

THE EFFECTIVENESS OF ADMIRAL 10 EC AS AN INSECTICIDE TO CONTROL THE PEST OF *GRAPHOLITHA MOLESTA* BUSCK (*LEPIDOPTERA*, *TORTRICIDAE*)

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Abstract

The effectiveness of sterilization of males in pheromone traps in plum pest control has shown a reduction in fruit attack compared to untreated control. These indices essentially exceed the chemical standard that accounted for 69.3%. The biological effectiveness of the sterilization method was 89.8 - 91.8%. The researches proved that the oriental moth (*Grapholita molesta* Busck) in the Center area of the Republic of Moldova in 2016 the flight lasted from the II-nd decade of April to the III-rd decade of September in three generations. The use of Admiral 10EC for plum protection in the Republic of Moldova conditions contributed to preservation of natural entomofauna in the plum orchard and to the increase of the number of predators, thus favoring the quality and quantity of the harvest obtained.

Key words: sexual pheromone, *Grapholita molesta* Busck, entomophages, sterilizer, pheromone traps

Fruit tree crops are of a particular importance for Moldovan agriculture. Fruit crop share in the national economy due to the role that fruits healthy human diet in the prevention and combating of diseases. But plantations and fruit production, are affected by the work of many species of pests in some years mass multiplied by attacking all organs causing considerable damage trees. Therefore it is important for detection, determination and knowledge of pests of fruit trees to be done quickly and correctly to achieve ecologically increased production and quality, unaffected by chemical pollution, with adverse effects on nutrition.

Solving of environmental problems and obtaining qualitative and competitive agricultural production requires the development of integrated protection systems, which will activate the natural forces of resistance, reduce the resistance of harmful organisms, and decrease financial and energy expenses on crops protection.

Harmless plant protection schemes are based on the application of biological or natural chemical means (Voineac V., 2011; Bixovet A.I. et al., 2009). A direction of perspective is the application of biorational pesticides: *biochemical* (hormones, pheromones etc.) which are less toxic but still causing death by disrupting insect ontogenesis development processes and behavior between the sexes, populations, or between insects

and host plants (Pavlyushin N.E., Dolzhenko V. A. 2005); *rational* – increasing plant resistance to pest, disrupting nutritive connections (extracts and vegetable oils, plant growth promoters, natural chemical preparates with low toxicity (Castanov O.L. 2002).

After the data of the authors (Macheiev G.I., et. al., 1991; Bradovschii V.A. et al., 1992; Voineac V., 2011) have a perspective the methods of autosterilisation of pests using the pheromonal traps alone or in complex with microbiological and rational preparates.

The implementation of biorational pesticides application technologies in schemes of integrated tree crop protection is necessary for households to obtain agricultural production with high indicators of quality and competitiveness on global market. Due to the lack of pesticides residues in production, application of pesticides with minimized phytotoxic action, plant growth and resistance stimulators the quantity and quality of production increases, and by simplifying and increasing the efficiency of monitoring and forecasting it reduces the number of treatments with pesticides and their appropriate volume of application, what positively influences on cultural biodiversity.

Due to the ecological plasticity, the plum tree is cultivated on all continents on an area of over 2 million hectares. Annual world plum

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production, according to FAO data, amounts to almost 8 mln. t, and about 50.0% of this is grown and harvested in Asia and 35.0% in Europe. In the Republic of Moldova, from the total area occupied by multiannual plantations, the plum plantations represent an average amount of 9.0%. More than 50.0% of this surface is located the central zone of the republic (Istrate, R.N et. al., 2001). Considering the particular importance of plum culture for agriculture, we can affirm a great importance of our research, which allows us to approach attention on the problem of increasing the productivity and the quality indicators of fruits, as well as improving their durability during storage and the resistance to diseases and pests.

MATERIAL AND METHOD

The experiments were carried out in plum tree (4.0 hectares, "Stanley") orchards Ltd. „ Agro Ialoveni”, Ialoveni village, Central part of Moldova during the vegetation growing season 2016 according to generally accepted methods (Îndrumări metodice, 2002). The control and capture of the main pest *Grapholita molesta* (Busck, 1916), (Lepidoptera: Tortricidae) were carried out with the help of standard pheromone traps (of laminated carton in the form of prism "Delta" type), produced in the Institute of Genetics, Physiology and Plant Protection, Academy of Sciences of Moldova (IGPPP ASM).

For the testing it was selected a plum plantation of Stanley variety on a surface of 4 hectares. In the experiment were included 4 variants: variant I- the experience on which 10 traps / ha were treated with the sterilizer Admiral, variant II - the experience on which were installed 20 traps / ha treated with the sterilizer Admiral; variant III - chemical etalon - scheme approved for the given area, variant IV - untreated control.

The experiments for determining the efficacy of integrated scheme based on the use of biorational preparates in comparison with chemical household etalon against *Grapholita molesta* Busck were used pheromonal traps.

The effectiveness examination of preparate Admiral in combating (*Grapholita molesta* Busck), on plum trees was spent on a surface of 4 ha of plum orchard in the pheromonal traps processed with sterilisators. The traps were uniformly installed 10 traps/ha on a distance of 30x30 m, at a proper height- 2-2.5 m. The evidence of captures in the control traps was performed once every 5 days until the end of butterfly flight after method (Îndrumări metodice 2002). The determination of the biological effectiveness of the sterilization method was carried out in the period of mass hatching out of larvae and appearance of pupae, against each generation of the pests according to generally accepted methods. In each variant, there were

analysed 300 fruits at 10 controlled trees. The number of predatory insects was calculated on 10 trees in every variant.

RESULTS AND DISCUSSIONS

As a result of the pheromone monitoring of the main pests of plum trees, there was established that the flight of the *Grapholita molesta* began on April, 2016. The capture of males of *G. molesta* has not exceeded 17.5 individuals/trap during 5 days on plum tree.

Examination of the effectiveness of male sterilization process in pheromonal traps by the placement of 10 traps / ha and 20 traps / ha on the plum crops in combating of Oriental moth (*Grapholita molesta* Busck) demonstrated a reduction of fruit attack compared to untreated control. The highest biological efficiency was obtained in variant I, where this index was 89.8% and respectively in variant II this index constituted 91.8%. These indices essentially exceed the chemical standard that accounted for 69.3%. The biological effectiveness of the method is 89.8% - 91.8% (Table 1).

Table 1
The biological effectiveness of the sterilization method of *Grapholita molesta* Busck males in pheromonal traps processed with hormonal preparate, LLC "Agro Ialoveni", plum orchard, central Moldavian zone conditions, Ialoveni village, 2016

Variant	Nr. of fruits (piece)	Damaged fruits, %	Biological efficacy of the method %
Control	300	4.9	-
Experiment I	300	0.5	89.8
Experiment II	300	0.4	91.8
Chemical Etalon	300	1.5	69.3
HSD _{0.05} = 1.88			

Analyzing the results obtained in the experimental variants we can see that the lowest indices of plum harm were marked in variant I and II, where from the total number of fallen fruits were not found fruits attacked by oriental moth, and from the fruits that remain on the trees were attacked only 0.4-0.5% of the fruits. In the untreated control variant we can see a visible difference, the fruits from the trees were attacked at the level of 4.9% and the number of attacked fruits from the chemical standard constituted 1.5% (figure1).

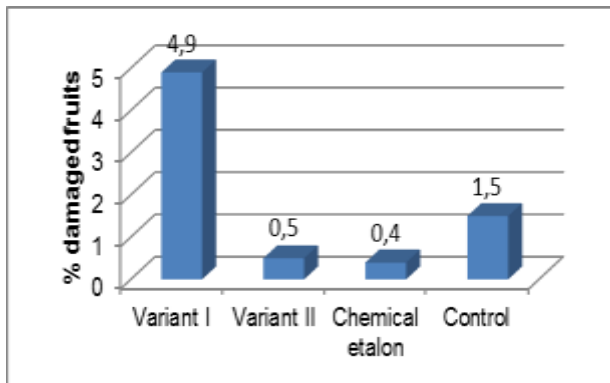


Figure 1 The degree of damage by variants of *Grapholita molesta* Busck LLC "Agro Ialoveni", plum orchard, central Moldavian zone conditions, Ialoveni village, 2016

The use of biorational prepare Admiral 10EC in the protection of plum against pests in conditions of Republic of Moldova has no influence on the number of entomofage insects, by contrary it contributes to the preservation of natural entomofauna in the plum orchards. There were encountered useful insects from the Coccinellidae, Chrysopidae and Arachnoidea families. Among the afidophages in the plum orchard predominated the species *Harmonia axyridis* (Pallas, 1773), *Coccinella septempunctata* L. (1758) (Coleoptera: Coccinellidae). From Chrysopidae we met in the orchard *Chrysopa carnea* Steph. (Neuroptera: Chrysopidae). There were also sufficient quantities of *Syrphus ribesii* (Linnaeus, 1758), (Diptera: Syrphidae) and representatives of the Arachnida class (Aranei).

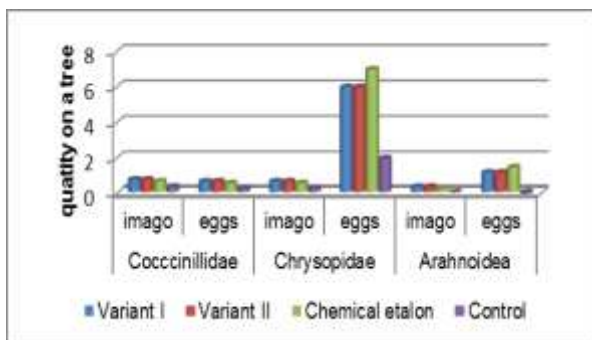


Figure 2 Species composition and population of aphidophagous species in plum tree orchards, "Agro Ialoveni" Ltd., Ialoveni village, 2016

In the following graph (figure 2) based on the obtained results we determined that the chemical standard contributes to the reduction of the number of entomophagus and between the variants I, II and the control there is an insignificant difference with small variations between the variants. It has been established that the use of biorational steriliser Admiral (with active substance periproxifene 10%) in the protection of plum cultures in conditions of Republic of Moldova has contributed to the

preservation of natural entomofauna in the plum orchards and increased the number of predators. It has been established that the reduction of chemical treatments, as well as the placement of forest protective strips along orchards, contributes to the accumulation of biota and ensures the growth of predators in the orchard, thus favoring the quality and quantity of the harvest obtained.

CONCLUSIONS

1. The research made proved that the Oriental moth (*Grapholita molesta* Busck) in the Central zone of the Republic of Moldova in 2016 started the flight in the 2nd-decade of April and developed until the end of September in three generations.
2. The comparative effectiveness of the sterilization process in the exposure of 10 traps / ha and 20 traps/ha on the plum culture was estimated and it was established that the difference between these two variants is not significant and taking into account the low pest density is proposed installing a smaller number of pheromone traps per hectare. In connection with the results obtained, it would be sufficient to install 10 traps/ha to protect the pest culture.
3. Based on the research carried out, the effectiveness of the male sterilization process in pheromone traps on the plum culture for pest control demonstrated a reduction in fruit attack compared to untreated control. These indices essentially exceed the chemical standard which constituted 69.3%. The biological effectiveness of the sterilization method was 89.8-91.8%.
4. Based on the results obtained, it was established that the chemical standard contributes to the reduction of the number of entomophagus, and between the variants I, II and the control there is an insignificant difference. It has been found that the use of biorational sterilizing prepare Admiral 10EC in protection of plums for conditions of Republic of Moldova has contributed to the preservation of natural entomofauna in the plum orchards and raised the number of natural predators, thus favoring the quality and quantity of the obtained harvest.

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