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Research Article

STUDYING OF EFFICIENCY OF THE MICROBIAL INSECTICIDE "HELITEC" AGAINST CHERRY SLUG (CALIROA CERASI L.) IN LABORATORY AND FIELD CONDITIONS

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ABSTRACT

The article gives information about the results of the experiments, provided to identify efficiency of the insecticide "HELITEC" to control larvae's of cherry slug (Caliroa cerasi L.) in laboratory and field conditions. During the experiments, it has recorded 98-100 % efficacy within 3 days at the laboratory, but at the field condition index changed to 80,1-85,0 percent at the seventh day in consumption rate 0,4-0,5 l/ha for each experiment.

KEYWORDS

Cherry slug (Caliroa cerasi L.), larvae, ordo, imago, consumption rate, microbial insecticide, Helitec, baculovirus, biological efficiency.

INTRODUCTION

In terms of cherry fruit production and export to the global market, Uzbekistan currently holds a unique position in horticulture. Uzbekistan is one of the top 10 cherry-growing countries in the world, among the 65 largest. In our country, there are 20,900 hectares of cherry orchards, with an average production of 13,2

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tonnes per hectare. All types of farms in the republic are expected to generate 183,000 tonnes of cherry goods this year, of which farmers and agricultural companies will produce 82,200 tonnes. [Information provided by the Ministry of Agriculture of the Republic of Uzbekistan's information service].

One of the biggest challenges facing today's exporters is increasing the marketability and productivity of cherry fruit and developing it in accordance with global needs. In this situation, the creation of ecological natural goods must receive special attention, and widespread usage of microbiological insecticides to pest and disease control must be implemented.

It is known that more than 10 insect pests would attack cherry orchards during the season. Cherry slug (Caliroa cerasi L.) is one of the significant harmful species among them. Due to its damage, the productivity falls, the fruit's quality declines, and the trees eventually perish (Fig. 1).

Cherry slug (Caliroa cerasi L.) belongs to the family Tenthredinidae of the ordo Hymenoptera [1,2,5,8,9,11,12]. The pest widespread in Europe, Asia, China, Japan, South and North America, South and North Africa, New Zealand.

Adult pest glossy black, 4-6 mm long, the fake pupa in a cocoon overwinters in the soil. It turns into a dome in the spring. Adults fly in late spring depending on local temperatures. They often reproduce by partonogenesis. Females lay 50-75 eggs, one by one, under the leaves. Eggs develop in 8-14 days. The larva feeds on leaves for 17-28 days and turns into a pupa in the soil [2,5,9,12]. During the monitoring, in 2019-2021, it was recorded 3 generations a year in the conditions of the Fergana Valley.

The pest attacks a variety of plants, including cherry, plum, rowan, quince, pear, and hawthorn. The larva eats by nibbling on epidermis of the leaf's top side (Fig. 2). It does not touch the bark on the underside, that is, it pierces one side of the leaf. Cherry slug is a moisture-loving pest. If the air humidity drops below 30-40%, the mass death of its young larvae can observed [2,5,9,12].

According to Beers, [7] Cherry slug gives two generations a year, and larvae of the second generation damage young trees even more lethal than the first generation. The optimal temperature for this pest is between 5 and 300 by celsius [8].

The experiment was provided at the horticulture farmland named "Hoji Abdulxai" of the Paxtaobod district and at residential gardens of the Izbosgan district of the Andijan region in 2019-2021.

During our observations, it was found that the Cherry slug - Saliroa cerasi L., belonging to the family of Hymenoptera, causes serious damage in cherry orchards. The first hatched larvae of the pest appeared in our experimental field on May 1-3. their mass damage coincided with the period of late ripening of cherry fruits. This caused inconvenience to cherry farms due to the delay in chemical treatment of orchards. As a result, 20-30% of the branches of the older trees died, and 60-80% of the young seedlings were damaged (fig.1.).

Such problems in cherry orchards have attracted the attention of world scientists. In particular, a number of scientists from Turkey, Australia, New Zealand, and Washington carried out a number of works on testing microbiological preparations. In Australia biological control of cherry slug, using natural enemies such as Beauveria bassiana and Blastocrithidia caliroa led to dramatic reductions in their numbers. [3,4].

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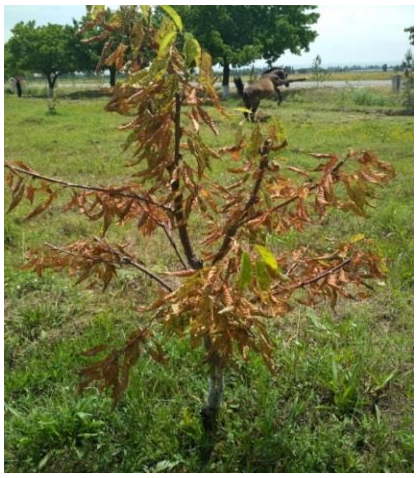


1-pacм. Cherry slug (Caliroa cerasi L.) damage in horticultural farm "Khoji Abdulkhai", Pakhtaabad district, Andijan region. Foto by Z.B. Kholmirzaeva 05/19/2020.

In addition, Lathrolestes luteolator caused 90% larval mortality in the first generation of Cherry slug, but failed to control larvae in the second generation. [11].

In our scientific research, we studied the biological effectiveness of the Helitec (c.s.) microbiological biopreparation produced by Kenya Biologics Ltd. In the laboratory and field conditions.

Helites (c.s.) is a preparation containing 5x1012 polyhedrosis (NPV) in one liter of solution, a virus belonging to the polyhedrosis subclass of the baculovirus family.

Representatives of the subgroup of polyhedrosis are especially numerous. According to the list compiled by V.V. Guliy et al., (1982), in the territories of the former Soviet Union, viruses of this subgroup were recorded in more than 109 species of insects belonging to three orders and 24 families, including 99 species of Lepidoptera (19 families), 7 species of Hymenoptera (4 families), 3 types of dipterans (2 families) have been studied [13,14].

Polyhedrosis viruses develop in the hypodermis in fat cells, hemolymph, and in arracks in the epithelia of the middle intestine. Insects are mainly infected in the larval stages.

Symptoms of the disease in larvae are as follows. At first, the abdominal joints of false worms turn a milky color, a milky white liquid flows from the mouth, and a dark brown drop comes out of the anus. Later, the false worms attach to the leaf plate by secreting a sticky substance and die from the virus in 24-48 hours. [13].

Symptoms of NPV infection include: discoloration (brown and yellow), stress, decomposition (dilution), slow movement, generally expressed by the refusal of the insect to eat [13,14,15].

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MATERIALS AND METHODS

We conducted the research in laboratory conditions together with the scientists of the Research Institute of Plant Protection. "Methodological guidelines for testing biological preparations for protecting plants from pests, diseases and weeds" (1973) were used for laboratory experiments. In determining the biological effectiveness of microbiological preparations, Sh.T. Khojaev's "Basic conditions for testing insecticides against pests and diseases of agricultural crops in small and large field experiments / Collection of methodological instructions for testing insecticides, acaricides, biologically active substances and fungicides", II edition (2004) methodological instructions were used.

The experiment was conducted in 4 repetitions of 3 options. To conduct the experiment, a 35x15x15 plastic container was taken, and 5 cm of experimental garden soil was placed at the bottom of the container(fig. 2.).

Figure 2. 35x15x15 size plastic containers adapted for feeding the cherry slug in laboratory conditions (by Z.B. Kholmirzaeva 3.06.2020.).

Band of leaves treated with 0.4 and 0.5 l/ha of Helitec biopreparation on freshly cut cherry leaves was wrapped with wet cotton and laid on the soil. The control variant was treated with water. Then, 10 larvae of the same age of cherry slug collected from cherry orchards were placed on the leaves. Wet cotton was taped to the walls of the container to maintain the humidity in the container, and it was renewed every 12 hours. The air temperature was maintained at a standard of 250C, and the relative humidity of the air was kept at 60-65%.

RESULTS AND DISCUSSION

After the experiment, count observations were made every 24 hours.

It was observed that the insects in our experiment completely stopped feeding and moving after 24 hours, and 20% of them died.

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After 72 hours, the color of the larvae of the cherry slug turned yellowish brown and the biological efficiency was 80.0%, and in 5 days, 100% of the larvae died and their color turned dark, that is, the signs of death due to viruses were clearly visible. (fig.3.).

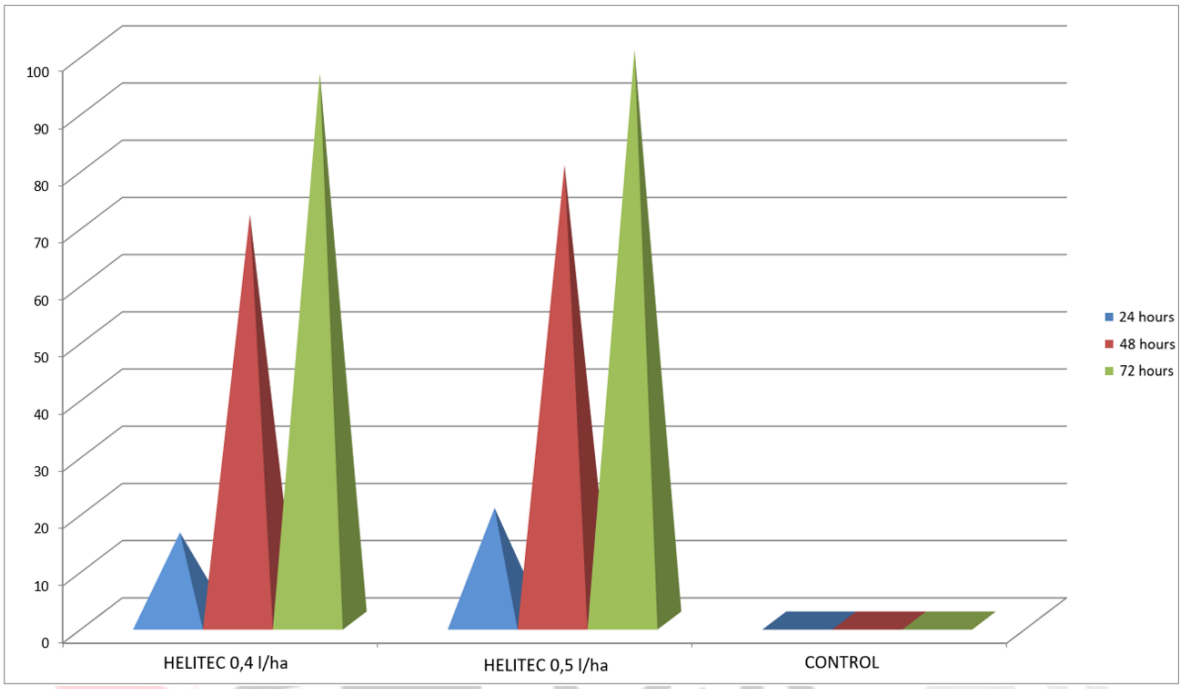

Figure 3. Biological efficiency of Helitec

In the control variant, when treated with normal water, it was noted that the larvae of the cherry slug were feeding on cherry leaves and they were actively moving (fig 4.).

Figure 4. Experiment: larvae of cherry slug infested with Helitec 0.5 l/ha (by Z.B. Kholmirzaeva 05.05.2020).

Experiment: larvae of cherry slug infested with Helitec 0.4 l/ha (by Z.B. Kholmirzaeva 05.05.2020).

Experiment: larvae of cherry slug infested with water (by Z.B. Kholmirzaeva 05.05.2020).

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Observing that the above-mentioned signs correspond exactly to the cases of death caused by the virus, it was concluded that the larvae died due to virus damage. In the control option, i.e., when treated with normal water, the larvae of the cherry slug fed on cherry leaves and they were actively moving (Fig. 4).

Due to the fact that the microbiological preparation Helitec has achieved high efficiency against cherry slug in laboratory conditions, on May 1, 2021 and 2022, it was tested on the "Volovaya serdtsa" variety of cherry in small field experiments in horticultural farms and household farms in Andijan, Fergana, Namangan regions. Experiments conducted in 3 option, consisted of 4 returns and was processed using a "Samara 999"-motorized hand sprayer.

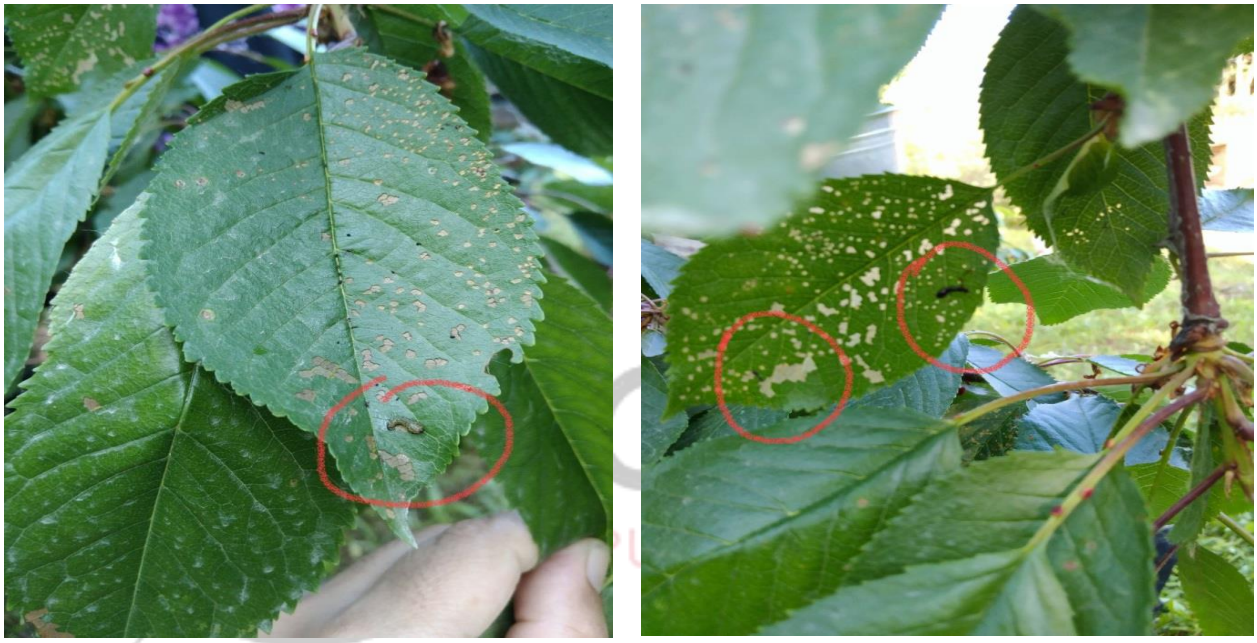

Figure 5a. Larva of the cherry slug, which died under the influence of a microbiological preparation Figure b. larvae of the cherry slug, which died under the influence of a chemical preparation

In the field experiment, when observations were made 24 hours after the application of the microbiological preparation, as in our experiment in the laboratory, the larvae of the cherry slug almost did not differ from healthy ones and stopped feeding, and the biological efficiency of the preparation was on average 13.6-15.9% in field conditions in Andijan region, 11.1 in Namangan region. It was observed that it was -13.5%, and in Fergana region it was 13.3-16.3%.

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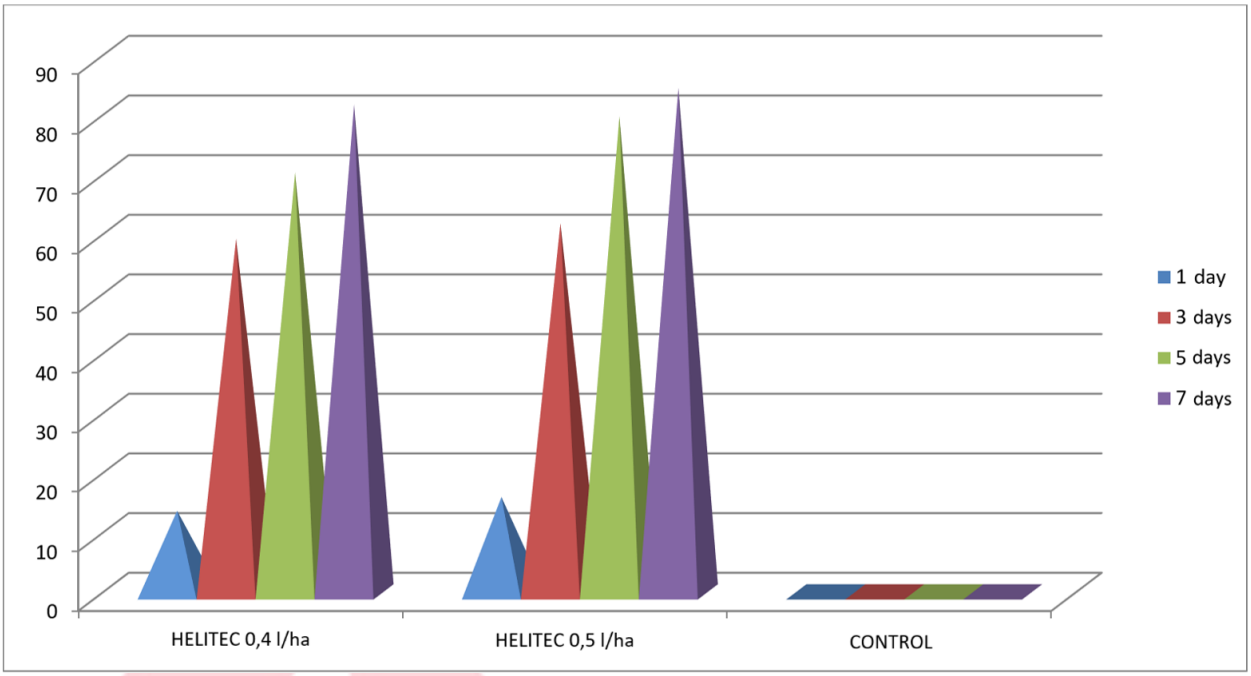

Figure 6. Biological effectiveness of Helitec microbiological preparation in field conditions, Andijan region

On the 3rd day after the use of the drug, when observations were made, symptoms of yellowing and swelling were observed in the larvae of the cherry slug, and the larvae turned upside down on the leaf plate, and the biological efficiency of the drug was 59.2-61.8% in field conditions in Andijan region, 54.9- 61.9%, and in Fergana region was 69.7-80.4% (fig 6.).

On the 7th day of the experiment, the larvae of the cherry slug turned dark, and the biological efficiency of the drug was 81.7-84.5% in Andijan region, 80.1-83.7% in Namangan region, and 81.4-85% in Fergana region. It was observed that it was 0% (Fig. 6). The conclusion is that we used the microbiological preparation in the first decade of May, during which the average air temperature was 20-250C and the relative humidity was 50-60%. Since this period is a favorable period for the use of microbiological preparations, the biological efficiency in field conditions is on average 80.1 It was 85.0%. According to the results of the experiment, it is recommended to use this biopreparation against cherry slug in order to obtain an ecologically safe product in the future.

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