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RESEARCH ARTICLE **Open Access**

INSECTICIDE MEDOUZ, MD IN THE FIGHT AGAINST APPLE CODLING MOTH AND APHIDS ON APPLE TREES

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Abstract
The insecticide Medouz, MD, SC demonstrated high effectiveness against aphids and apple codling moth on apple trees when applied at a rate of 0.3 L/ha. We recommend the use of the insecticide Medouz, MD, SC against aphids and apple codling moth on apple trees, applied at a rate of 0.3 L/ha during the plant's vegetative period.

Keywords Insecticide, effectiveness, aphids, apple codling moth, apple trees, application rate, treatment, plants.

INTRODUCTION

To ensure food safety worldwide, research is being conducted on advanced technologies for the cultivation of agricultural products and their protection from harmful organisms. However, a portion of the produce grown in orchards is lost due to the impact of these harmful organisms. Therefore, the distribution, damage, and bio-ecological characteristics of apple pests, as well as the effectiveness of entomophages in controlling their population, and on this basis, the improvement of an integrated pest control system for apples, have significant scientific and practical importance.

Agriculture is a key sector in the economy of the Republic of Uzbekistan. Modern agricultural production technologies, based on the widespread use of pesticides and mineral fertilizers, have largely solved the problem of food security but have also created multiple ecological, medical, and environmental issues, including concerns about environmentally friendly and biologically sound food, land rehabilitation, and restoration of soil fertility. Consequently, the introduction of new classes of pesticides with different mechanisms of action, high selectivity, and low toxicity to warm-blooded organisms has become increasingly relevant.

Globally, the development and application of new, non-toxic plant protection products for humans and animals have become a priority. Research focused on the creation of plant protection agents based on microorganisms and their metabolites, as well as the search for plant-derived substances with potential pesticidal activity, is of particular importance. However, research on the development of pesticides based on chemical compounds that offer high effectiveness, selectivity for target applications, and rapid environmental breakdown continues.

Ensuring national food security, producing environmentally friendly products, significantly increasing export potential in the agro-industrial complex, expanding new intensive orchards, creating and introducing new pest-resistant crop

varieties that are suitable for local soil and climatic conditions are among the pressing tasks of the modern era. Significant resources have been allocated to achieve these goals, with support provided to fruit farmers, resulting in substantial outcomes. Uzbek horticultural products are in demand on the global market, with food and fruit-vegetable exports reaching around $5 billion. Over the past three years, the volume of exported agricultural products has more than tripled. Our country exports more than 180 types of premium fruits and vegetables, as well as processed products, to 80 countries worldwide. Uzbekistan ranks among the top ten countries globally in terms of export volumes for apricots, plums, grapes, nuts, cabbage, and numerous other fruits and vegetables [14].

In the 21st century, the FAO experts recognize the integrated plant protection concept as the leading approach to addressing food security issues [14, 15].

To preserve the ecological sustainability potential of plants, including their resistance to pathogens, the use of pesticides should be minimized. Organophosphorus insectoacaricides, which can block the function of key oxidative-reductive enzymes responsible for ecological stability, including resistance to pathogens, are particularly hazardous for plants [11, 12].

The requirements for pesticide registration are becoming increasingly stringent. For example, in the USA, over 1,200 active pesticide substances are registered, with 20,000 products on the market annually, amounting to $12 billion. Since 1988, under the auspices of the Environmental Protection Agency, the re-registration of pesticides has been systematically conducted according to new requirements, improving the quality of the pesticide assortment. In the European Union, out of 967 pesticides listed, a decision was made to support 463. A total of 429 products are not subject to re-registration, with 48 added to the list and 27 removed [3, 13].

M.T. Petrukhina conducted an experiment using entobacterin mixed with Bordeaux mixture, achieving 98.8% effectiveness on the 12th day of the trial. O.Z. Metlitsky demonstrated the high effectiveness of biopreparations against the American white moth. In 1986-1987, employees of the Institute of Zoology of the Academy of Sciences of Ukraine applied lepidocid at a rate of 1.5 kg/ha against orchard pests, achieving 84.0-90.0% effectiveness [6, 10].

Although a complete abandonment of chemical methods in orchards and vineyards is currently impossible, a shift towards biological protection has resulted in a threefold reduction in pesticide use. The feasibility of biological protection is also confirmed by increased production profitability. For example, in Primorye, profitability from chemical methods was 19.5%, from the combined use of biological and chemical methods – 26%, and from the biological method alone – 36.7% [2, 4].

Among fruit crops and grapevines, mites are some of the most dangerous pests. Biological control methods for these crops are not as well-developed as those for pests belonging to the insect class. Some studies have noted the impact of leaf hairiness on the population of spider mites on grapes, where varieties with weak and medium hairiness are particularly affected by mites, while varieties with felted hairiness are less damaged [1].

METHODS

The insecticide Medouz, MD was tested in a vigorous apple orchard belonging to the farmer's enterprise “Kuzibayev Jamolbek” located in the Shavat district of Khorezm region. The area is situated in the Turan lowland agricultural zone. The orchard was established 12 years ago, with apple trees of the “Golden Delishes” variety. Treatments were carried out using a K-90 backpack motor sprayer, with a calculated working fluid consumption rate of 1000 l/ha. The trials were conducted in the morning, between 7 and 8 a.m., when the air temperature did not exceed 28°C and wind speed was 1 m/s. The research utilized commonly accepted methods in entomology and agricultural entomology (Bondorenko, 1982; Murodov, 1986), as well as methodological guidelines (2004) and Abbot's formula for calculations [5, 6, 7, 8, 9].

RESULTS

The insecticide Medouz, MD was tested against

aphids. When tested at a consumption rate of 0.3 l/ha, the effectiveness on the 1st day was 95.7% (Table 1) and increased to 97.4% and 99.0% on the 3rd and 7th days, respectively. Only on the 14th and 21st days was there a slight decrease in effectiveness to 98.2% and 97.2%, respectively. These data are consistent with the effectiveness indicators of the reference variant, where Nuker-Pro was applied at a consumption rate of 1.0 l/ha, with effectiveness on the 1st day of 91.2%, on the 3rd day – 93.0%, on the 7th day – 99.0%, on the 14th day – 98.2%, and on the 21st day – 97.2% (Table 1). These results indicate the high effectiveness of Medouz, MD against aphids on apple trees (Table 1).

Table 2
Biological effectiveness of the Meadows, MD product against the codling moth on apple trees

Field Trial, 2023, Khorezm Region, Shavat District, Kuzibayev Jamolbek Farm

Field Experiments	For reference l/ha	Average number of fruits considered per tree			Fruit damage, %			Reduction in crop damage compared to control, %	
		Fallen fruits	Harvest		Fallen fruits	Harvest			
			Removable	Gross		Removable	Gross	Removable	Gross
Medouz, MD s/k	0,3	17,8	135,4	153,2	6,8	3,6	5,2	90,2	90,1
Nuker-Pro, 55% em.k. (template)	1,0	18,2	128,4	146,6	7,4	4,0	5,7	89,1	89,1
Control (unprocessed)	-	57,6	77,8	135,4	68,2	36,8	52,5	-	-

Further, the insecticide Medouz, MD was tested against the apple codling moth. When applied at a rate of 0.3 l/ha, an analysis of the harvested apples showed that the reduction in damage to the harvested crop relative to the control was 90.2%, and the overall yield was 90.1% (Table 2). These results are also consistent with the reference variant, where Nuker-Pro was applied at a rate of 1.0 l/ha, resulting in a reduction in damage to the harvested crop of 89.1%, and the overall yield – 89.1% (Table 2).

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Biological effectiveness of the Meadows, MD product against the codling moth on apple trees

Field Trial, 2023, Khorezm Region, Shavat District, Kuzibayev Jamolbek Farm

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Control (unprocessed)	-	57,6	77,8	135,4	68,2	36,8	52,5	-	-

CONCLUSIONS

The insecticide Medouz, MD SC, demonstrated high effectiveness against aphids and the codling moth on apple trees at a consumption rate of 0,3 l/ha. We recommend the insecticide Medouz, MD SC, for use against aphids and the codling moth on apple trees at a consumption rate of 0,3 l/ha by treating during the plant's vegetation period.

The preparation form is convenient to use, quickly forming a working solution when mixed with water. No phytotoxicity was observed after spraying.

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