

## SUCKING PHYTOPHAGES OF OPEN-SEEDED TREES AND SHRUBS IN THE FERGANA VALLEY (LACHNIDAE, DIASPIDIDAE): FAUNA AND ECOLOGY

Kapizova Dilafuz Rakhmonjonovna<sup>1</sup>,  
Gulnora Zokirova Mamadjonovna<sup>2</sup>.  
Andijan State Medical Institute<sup>1</sup>,  
Fergana State University<sup>2</sup>

### Annotation

The article provides an ecological-faunistic analysis of sucking insects living on open-seeded plants in the Fergana Valley. In open-seeded trees and shrubs, 7 species of sap and 2 species of shield were recorded. Of these, *Cinara pinicola* Kalt., *Carulaspis visci* (Schrank, 1781) and *Carulaspis minima* (Targioni – Tozzetti, 1868) were first recorded in the Fergana Valley.

Species with a single-stage food spectrum (*Cinara picea*, *Eulachnus alticola*, *E. tauricus*, *Carulaspis minima*, *C. visci*) are divided into ecological series of species with a two-step food spectrum (*Cinara tujafilina*) according to the degree of attachment of sucking insects to food plants. Seasonal changes in the quantitative densities of *Cinara tujafilina*, *Eulachnus alticola*, *E. tauricus* sap were analyzed by Fisher's Z method and reliability levels were determined.

On the basis of studies on the biology and ecological properties of all species of algae and thyroid, special studies on the entomophagous of the thyroid have been conducted and preliminary results have been obtained.

**Keywords:** Open-seeded, tree, shrub, phytophagous, aphids, shield, fauna, ecology, taxonomy, quantity density, correlation, Fergana Valley.

### INTRODUCTION

Representatives of plant-sucking insects play an important role in the entomocomplex of open-seeded trees and shrubs. Most of them are insects with a primitive structure. In particular, although the saplings of the lyakhnida family used to feed on open-seeded plants or their ancestors in ancient times, later due to changes in the evolutionary development of the fauna of our region, many species of the family have been associated with open-seeded plants - Pinaceae and Cupressaceae. Others specialize in the Salicaceae and Rosaceae families and are found in the entomocomplex of shrubs and trees.

In recent years, the expansion of alleys, trees and shrubs in the Fergana Valley has led to the emergence of adventive species in the region, as well as changes in aphidofauna [4].

Studies have shown that a number of scientists have reported on the presence of aphids in open-seeded trees and shrubs in Uzbekistan. Although research in this area has been carried out in separate groups or species, the sap of open-seeded plants was not a separate object of study, except for some data on open-seeded lyakhnina in the research of M.Akhmedov, M.Mansurkhodjaeva, A.Khusanov, I.Zokirov [1, 7, 14, 17]. Alternatively, the study of shields of open-seeded trees and shrubs is somewhat limited.

For this purpose, observations on the development, biology, ecological characteristics, life cycles, distribution of sucking insects of open-seeded plants were carried out in the alleys and fields of the Fergana Valley. Attention was paid to changes in the morphology and ecology of sap and shield in spruce, camel, Crimean pine and other open-seeded plants growing in different ecological conditions.

## MATERIAL AND RESEARCH METHODS

Insects were collected and studied at certain times of the season as well as on routes. Because most open-seeded plants are green throughout the year, insect encounters have been observed in them all year round. Entomological studies were conducted on the basis of generally accepted methods from artificial and natural biocenoses. In particular, the morphological and classification features of coccids were studied on the basis of classical identifiers and catalogs of the field [2, 12].

The materials of juices were collected and processed according to the methods proposed by AK Mordvilko [8], GH Shaposhnikov [15], MH Ahmedov, J. Kushakov, I. Zokirov [2]. More than a hundred specimens of insects were collected during the study. Persistent drugs were prepared in the laboratory from individuals who were required in terms of size and morphometric characteristics.

Photographs of plants and insects were taken if necessary.

Insect incidence, population density, and dominance were determined using the K.K. Fasulati method [13].

Dispersion differences in the seasonal variation of the quantitative density of insects were calculated based on the following formula [6]:

$$S_x^2 = \frac{\sum (x_i - \bar{x})^2}{n-1}$$

In the formula - variance, - the arithmetic mean, n - the number of samples (or experiments).

The accuracy levels (Ff) of the differences between the variances were checked using the Fisher method.

$$F_\phi = \frac{S_1^2}{S_2^2}$$

Annual joints of insects are observed in all seasons, 10 cm. the quantitative density in the rod was studied.

## RESULTS AND THEIR DISCUSSION

During the study, it was found that in the Fergana Valley, 7 species of sap and 2 species of shield plants are found and damaged in open-seeded plants. The following is their taxonomic list and bioecological features.

Homoptera: Lachnidae

Eulachnus Guercio, 1909 generation

1. Eulachnus alticola Börner, 1940

Narrow (narrow) oligophage. E. alticola is found in pines. In the Fergana Valley, Crimean pine (*Pinus pallasiana*), eldar pine (*Pinus brutia* var. *Eldarica*), spread on the branches of common pine (*Pinus sylvestris*), forming new colonies along the leaves, young trunks and leaf axils. The sap in the colony is

characterized by extreme mobility. In most cases, they are found in dark green. In late May and mid-September-October, the juices release a rapid liquid. It was recorded in all seasons in the conditions of the Fergana Valley. Wintering living individuals were also observed in January 2022. However, as the temperature dropped, their eggs appeared in February of this year.

Distribution: European and Central Asian countries, including Uzbekistan.

2. *Eulachnus tauricus* Bozhko, 1961.

Narrow (narrow) oligophage. *E. tauricus* lives in small colonies on the petals, leaf axils and branches of the Crimean pine (*Pinus pallasiana*). Occasionally also found in eldar pine (*Pinus brutia* var. *Eldarica*) and common pine (*Pinus sylvestris*). These juices are fast and erratic. The colony does not get too big.

Distribution. European and Central Asian countries, including Uzbekistan.

*Cinara* Curtis, 1835 generation

3. *Cinara piceae* (Panzer, 1801) = *Cinara grossa* (Kaltenbach, 1846)

Narrow (narrow) oligophage. The juice of *C. piceae* is motile and consists of 5-6, in some cases up to 10 mature individuals and their larvae in clusters. The clusters are mainly found in the thick body of pines (*Pinus pallasiana*, *Picea schrenkiana*, *Picea koraiensis*), and sometimes on the opposite side of the perennial branches to the sun. The Frank spruce (*Picea Schrenkiana*) also lives at the base of its body and on thick branches. The color is brownish-black, with a faint sheen, the body is continuous-oval, covered with short and sparse hairs. Ants are always observed in the colonies. The biology of the species has not been studied in Central Asian conditions.

Distribution. Central Europe, Central Asia: Distributed in Kyrgyzstan on the Chatkal mountain range (Sarichelak forestry, around Lake Sari-Chelak) at an altitude of 2,000 meters above sea level.

4. *Cinara tujafilina* (del Guercio, 1909).

Keng oligophag. Cosmopolitan. *C. tujafilina* sap forms linear colonies along the branches of spruce, saur and camel (*Juniperus seravshanica*, *Juniperus turkestanica*, *Juniperus communis*, *Biota orientalis*, *Thuja occidentalis*). The difference between this species and other juices is that it changes color according to the habitat it occupies in the food plant. In particular, light brown sap is fed on perennial twigs, while dark green sap is found on annual shoots. In the first half of June, it was observed that swarms of lizards were composed of wingless live births and their vinegars.

5. *Cinara pseudosabinae* (Nevsky, 1929)

Narrow (narrow) oligophage. The saplings *Juniperus pseudosabina*, *J. polycarpus*, *J. semiglobosa* and *J. Seravchanica* live in cracks and young branches of the bark of spruce and form large colonies. MN Narzikulov this species *Cupressobium Vorn.* expressed in the form of the seed *Cupressobium pseudosabinae* (Nevs.) [10]. The description of the species has not been fully studied. Biology has not been studied.

Distribution. The tour spread northward along with the spruces. It is spread from the Zarafshan mountain range to the Korjon Mountain and Jaboglitag mountain ranges in Kazakhstan. In Uzbekistan, it is found in Shahimardon (Fergana) and around Samarkand (Urgut, Takhta Qala). In Tajikistan, it is found in spruce in the Kusavli-Soy region.

6. *Cinara pinicola* Kalt.

Narrow (narrow) oligophage. The Frankish spruce lives at the base of its body and on thick branches. MN Narzikulov noted that this species is found in the young representatives of the Tianshan spruce and other conifers in Tajikistan [10]. It was first encountered in the Fergana Valley.

Distribution. Central Asia: Chatkal Range, Kazakhstan, Western Europe.

7. *Cupressobium mediterraneum* Narz.

The saplings live in the horns and bodies of *Biota orientalis*, *Thuja occidentalis*, sometimes forming large colonies. In the branches, sap colonies are found in a single line. Juices accumulate near the bark or root of the tree. In this case, the sap accumulates in cracks, cuts and crusts [11].

Distribution: this species is distributed in Tashkent, Fergana, Bukhara.

### **Hemiptera: Diaspididae**

*Carulaspis* Mas Gillivray, 1921

8. *Carulaspis minima* (Targioni - Tozzetti, 1868)

The shield feeds on the leaves and fruits of the camel plant and causes damage. One of the most common species. The yellowish-brown, 1.8 mm-sized insect feeds firmly on the leaves and fruits of the plant. The adult female lays her wintering eggs on the trunk of the tree. From them emerge motile nymphs, which move to the parts of the plant where feeding is convenient. After the first weeding, the plant settles firmly and continues to feed. When they mate, the males die.

Distribution. Western Europe, Caucasus, Crimea, Ukraine, Azerbaijan. It was first recorded in the Andijan region of the Fergana Valley.

9. *Carulaspis visci* (Schrank, 1781)

Lives in cypress and camel plant. The host of this species lives in a plant that produces galls. Physiological changes occur in the affected plant. Its biology has not been fully studied. It was first recorded in the Fergana Valley.

Distribution. Central Asia, Western Europe, Azerbaijan, North America [9].

The lifestyle of insects living in open-seeded plants is drastically different from that of other groups of aphids. They feed on the trunks, branches and twigs of trees and shrubs, forming very large colonies, especially in the second half of summer and autumn.

According to I.Zokirov's research in 2005-2009, lyakhnina sap belongs to the family of plants of pine (Pinaceae), Cupressaceae, Salicaceae, Moraceae and Rosaceae plants in Uzbekistan. ]

In general, in the process of formation of the Central Asian entomofauna, many years of historical development and various environmental impacts on the region have played an important role. In addition, in recent years, many species of ornamental open-seeded trees and shrubs have been brought to the region from abroad for the construction of gardens and alleys. As a result, certain types of open-seeded plant sap and shield came into the Fergana Valley.

The food spectrum of this group of insects is not wide, they live in plants of one or two species. Therefore, polyphages are not found in them.

It can also be seen that the food spectrum of another group of insects is relatively diverse and in some cases expanding. For example, in the nutrient spectrum of *Cinara tujafilina* juice, plant diversity can be observed.

Sucking insects in open-seeded trees and shrubs can be divided into the following ecological ranks in terms of the degree of binding to food plants:

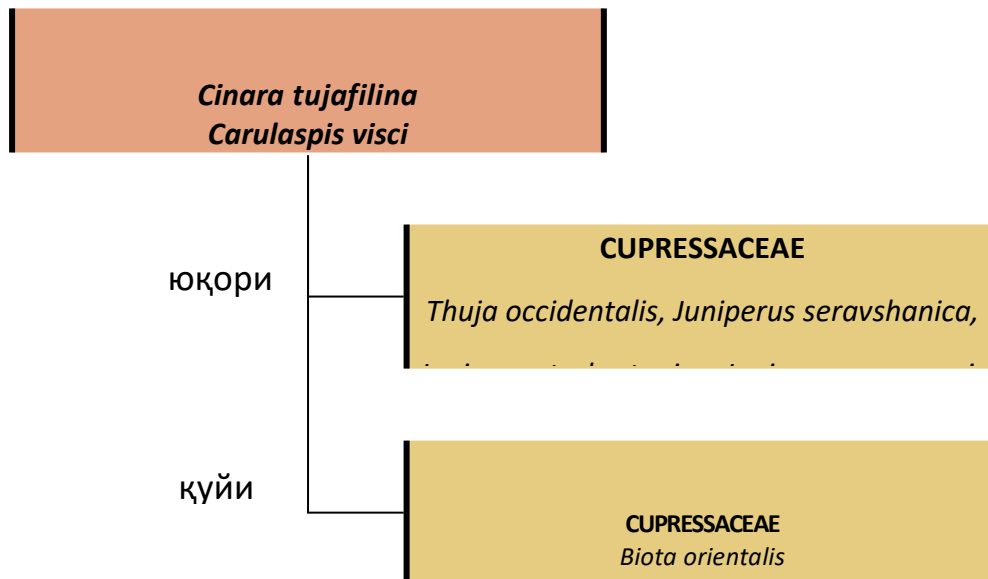
- species with a single-stage food spectrum (*Cinara picea*, *Eulachnus alticola*, *E. tauricus*, *Carulaspis minima*, *C. visci*);
- species with a two-step food spectrum (*Cinara tujafilina*);

Insects with a single-stage food spectrum live in one or more species of plants belonging to the same family. For example, for *Cinara piceae* juice, two species of pines, *Picea koraiensis* and *Picea schrenkiana*, have equal ecological value. The *Cinara piceae* colonies in them occupy a place of almost the same size and are stable (Scheme 1, a, b, c).

Scheme 1. One-step ecological rows of forage plants

***Cinara tujafilina* (del Guerc.)** Sap mainly lives in the species *Thuja occidentalis*, *Juniperus seravshanica*, *J.turkestanica*, *J.communis*, representatives of the family Pine. These plants occupy the top rung of its food chain. In some years, this species can also feed on aphids (*Biota orientalis*). The same situation is not always reversible, so the biota forms the lower rung of the same type of food chain (Scheme 2).

**Scheme 2. Two-tiered ecological rows of forage plants**



Based on the above, it should be noted that the expansion of the food spectrum coverage of these species plays a certain role in the stability of their population density [1, 16, 18].

Because in recent years, a sharp increase in the population density of insects on trees and shrubs due to weather temperatures has a serious negative impact on its vegetation. In particular, the approximate results obtained on seasonal changes in the quantitative densities of insects were correlated with Fisher's Z method. *Cinara tujafilina* ( $n = 166.0$ ;  $r = 0.6659$ ;  $Sr = 0.043$ ;  $Z = 10.3565$ ,  $R = 0.001$ ), *Eulachnus alticola* ( $n = 105.1$ ;  $r = 0$ ), which had an increase in quantitative density during the season. , 24;  $Sr = 0.095$ ;  $Z = 2.4745$ ,  $R = 0.05$ ) The approximation results of seasonal changes in the quantitative density of sap proved to be reliable according to the correlation analysis. However, changes in the quantitative density of *Cinara piceae* juice were not within the reliability limit ( $n = 48.5$ ;  $r = 0.1366$ ;  $Sr = 0.142$  and  $Z = 0.9518$ ) (Table 1).

**Table 1. Annual correlation analysis of the density of sap (species with a single increase in the density of sap)**

Кўрсаткичлар	<i>Cinara piceae</i>	<i>Cinara tujafilina</i>	<i>Eulachnus alticola</i>
<b>n</b>	48,5	166,0	105,1
<b>r</b>	0,1366	0,6659	0,2400
<b>S<sub>r</sub></b>	0,142	0,043	0,095
<b>Z</b>	0,9518	10,3565	2,4745
<b>P</b>	-	0,001	0,05

Both elevations of *Eulachnus tauricus* juice, which had two increases in volume density, were found to have reliable approximation results.

The seasonal values of *Cinara piceae* juice do not follow the rules of correlation analysis due to the fact that the number of individuals in the colony at the same time is very low (n1 = 48.1; n2 = 37.1).

**Table 2. Annual correlation analysis of sap density (species with two increases in quantity density)**

Кўрсаткичлар	<i>Eulachnus tauricus</i>	
	1-кўтарилиш	2-кўтарилиш
<b>n</b>	59,4	66,5
<b>r</b>	0,6466	-0,3111
<b>S<sub>r</sub></b>	0,099	0,110
<b>Z</b>	5,8125	2,5584
<b>P</b>	0,01	0,05

It should be noted that in the conditions of the Fergana Valley, sucking phytophagous plants of open-seeded plants were not recorded in as many species as in the territories of neighboring countries. This can be justified by the fact that in our conditions no special research in this area has been conducted.

## CONCLUSION

As a result of faunistic research in the Fergana Valley, it was found that 7 species of sap and 2 species of shield were found in open-seeded trees and shrubs. Of these, *Cinara pinicola* Kalt., *Carulaspis visci* (Schrank, 1781) and *Carulaspis minima* (Targioni – Tozzetti, 1868) were first recorded in the Fergana Valley.

Species with a single-stage food spectrum (*Cinara picea*, *Eulachnus alticola*, *E.tauricus*, *Carulaspis minima*, *C.visci*), in terms of the degree of binding of sucking insects to food plants, are species with a

two-step food spectrum (*Cinara tujafilina*). The expansion of insect feeding spectrum coverage will play a role in the stability of their population densities.

The study of the biology and ecological properties of all species of algae and thyroids is underway. In particular, special studies on the entomophagous of the thyroid have been conducted and preliminary results have been obtained [4, 5, 19].

Changes in the quantitative densities of *cinara tujafilina*, *Eulachnus alticola*, *E. tauricus* sap were also confirmed when analyzed by Fisher's "Z" method.

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