

Harm of *Planococcus ficus* in the Vineyards of Armavir Region

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Abstract – In the vineyards of the Armavir region, *Planococcus ficus* is one of the main pests of grapes, which in recent years has been a serious obstacle for farmers engaged in viticulture. For this purpose, during 2020-2021, in the vineyards of Armavir region. Infection and harmfulness of different grape varieties with *Planococcus ficus* were studied, which was rated on a 5-point scale. All the studied varieties were populated with *Planococcus ficus* to varying degrees, but the table grape varieties were the most populated. Anatomical incisions were made in healthy leaves and the leaves damaged by *Planococcus ficus*, as a result of which thickening of the spongy parenchyma, structural disorder of palisade parenchyma, death and cell destruction were observed in the injured leaves.

Keywords – Grapes, *Planococcus Ficus*, Harm, Variety, Study.

I. INTRODUCTION

The *Planococcus ficus* was first discovered in Armenia in 1936. In the Meghri region, on a fig tree. Until 1961 the *Planococcus ficus* was considered a quarantine pest. 1961 it was spotted in Yerevan on grape trees [2].

In the republic, the damage of the *Planococcus ficus* was of focal nature, it damages mulberry, fig, pomegranate, apricot, to a greater extent- grapes, from the ornamental tree species to Eastern *Platanus* oriental is [1, 2, 3].

In winter immature females and adult larvae mainly stay under the bark in the lower part of the nest, in the cracks of the bark and in other protected places [4, 5, 8].

In Armenia during the winter period, it is in the stage of an adult larva and an immature female and is located in the cracks of tree trunks, bark, branches, under half-torn bark on a vine [2, 7, 8].

Planococcus ficus is very sensitive to winter colds, so the development of the first generation is weak and the damage is negligible.

Optimal living conditions are +22 +25 °C and 45-75% relative humidity. Cool, rainy springs and hot summers inhibit the development of the pest.

Rainy cold spring and hot summer is an obstacle for the development of the pest. Mass extinction of larvae is observed in winter at temperatures below -15 °C [4, 5].

Planococcus ficus cause direct and indirect damage. Numerous colonies at the base of the clusters are formed after the larvae hatch. It is a sucking insect whose nymphs and female feed on plant sap, slowing down plant growth, causing leaf deformation, and yellowing or reddening of leaves. There is a decrease in photosynthesis, consequently the quantity and quality of the crop decreases, the flowers and the fruits of the clusters often fall off.

As a result of biological activity of the *Planococcus ficus* and due to the decrease in photosynthesis the plant also creates fewer flowers and fruits [5, 8].

Infection of shrub with *Planococcus ficus* weakens the plant and makes it susceptible to other phytopathogens (fungal diseases, other pests).

It is now proven that *Planococcus ficus* is a carrier of viruses, particularly in GLRaV-3 leaf curl [11].

II. MATERIALS AND METHODS

The studies were conducted in the vineyards of Armavir region in 2020-2021. In the vineyards, through routine surveys, observations and records were made, samples were constantly taken according to the methods accepted in entomology [9, 10]. During the study, the *Planococcus ficus* was collected from the vine at the time of spawning. We put *Planococcus ficus* in 70% alcohol. We collected the *Planococcus ficus* egg sacs in a dry state together with other parts of the plant, and placed them in small cardboard boxes of different sizes on a layer of cotton. We took stripes from the vines, like thin branches. All identified species (at different stages of development) were transferred to a laboratory, where laboratory analysis of the collected samples was performed according to the methodology adopted in entomology.

To determine the population of *Planococcus ficus* grape vines and its harmfulness, the trees were viewed from all geographical points and evaluated on a 5-point scale [6].

0 points - healthy plants.

1 point - very poorly populated (damaged) plants (up to 5%), special individuals are found on the tree, it is difficult to notice.

2 points - poorly populated (damaged) plants (5.1-25%), *Planococcus ficus* are found in small colonies, easy to notice.

3 points - moderately inhabited (damaged) plants (25.1-50%), *Planococcus ficus* colonies have covered 1/3 of the trees

4 points - heavily populated (damaged) plants (50.1% and more), *Planococcus ficus* colonies have covered 2/3 of the trees, the leaves are falling, the branches are drying out.

The density of *Planococcus ficus* is determined by the following formula: $D = \frac{P \times 100}{W}$, where

D - is the density of the pest on the plant,

P - is the number of plants infected with the *Planococcus ficus*.

W - is the total number of Weak trees.

After determining the damage of each plant, the average population (damage) size of all examined plants (damaged and undamaged) was determined by the following formula: $P = \frac{\sum abc \times 100}{N \times 4}$, where.

P - is the average population density (damage) of plants;

$\sum abc$ - is the sum of points,

N - is the total number of registered plants,

4 - is the highest score.

III. RESULTS AND DISCUSSION

In the conditions of Armavir region, we have studied the lifestyle and damage of the grape *Planococcus ficus* on different types of grapes.

To determine the population and degree of population of different types of grapes, both table and technical grape varieties aged 8-10 years were tested during the vegetation period, the results of which are presented in Table 1.

Table 1. Population of different grape types with *Planococcus ficus*.

	Types	Population %	Population Degree, %
Table	Shahumyan	34,8	51,7
	Itsptuk	48,9	68,8
	Yeleow of Yerevan	50,1	72,4
Technical	Kangun	22,8	38,7
	Garan dmak	31,6	47,3
	Rqatsiteli	24,2	39,9

According to our observations (Table 1), all the studied types of grape were populated with *Planococcus ficus* to varying degrees, but the table grape types were more populated. Thus, the most populated of the table types were the Yellow of Yerevan and Itsaptuk, which had a population of 50.1 and 48.9%, respectively, and a population degree of 72.4 and 68.8%. The technical types were the least populated with *Planococcus ficus*, with a population of 22.8-31.6% and a population degree of 39.9-47.3%.

Females and larvae of the *Planococcus ficus* actively move during feeding process, constantly changing their feeding place. Young females become very mobile before spawning, and even during light mechanical intervention, they easily fall off the vine.

Due to the waxy flour coating of the body, *Planococcus ficus* can stay in the water for a long time, spread due to the flow of water, appearing on new plants and cause new outbreaks of infection (Photo 1).



Photo 1. *Planococcus ficus* damage (pictures taken by the authors).

Planococcus ficus has a piercing-sucking mouth apparatus, while eating it inserts a piercing brush (trunk) into the plant tissues, fills it with saliva and then sucks the plant juice. Under the influence of salivary enzymes, structural disorders and changes in their biochemical properties occur in plant tissues.

We have conducted research on the anatomical changes that occur as a result of pest feeding, for which the object of study was the anatomical cuts of leaves of both healthy grapes and grapes damaged by *Planococcus ficus* (Photo 2). Under the microscope, the thickness of the leaf blade, the upper and inner epidermis, and the thickness of the palisade and spongy parenchyma were determined. The results of the study are presented in Table 2.



Photo 2. Anatomical cuts of the grape leaf (from left: the necrosis of damaged leaf cells and tissues, right: healthy leaf) (pictures taken by the authors).

Table 2. Anatomical changes of leaves damaged by *Planococcus ficus* (Table compiled by the authors).

Types	Leaf Blade	Upper Epidermis	Palisade Parenchyma	Spongy Parenchyma	Inner Epidermis
Leaves of Healthy trees	168.63 ± 0.29	28.87 ± 0.09	70.56 ± 0.29	49.66 ± 0.17	18.58 ± 0.16
Leaves damaged by pests	166.95 ± 0.38	28.77 ± 0.23	59.12 ± 0.17	62.27 ± 0.24	18.69 ± 0.12

As can be seen from the data in the table, the diet of *Planococcus ficus* causes structural changes in the leaf blade tissues. Microscopic examination showed that spongy parenchymal cells were not destroyed and the tissues have become slightly thicker.

However, the thickness of palisade parenchyma has sharply decreased, grooves have been formed in the pest feeding area, the cells have broken down and died. As females and larvae of *Planococcus ficus* move actively during feeding, then injuries to palisade parenchyma are very common.

Young females and caterpillars produce abundant sticky excrement during feeding, which cover the leaves, fruits and branches. Saprophytic fungi grow on this wax.

IV. CONCLUSION

1. *Planococcus ficus* is one of the main pests of Armavir region. All the studied grape types were populated to varying degrees, but the table grape types were the most populated. Thus, the Yellow Yerevan variety was the most populated of the table varieties - 50.1%, and the Garan Dmak type was the most populated of the technical varieties - 31.6%.

2. During the feeding of *Planococcus ficus*, thickness of spongy parenchyma is observed in the leaves of the grapes, as well as constructional destruction, death and cell breakdown of palisade parenchyma is noticed, as a result of which chlorosis, drying and premature leaf drop occur, which leads to a 30% reduction in leaf mass.
3. *Planococcus ficus* produces abundant sticky excrement during feeding, which covers the leaves, fruits and branches. Saprophytic fungi grow on this wax.

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