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PHENOLOGY OF THE BLACK BEAN APHID (*Aphis fabae* Scopoli)

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ФЕНОЛОГИЯ СВЕКЛОВИЧНОЙ ЛИСТОВОЙ ТЛИ (*Aphis fabae* Scopoli)

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Abstract. Black bean aphid (*Aphis fabae* Scopoli), which are dangerous pests of beet, were studied in 2015-2021 in the farms and surrounding bio and agrocoenosis of the Mil-Mugan economic region of Azerbaijan. As a result of the conducted studies, it was found that *Aphis fabae* gives up to 15 generations in this region. 10-12 of them have increased in beetroot agrocoenosis and are reproducing, so in the result, farms are seriously damaged. At the same time, it was determined that if population density and the physiological state of the plant play the main role in the formation of different morphs of this pest in the spring and summer generations, low temperature and short photoperiod are the main factors in the formation of autumn morphs.

Аннотация. Фенология свекловичной листовой тли (*Aphis fabae* Scopoli), являющиеся опасным вредителям сахарной свеклы, изучались в 2015–2021 годах в фермерских хозяйствах и окружающих био- и агроценозах Миль-Муганского экономического района Азербайджана. В результате проведенных исследований установлено, что *Aphis fabae* в этом регионе дает до 15 поколений. 10–12 из них размножаются в агроценозах сахарной свеклы и, в результате чего хозяйства серьезно пострадает. В то же время установлено, что если основную роль в формировании разных морф этого вредителя в весенне-летних генерациях играют плотность популяции и физиологическое состояние растения, то основными факторами в образовании полоносок и самцов осенью являются низкая температура и короткий фотопериод.

Keywords: black bean aphid, phenology, density, polymorph, plant pests.

Ключевые слова: свекловичная листовая тля, фенология, плотность, полиморфизм, вредители растений.

Introduction

A beetroot is an invaluable raw material for buying sugar, which is considered to be one of the most valuable foodstuffs in the first place. When processing the products of the plant, additional products are obtained, which are of great harm to animal husbandry.

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The fact that the leaves of sugar beet are thin and juicy, and the root and fruit are extremely nutritious, makes them very willing to be infected and eaten by pests, which leads to a decrease in productivity.

Information about the pests of beetroot can be found in the works of scientists and experts of all countries where it is planted and cultivated. The studies of E.V.Zverozomb-Zubovski in this area are special. He studied in detail the fauna of insects that damage sugar beet in Ukraine, prepared a list of species, and developed methods of combating dangerous species [1].

A. A. Migulin and G. E. Osmolovskiy noted that during the entire vegetation of the sugar beet, 300 species were damaged by pests [2].

Subsequently, S. M. Pospelov, N. G. Berim, E. D. Vasilyeva and M. P. Persov indicated that in total 400 species of insects and other creatures caused damage to the sugar beet, of which about 40 species are dangerous pests. In both literature, *Aphis fabae* has been shown to be a serious pest of the plant [3].

In the researches of Turkish scientists, it is noted that 31 types of pests on sugar beet cause different degrees of damage to productivity, beet leaf extract is noted to have a special activity among them [4].

Harmful entomofauna of sugar beet plantations were studied in detail by Z. Marinova, S. Raikov, V. Arnaudov and K. Tanova in Bulgaria, and it was noted that 14 species of pests belonging to 6 families per plant, including Aphis fabae, caused considerable damage [5].

V. P. Fedorenko studied the bioecological properties of insects prevalent in sugar beet fields in Ukraine, as well as adaptation of Aphis fabae to new trophic conditions, and noted that it is a dangerous pest [6].

V. T. Sabluk, V. A. Doronin, and O. N. Grishchenko have in recent times provided detailed information about insect groups that cause damage to the sprouts of sugar beets in Ukraine, and pointed out that leaf beetle is a serious pest [7].

More than 150 pests damage sugar beet in varying degrees in California, noted by W. Harrey [8].

Apparently, there is a lot of literature on the study of beet leaf beetle and its serious pest of the plant. Extensive research on the study of the entomofauna of sugar beets in our republic was carried out by S. Gazi and noted that 48 species of wheat belonging to 5 sets, 15 families and 42 genders in agrocenosis caused various degree of productivity damage [9].

It should be noted that the ecological regulation of the polymorphism of leaf beetle, photothermic reactions, etc. properties were investigated for the first time in Azerbaijan by our perspective [10].

Material & Methods

Phenology of the leaf beetle and dynamics of different morphs from dangerous pests of sugar beets were carried out in farms of Imishli region and bio and agroenoses located around it.

Observations on beetles were conducted regularly from the beginning of spring (March) to the end of autumn (October-November). The migration of pests from wintering plants to beetles, their development in later years, and their transition to the wintering plants , has been determined through observations. Glass jars have been used to observe the development of wintering eggs. So, 3-5 cm thick sand is poured over the container, and ordinary papers with needle holes or a gauze is covered. A small piece of trees with eggs on them are cut from plants (mostly ranches and invitations) and pushed into the sand in the bowl. A glass bowl is placed at room temperature for the larvae to quickly exit the eggs. After the larvae have fully hatched, hatching or percent of

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mortality is calculated. Observations were made every 3-5 days. How many percent of larvae are emitted from eggs during observations:

-amount with percent of those who developed;

-the number of generations given on the first plant;

-periods of formation of winged species;

-periods of mass migration from the first plant;

-the developmental dynamics of beetles and the state of entomophagy in the first plant were contemplated through visual observations and experiments.

Observations in the beetle field were mainly carried out after the first sprouts formed from April and continued until the end of August.

As a result of observations. The first settlement of bettles, specially winged ones , on outside plants of fields:

-moving from edge plants to midlands;

-infection of plants by beetles;

-the sight of parasites and predators in the fields;

-the rate of infection of beetles with entomophages;

-studing on the reduction of beetles in these areas and the remigration to other plants (to winterize) have been determined their duration and rates.

Results & Discussion

Our research has shown that Aphis fabae Scop. eggs are overwintered around the agrocenoses with overgrown spindle and camelthorn plants. After wintering, the appearance of larvae (fundatrix) from the first eggs on plants where they winter is observed in early spring (mainly in the second 10 days of March) when the air temperature is higher than 7-8°C.

These larvae are referred to as fundatrix-y species, giving them a starting point for future generations. Fundatrix largely emerge from the egg in the opening stages of shoots in plants or in the developmental phases of young sprout. These phases usually occur in the second half of March and early April. Hatched larvae develop by feeding on the plant for 10-12 days. In the first 10 days of April, larvae develop rapidly when the air temperature is above 12-13˚ C, and they give 2-3 generations on plants that they winter until early May. Members of the latter generation consist almost entirely of winged species. Winged species migrate to beetle fields along with other plants around them (goosefoots, saltbushes, thistles, spinach, salsola, burdock, carrots, parsley and etc.) in late April and early May. This is actually the first verse of the beetles. Thanks to these species, insects move to other plants in agrocenosis, feed there, and make conditions for the emergence of other phases (sex transmitters, normal females and males, etc.).

During our observations in the beetle agrocenosis in Imishli region, it was determined that winged parthenogenetic species migrated to beetle plants on the first ten days of May (3-5 May). In agrocenosis, winged individuals of the pest are found in the second half of May (15-25 May). It should also be noted that to there is a difference of 2-3 days between these dates. Probably, these differences also have an effect on the planting time, precipitation, temperature differences, and also the amount of entomophages where the pest resides. By the end of the second ten days of May, winged species observed in agrocenosis massively multiply rapidly, spreading to different parts of the field. Infection of plants during this period is sometimes above 55-60%.

In late May and June, peculiar polymorphs begin to form when there is a population density of plants and winged migrations occur. The development of the pest on the beetle plant mainly lasts until the third of July, during which time it produces 10-12 parthenogenetic offspring. Due to

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roughing of the leaves of the beetle plant and low nutrient quality, the winged species that occur in the population pass into the weeds in the vicinity (cress, vinegar, bull thistle, etc.).

Individuals who feed on weeds give a few partogenetic offspring by the end of September. At the end of September, sex-transmitting (sexupara) members are formed among species. In their formation, they act mainly as a low temperature and short photoperiod signal. They migrate to their original ownership and give birth to larvae, which can be male species. The larvae develop rapidly and reach sexual maturity. After fertilizing the female, individuals die after placing 8-12 eggs between the shoots of the plant or on the shoot armpit (Figure).

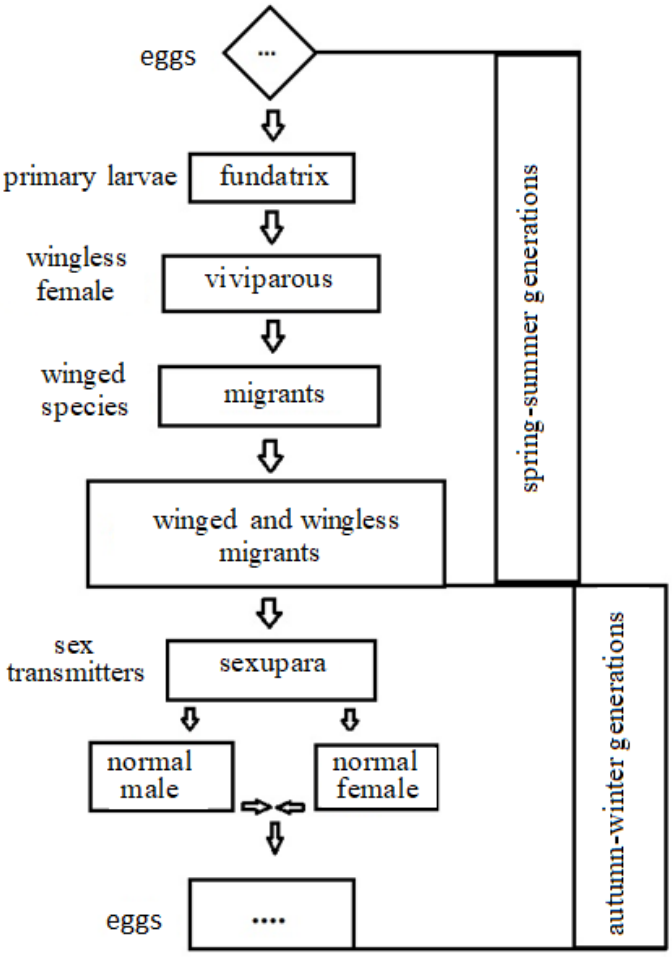

Figure. The developmental phases of *A. fabae* in nature

As a result of many years of research on the phenology and biology of leaf beetles of sugar cane (2015-2021), it was found that this environment produces up to 15 generations of sugar beets planted in the areas of Mil-Mugan economic district of the Republic. 10-12 of them have increased in beetle agrocenoses and are reproducing, so in the result, farms are seriously damaged.

The development, multiplication, productivity of beetles and formation of various morphs in the population are closely related to the temperature, humidity, nutrient quality, and of course the length of the day in the area.

The average development time of larvae during the vegetation period ranges from 6 to 10 days. Depending on the temperature in different months, these numbers range from 4-6 and 13-15 days.

The birth process of female members can last 4-17 days. An species' maternal fertility can range from 3 to 12 larvae per day. Depending on the conditions, one female species can give from 4

to 115 cubs during the breeding season.

The average daily temperature in agrocenosis has a negative effect on the reproduction and development of beetles when they are above 25˚ C (27-30˚ C). Thus, the increase of this indicator above 27˚C causes a dramatic shortening of the life expectancy of the larvae and a decrease in the breeding potential of the larvae.

The results of the study showed that if the population density and the physiological state of the plant play a main role in the formation of different morphs in the spring and summer generations, then low temperature and short photoperiod as a major factor in the formation of autumn morphs (breeder morphs) show their effect.

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