerbaijan

Genus of armored scale insects, and lecanium	Species of armored scale insects, and lecanium
Genus of armored scale insects	Species of armored scale insects
1. <i>Parlatoria</i> Targioni – Tozzetti	<i>Parlatoria oleae</i> (Colvee) <i>Parlatoria ziziphi</i> (Lucas)
2. <i>Lepidosaphes</i> Shimer L.	<i>Lepidosaphes gloveri</i> (Packard) <i>Lepidosaphes ficus</i> Sign. <i>Lepidosaphes granati</i> (Koroneos)
3. <i>Cornuaspis</i> MacGillivray	<i>Cornuaspis beckii</i> (Newman)
4. <i>Pseudaulacaspis</i> MacGillivray	<i>Pseudaulacaspis pentagona</i> (Targ.-Tozzetti)
5. <i>Chrysomphalus</i> Ashmead	<i>Chrysomphalus dictyospermi</i> (Morqan)
6. <i>Kuwanaspis</i> MacGillivray	<i>Kuwanaspis shovardi</i> (Cooley)
7. <i>Aonidiella</i> Berlese et Leonardi	<i>Aonidiella citrine</i> (Coquillett)
8. <i>Aspidiotus</i> Bouche	<i>Aspidiotus nerii</i> Bouche <i>Aspidiotus destructor</i> (Signoret)
9. <i>Lopholeucaspis</i> Balachowsky	<i>Lopholeucaspis japonica</i> Cockerell.
Genus of Lecaniidae	Species of Lecaniidae
1. <i>Coccus</i> L.	<i>Coccus hesperidum</i> L. <i>Coccus pseudomagnoliarum</i> (Kuw.)
2. <i>Pulvinaria</i> Targioni Tozzetti	<i>Pulvinaria floccifera</i> (Westw.) <i>Pulvinaria aurantii</i> Ckll. <i>Pulvinaria pistaciae</i> Bod.
3. <i>Saissetia</i> Depl.	<i>Saissetia oleae</i> (Bern.)
4. <i>Ceroplastes</i> Gray.	<i>Ceroplastes sinensis</i> Guer. <i>Ceroplastes japonicus</i> Green

Lecanium (Hemiptera: Lecaniidae)

Genus: *Coccus* L., 1758.

1. Species: *Coccus hesperidum* L., 1758. *

It lives on the leaves and stalks their trunks of subtropical and tropical plants, and causes great damage. It gives 3-4 generations a year.

Distribution: It is a new form delivered to the former USSR. It is widely spread in the Crimea's southern coast, in the Krasnodar region, as well as in the Transcaucasian republics. It is spread all over the world in greenhouses.

2. Species: *Coccus pseudomagnoliarum* (Kuw., 1914)*

It was spread on the body, stems and leaves of citrus plants, which causes great damage. It is wintering in the larval stage. Gives one generation within a year, lays eggs in May.

Distribution: It was delivered to the former USSR and spread in the Caucasus, California, Japan and Turkey.

Genus: *Pulvinaria* Targioni Tozzetti, 1869

3. Species: *Pulvinaria floccifera* (Westw., 1870)*

It was spread on citrus plants and the *Camellia sinensis*. It causes too much damages. They wintering in the larval stage,

giving one generation within a year.

Distribution: It was delivered to the Former Soviet Union, spread over the southern coasts of Crimea, Azerbaijan, Georgia, all over the world in greenhouses.

4. Species: *Pulvinaria aurantii* Ckll. 1896

It is a pest of citrus plants, *Eriobotrya japonica* and *Camellia sinensis*. It gives two generations within a year: during May-June and September-October.

Distribution: It is a widespread species.

5. Species: *Pulvinaria pistaciae* Bod. 1926

It lives on branches, sprouts and fruits of pistachio trees. It damages sometimes. Adult females are oval, and their ovary is very wide. They lay eggs on the third decade of May, and first decade of June.

Distribution: It spread in Central Asia, on the southern shores of Crimea, Iran, Iraq and Pakistan.

Genus: *Saissetia* Depl, 1865.

6. Species: *Saissetia oleae* (Bern, 1782)*

It damages citrus in Lankaran region. It lives on olives. Female teens and the larvae are wintering. It gives one generation within a year, lays eggs in May.

Distribution: Widespread all over the world. Delivered to the former USSR.

Genus: *Ceroplastes* Gray, 1830.

7. Species: *Ceroplastes sinensis* Guer, 1900*

It lives mainly in sprout, branches and leaves of citrus plants. It also harms the Japanese palm, pomegranate leaf. It gives one generation per year.

Distribution: Widespread in Western Europe, North Africa, Turkey, the Black Sea coast of the Caucasus.

8. Species: *Ceroplastes japonicus* Green, 1921*

It harms citrus plants. This species hibernates in adult stage. It gives one generation within a year, the larvae are born in June.

Distribution: Spread in Japan. Delivered to the former USSR

Conclusions

- Thus, subtropical plants in Azerbaijan were found to be damaged by 14 species of armored scale insects and 8 species of lecanium. 9 species of 14 species of armored scale insects are a powerful pest of subtropical plants and are widely distributed. 6 species of armored scale insects damage subtropical plants.
- Armored scale insects species damaging subtropical plants are belong to 9 genus. *Lepidosaphes* genus has 4 species. Each of *Aspidiotus*, *Parlatoria* genus have 2 species each. Each of the remaining 6 genus is represented by only one species.
- 8 species of lecanium belong to 4 genus. Among them, *Pulvinaria* is in the first place, this genus is represented by 3 species. Each of the genus *Coccus*, *Ceroplastes* have 2 species. *Saissetia* genus includes only 1 species.

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