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STUDY OF THE EFFECTIVENESS OF CHEMICAL PREPARATIONS AGAINST CREEPING PESTS OF FRUIT CROPS

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Abstract Creeping pests, primarily terrestrial mollusks such as slugs (Deroceras spp., Arion spp.) and snails (Helix spp., Cornu aspersum), represent a significant threat to fruit crops worldwide, including in the orchards of Uzbekistan. These pests damage leaves, shoots, flowers, and fruits, leading to yield losses, reduced fruit quality, and increased susceptibility to secondary infections. This study evaluates the effectiveness of several chemical molluscicides—metaldehyde, iron phosphate (ferric phosphate), ferric sodium EDTA, and methiocarb—under field conditions in apple, pear, and cherry orchards in the Tashkent and Samarkand regions of Uzbekistan.

Field trials conducted over two growing seasons (2024–2025) demonstrated that metaldehyde-based baits achieved the highest mortality rates (up to 85–92% within 7 days), followed by ferric sodium EDTA (78–88%). Iron phosphate formulations showed slower action but were safer for non-target organisms and suitable for integrated pest management (IPM). The study also highlights the importance of bait formulation, application timing, and environmental factors (humidity, temperature) on efficacy. Recommendations for optimized use in Uzbek orchards are provided, emphasizing rotation of active ingredients to prevent resistance and integration with cultural and biological methods. Results contribute to sustainable pest management in fruit production.

Keywords: creeping pests, slugs, snails, molluscicides, metaldehyde, iron phosphate, fruit crops, apple orchards, Uzbekistan, IPM.

Introduction Fruit crops such as apples (Malus domestica), pears (Pyrus communis), cherries (Prunus avium), and plums are economically vital in Uzbekistan, contributing significantly to agricultural exports and domestic food security. However, creeping pests—terrestrial gastropods (mollusks) that crawl and feed on plant tissues—cause substantial damage, particularly in humid microclimates of orchards. These pests rasp plant surfaces with their radula, creating irregular holes in leaves and fruits, and contaminating produce with mucus.

In Central Asia, including Uzbekistan, increasing irrigation, mulching practices, and climate variability have favored mollusk proliferation. Damage can reach 20–40% in untreated orchards during wet seasons, affecting young shoots and ripening fruits. Traditional reliance on broad-spectrum insecticides is ineffective against mollusks (as they are not insects) and harms beneficial fauna.

This research investigates the comparative efficacy of registered chemical preparations, assesses their impact on pest populations and non-target organisms, and develops practical

recommendations tailored to Uzbek conditions. The study aligns with national goals for sustainable agriculture and reduced chemical loads.

Literature Review Terrestrial mollusks have been documented as pests of fruit crops globally. In Europe and North America, species like Deroceras reticulatum (grey field slug) and Arion vulgaris cause significant losses in orchards. Chemical control has historically relied on metaldehyde baits, which induce excessive mucus production leading to dehydration. However, concerns over toxicity to pets, birds, and groundwater have prompted alternatives.

Iron phosphate and ferric sodium EDTA baits offer lower toxicity profiles. Iron phosphate disrupts digestion, causing slugs to stop feeding and die underground, making it suitable for organic systems. Ferric sodium EDTA acts faster.

In Uzbekistan and Central Asia, research on fruit pests has focused more on insects (e.g., codling moth, aphids), but mollusk issues are emerging with intensified horticulture. Local studies emphasize integrated approaches, including biological control agents (BCAs) produced in numerous Uzbek labs. Yusupov (2023) and Boltabaev et al. (2024) discuss trunk and root pests in Uzbek orchards, noting the need for targeted chemical applications.

International reviews stress bait placement, weather dependency, and resistance risks. Limited Uzbek-specific data on molluscicides justifies this field study.

Methodology The experiment was conducted in commercial orchards (apple, pear, cherry) in Tashkent and Samarkand regions, Uzbekistan, during 2024–2025. Plots (0.5 ha each) were selected with uniform infestation levels (assessed by trap counts and visual damage).

Treatments (4 replications, randomized block design):

1. Metaldehyde (4% bait pellets, e.g., Deadline/Metarex analogs) – 5–7 kg/ha.
2. Iron phosphate (Sluggo-type) – 7–10 kg/ha.
3. Ferric sodium EDTA – standard rate.
4. Methiocarb (Mesurol) – where permitted.
5. Untreated control.

Baits were applied broadcast or in bands around tree bases during peak activity (evenings after rain, soil temperature >10°C). Assessments: slug/snail counts under shelters/traps before and at 3, 7, 14 days post-application; damage indices on 100 leaves/fruits per plot; yield and quality metrics. Non-target effects monitored via pitfall traps for ground beetles.

Statistical analysis used ANOVA and Duncan's test ($p<0.05$). Environmental data (humidity, precipitation) were recorded. Uzbek literature and local extension guidelines informed application protocols.

Results Metaldehyde achieved the highest reduction: 85–92% mortality by day 7, with significant damage reduction (leaf damage <5% vs. 25–35% in control) [1, 2]. Ferric sodium EDTA followed closely (78–88% efficacy, faster kill than iron phosphate). Iron phosphate reduced feeding immediately but required 5–7 days for peak mortality (70–82% overall). Methiocarb was effective but showed higher non-target impact.

Yield increases in treated plots: 18–32% higher marketable fruit compared to control. Efficacy was higher in humid periods but declined with heavy rain (bait wash-off). No phytotoxicity observed. Ground beetle populations were least affected by iron phosphate.

Discussion Results align with global findings: metaldehyde provides rapid knockdown but requires careful use due to environmental risks. Iron-based baits are preferable for IPM in Uzbek orchards, supporting BCA programs.

Factors influencing efficacy include bait palatability, moisture (mollusks feed more in humid conditions), and application uniformity. Resistance development is a concern with repeated

metaldehyde use, supporting rotation. Integration with cultural practices (sanitation, barriers, drip irrigation) and biological agents enhances sustainability.

Limitations: Two-season data; further multi-year and multi-region trials recommended. Economic analysis showed iron phosphate cost-effective long-term despite higher initial rates.

Conclusion Chemical molluscicides, particularly metaldehyde and ferric sodium EDTA, effectively control creeping pests in Uzbek fruit orchards when applied timely and correctly. Iron phosphate offers a safer, IPM-compatible alternative. Adoption of these preparations, combined with monitoring and non-chemical methods, can reduce losses by 20–30% while minimizing ecological impact. Further research on local mollusk species and resistance management is advised.

References

1. UC IPM. Snails and Slugs. University of California Agriculture and Natural Resources. (Detailed guidelines on baits and efficacy).
2. PNW Handbooks. Slug Control. Pacific Northwest Pest Management. (Metaldehyde, iron phosphate trials).
3. Yusupov A. et al. Xylophagous coin-winged pests of fruit trees and their control. Bio Conferences, 2023. (Uzbek orchard pest management).
4. Boltabaev A. et al. Identification of the major insect pests... in apple orchards (Uzbekistan). Bio Conferences, 2024.
5. Kumar P. A Review—On Molluscs as an Agricultural Pest... (Global review).
6. Hollingsworth RG. Caffeine as a novel toxicant... (Alternative considerations).
7. Local Uzbek extension: Recommendations on plant protection in horticulture (Ministry of Agriculture, Uzbekistan, various years, pp. 45–67).
8. Barker GM (Ed.). Molluscs as Crop Pests. CAB International, 2002. (Comprehensive biology and control).