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UO‘T: 632.951:634.23

APPLICATION OF CHEMICAL AGENTS AND DETERMINATION OF THEIR BIOLOGICAL EFFICACY IN MANAGING CHERRY FRUIT FLY POPULATIONS IN CHERRY ORCHARDS

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Annotation: The article examines the use of chemical agents to control the cherry fruit fly in cherry orchards and the determination of their biological efficacy. The study investigates the impact of insecticides used to reduce pest populations, their biological efficacy, and their importance for preserving the cherry crop. Based on the results obtained, recommendations have been developed for selecting effective chemical control agents and improving orchard protection systems.

Key words: sweet cherry, cherry fruit fly, chemical control, insecticide, biological efficacy, pest population, cherry orchards, productivity.

Introduction. The sweet cherry is a significant stone fruit crop distinguished by its high nutritional value, flavor, and marketability. Insect pests – specifically the cherry fruit fly – are among the factors that negatively affect the production of high-quality cherry yields. This pest causes damage to the fruit and degrades its appearance and quality, ultimately reducing both the product's market value and overall yield.

The use of chemical control agents is crucial in combating the cherry fruit fly. However, improper selection of preparations, as well as failure to adhere to correct application timing and dosage rates, can lead to reduced efficacy, adverse effects on beneficial organisms, and environmental pollution. Therefore, it is essential to scientifically evaluate the biological efficacy of insecticides used to effectively manage pest populations.

The objective of this study is to determine the biological efficacy of chemical agents used against the cherry fruit fly in cherry orchards, evaluate their impact on reducing pest populations, and identify effective preparations for protecting the cherry crop. The research results contribute to improving protective measures in cherry orchards, producing high-quality crops, and ensuring the rational use of chemical agents.

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Literature review. The European cherry fruit fly, Rhagoletis cerasi (L.) (Diptera: Tephritidae), is considered the most significant pest of sweet cherries in Europe. Without insecticide treatment, fruit damage can reach up to 100% [1].

R. cerasi poses a challenge for cherry growers because market tolerance for damaged fruit is relatively low, with a maximum threshold of 2%. Since it is impossible to sort out the infested fruit, the entire batch is rejected if this tolerance level is exceeded. Downgrading table cherries to processing-grade fruit significantly reduces market value, leading to serious financial losses. In particular, the currently used insecticide dimethoate is facing challenges due to concerns regarding ecotoxicity and residues. Yellow sticky traps are currently used as an alternative in organic cherry production; however, this strategy is labor-intensive and often fails to provide adequate control [2].

Researchers studying chemical control strategies in cherry orchards have found that insecticide efficacy depends on the type of product, the timing of treatment, and the number of applications. Studies have documented the effectiveness of certain chemical agents against Drosophila suzukii and Rhagoletis cerasi. These findings highlight the importance of applying chemical control agents in alignment with the specific developmental stages of the pests [3].

Research conducted in Turkey between 2015 and 2017 evaluated alternative control methods against the cherry fruit fly, including covering trees with specialized netting and mass trapping. The results demonstrated that netting provided 100% effectiveness. This study underscores the necessity of employing alternative protection methods alongside chemical treatments [4].

Materials and Methods. The research was conducted using standard methods and techniques widely employed in general and agricultural entomology. Species identification of the pests and entomophages was based on the works of G.Ya. Bei-Bienko (Keys to the Insects of the European Part of the USSR, Vols. II–V) and B.V. Dobrovolsky. Agro-toxicological studies were conducted following the methodology of Sh.T. Khojaev (Methodological Guidelines for Testing Insecticides, Acaricides, Biologically Active Substances, and Fungicides), while the biological efficacy of chemical and microbiological agents was evaluated using the methods of Sh.T. Khojaev and W.S. Abbott.

Results and Discussion. Small- and large-scale field experiments were conducted to determine the biological efficacy of chemical preparations used to control the cherry fruit fly in cherry orchards.

Experiments were conducted in cherry orchards to prevent the development of cherry fruit flies using the following chemical preparations at specified application rates: Uniron 10% EC (Novaluron) at 0.1–0.2 l/ha, Vilucho 35% S.C.(Imidacloprid 350 g/l) at 0.2–0.4 l/ha, and—as a reference variant—TVINGO EVRO MD (Diflubenzuron 180 g/l + Acetamiprid 45 g/l) at 0.75 l/ha. Despite significant achievements in the field of plant protection, a substantial portion of the harvest is still lost due to pests and diseases. The cherry fruit fly is considered a severe and persistent pest of sweet and sour cherries.

We conducted experiments between 2023 and 2025 at a field trial site in the Shahrisabz district of the Kashkadarya region—an area specializing in cherry orchards – to identify the dominant species and distribution patterns of the cherry fruit fly and to improve control measures against it. The chemical agents Uniron 10% EC (Novaluron) at 0.1 – 0.2 l/ha and Vilucho 35% S.C.(Imidacloprid 350 g/l) at 0.2 l/ha were used in our experiments. According to the results of the experiments, in the variant where Uniron 10% EC (Novaluron) was applied at a rate of 0.1 l/ha, the efficacy was 90.1% three days after application and reached 93.5% by the seventh day. By the fourteenth day, the biological efficacy was 91.7%. In the second experimental plot, where Uniron 10% EC was applied at a rate of 0.2 l/ha, the efficacy was 92.5% three days after application and reached 96.4% by the seventh day.

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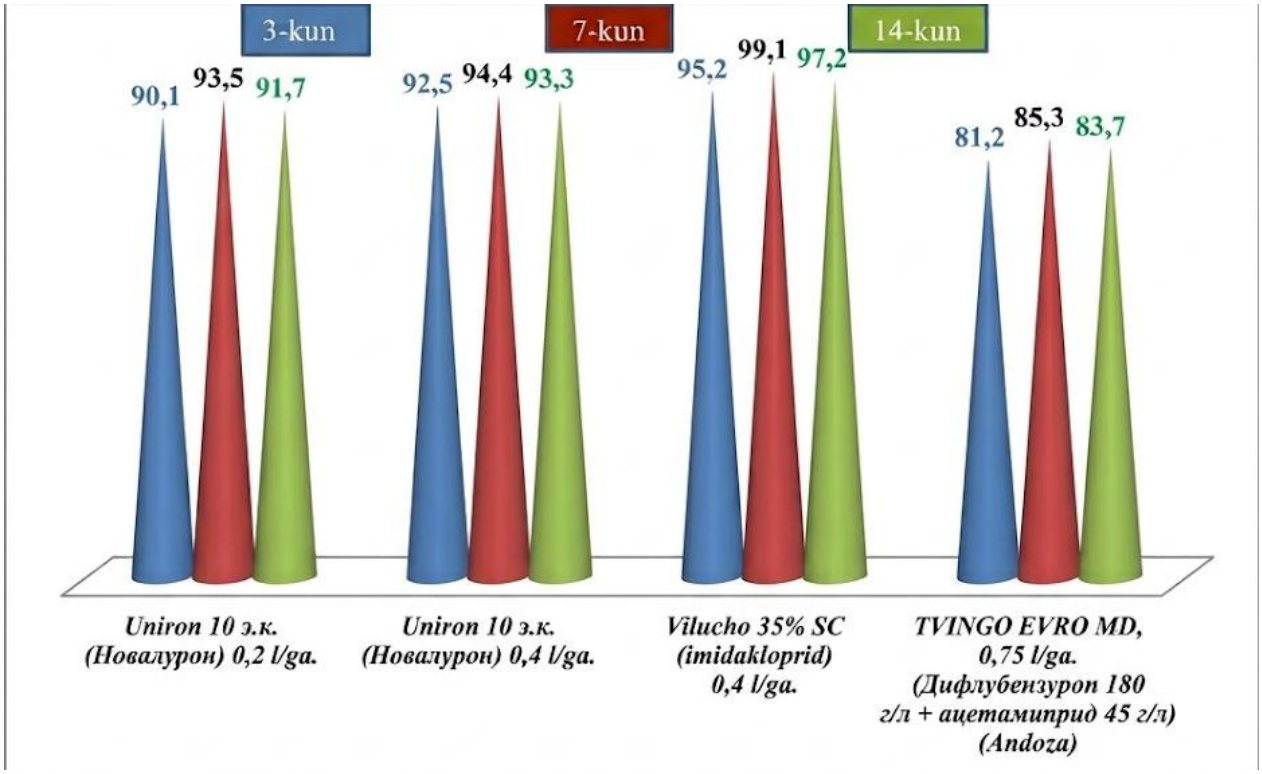


Figure 1. Biological efficacy of insecticides against the cherry fruit fly on cherries (2023–2025).

Monitoring of the cherry fruit fly showed that by the 14th day, biological efficacy reached 93.3%. In the third experimental plot, following the application of the chemical preparation Vilucho 35% S.C.(imidacloprid 350 g/L) at a rate of 0.2 L/ha against the cherry fruit fly, biological efficacy was 95.2% on the 3rd day, 99.1% on the 7th day, and 97.2% on the 14th day.

In the control variant, where the preparation TVINGO EVRO MD (diflubenzuron 180 g/L + acetamiprid 45 g/L) was applied at 0.75 L/ha in cherry orchards, efficacy was 81.2% on the 3rd day and 85.3% on the 7th day. Observations showed that by the 14th day, biological efficacy reached its peak at 83.7% (see Figure 1).

Conclusion. Field experiments conducted in cherry orchards in the Shahrisabz district of the Kashkadarya region during 2023–2025 determined the biological efficacy of chemical preparations used against the cherry fruit fly. According to the experimental results, Uniron 10% EC. The biological efficacy of the (Novaluron) preparation was 93.5% at a rate of 0.2 l/ha and 96.4% at a rate of 0.4 l/ha on the 7th day. The highest efficacy was observed with the Vilucho 35% S.C.(imidacloprid 350 g/l) preparation applied at a rate of 0.4 l/ha, reaching 99.1% on the 7th day. TVINGO EVRO MD (diflubenzuron 180 g/l + acetamiprid 45 g/l) at 0.75 l/ha was used as the standard reference.

Thus, among the tested preparations, Vilucho 35% S.C.demonstrated high biological efficacy at the 0.4 l/ha rate. The results obtained are of significant practical importance for improving chemical control measures against the cherry fruit fly in cherry orchards. When applying these preparations in practice, it is essential to ensure they are officially registered and to adhere to the label-specified application rates and pre-harvest waiting periods.

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