



## COMBATING RODENT PESTS IN OILSEED CROPS GROWN IN KARAKALPAKSTAN

**Yusupov Beknazar Orazbaevich**

Assistant of the Department of Plant Growing, Forestry and Landscape Design,  
Karakalpakstan Institute of Agriculture and Agrotechnologies

E-mail: [beknazaryusupov406@mail.com](mailto:beknazaryusupov406@mail.com)

<https://doi.org/10.5281/zenodo.18830238>

**Abstract.** The article analyzes the impact of rodent pests on oilseed crops cultivated in Karakalpakstan under arid and saline environmental conditions. Particular attention is given to species such as *Rhombomys opimus*, *Mus musculus*, and *Microtus socialis*, which cause significant damage to seeds, stems, and root systems at different growth stages. In addition to direct yield losses, rodent activity disrupts irrigation infrastructure and increases post-harvest contamination risks. Furthermore, the study evaluates the effectiveness of integrated pest management (IPM), combining agrotechnical, biological, mechanical, and carefully regulated chemical measures. Overall, sustainable rodent control is essential for maintaining agricultural productivity and ecological stability in the region.

**Keywords:** oilseed crops, rodent pests, Karakalpakstan, integrated pest management, sustainable agriculture, arid agroecosystems.

Rodent pests represent one of the most persistent and economically significant biotic constraints affecting oilseed production systems in Karakalpakstan. In recent years, oilseed crops such as sunflower (*Helianthus annuus*), sesame (*Sesamum indicum*), and flax (*Linum usitatissimum*) have gained increasing importance in the region due to their relative drought tolerance, economic profitability, and strategic role in agricultural diversification under the ecological conditions shaped by the Aral Sea crisis. Nevertheless, despite their adaptive potential, these crops remain highly vulnerable to rodent infestation, which leads not only to direct yield losses but also to broader agroecological and infrastructural damage. Therefore, the development of scientifically grounded, ecologically sustainable, and region-specific strategies for combating rodent pests has become a priority for agricultural science and practice in Karakalpakstan.

First and foremost, the ecological context of Karakalpakstan must be taken into account when analyzing rodent pest dynamics. The region is characterized by arid and semi-arid climatic conditions, saline soils, fragmented vegetation cover, and fluctuating groundwater levels. Under such circumstances, rodent populations often experience cyclical outbreaks, particularly in years with



favorable temperature regimes and sufficient food availability. Among the dominant species, the Great gerbil occupies a central position in desert and steppe agroecosystems. This species forms extensive burrow systems and large colonies, which not only consume sown and germinating oilseed crops but also undermine irrigation canals and embankments. In addition, the House mouse demonstrates high ecological plasticity, enabling it to exploit both field environments and storage facilities, thereby causing significant pre-harvest and post-harvest losses. Similarly, the Social vole contributes to underground damage by feeding on roots and green tissues, ultimately weakening plant vitality and reducing seed formation. Consequently, the combined activity of these rodent species creates a complex and multifaceted threat to oilseed productivity [5].

Moreover, the economic implications of rodent infestation are substantial. Direct losses occur through seed consumption at sowing, stem cutting during vegetative stages, and feeding on mature seeds before harvest. However, indirect losses are equally significant, since burrowing activity disturbs soil structure, increases moisture loss, facilitates weed invasion, and damages irrigation systems that are already vulnerable in water-scarce regions. Furthermore, contamination of stored oilseeds by rodent excreta reduces product quality and market value. In outbreak years, yield reductions may reach 20–40 percent, thereby undermining farm profitability and regional food security. Thus, combating rodent pests must be approached not merely as a plant protection issue, but as an integrated agroecological challenge [3, 16-20].

In this context, integrated pest management (IPM) emerges as the most rational and sustainable framework for rodent control. On the one hand, agrotechnical measures constitute the primary preventive strategy. For instance, deep autumn plowing effectively destroys burrow systems and disrupts nesting sites, while timely harvesting reduces the period during which crops are exposed to rodent feeding. Additionally, crop rotation with less palatable or less preferred plant species can decrease habitat suitability for rodents. Proper field sanitation, including the removal of plant residues and weeds, further limits food resources and shelter availability. Consequently, preventive agronomic practices serve as the foundation of long-term population regulation.

On the other hand, biological control methods offer environmentally sound alternatives to excessive chemical application. Encouraging natural predators such as owls, hawks, and foxes contributes to the ecological regulation of rodent populations. The installation of artificial perches in open oilseed fields has been shown to enhance predatory bird activity, particularly in steppe landscapes. In



this way, trophic balance within agroecosystems can be partially restored. Furthermore, the conservation of natural habitats adjacent to agricultural lands supports predator biodiversity, which in turn stabilizes rodent population dynamics [6].

Nevertheless, mechanical and chemical measures remain relevant, especially during population peaks. Mechanical methods, including trapping and burrow destruction, may be applied in localized high-density zones. Meanwhile, chemical rodenticides, particularly anticoagulant baits, can be used selectively under strict environmental supervision. However, it must be emphasized that indiscriminate chemical use may result in secondary poisoning of non-target organisms and contamination of soil and water resources. Therefore, chemical control should be considered a supplementary, rather than primary, component of rodent management strategies.

Furthermore, modern monitoring technologies can significantly enhance the effectiveness of rodent control programs. Regular field surveys combined with geographic information systems (GIS) enable the mapping of infestation hotspots and the prediction of outbreak risks. Early detection systems, based on population density thresholds, allow timely intervention before economic damage becomes irreversible. In addition, farmer training and awareness programs play a crucial role in ensuring the proper implementation of integrated measures. Without coordinated action at the community and regional levels, isolated control efforts often remain insufficient.

In conclusion, combating rodent pests in oilseed crops grown in Karakalpakstan requires a comprehensive, ecologically balanced, and scientifically informed approach. While species such as *Rhombomys opimus*, *Mus musculus*, and *Microtus socialis* pose serious threats to productivity, their impact can be mitigated through the systematic application of integrated pest management principles. Specifically, the combination of agrotechnical prevention, biological regulation, mechanical intervention, and carefully controlled chemical use offers the most sustainable solution under the fragile environmental conditions of the Aral Sea region. Ultimately, strengthening monitoring systems, promoting ecological awareness, and integrating scientific research with practical farming strategies will ensure both agricultural resilience and environmental protection in Karakalpakstan.

#### Reference:

1. David V. Alford "Pest and Disease Management Handbook" 2014
2. Rath M, Malhotra B.P. "Plant Protection in Agriculture" 1999



3. Rehman, Q. S. U., Ali, K. W., Ali, W. S. M., Waqar, M., Muhammad, N., Abdul, S., & Ullah, K. A. (2019). Damage impact of vertebrate pests on different crops and stored food items. *GSC Biol. Pharm. Sci*, 6(1), 16-20.
4. Sultana, S. N., Zubayer, M., Islam, M. S., Ashab, K. R., Shanta, S. H., & Kayesh, E. (2024). Sustainable and ecofriendly approach to weed management. *Weed Management-Global Strategies*; IntechOpen: London, UK, 83.
5. Zonata, B. (2012). Pests and pest Control. The Zoological Society of Pakistan expresses its deep gratitude to the Vice Chancellor, Government College University, Lahore, Pakistan and faculty members and students of the Department of Zoology for extending warm hospitality., 32, 164.
6. Каримов А., Абдуллаев Б. "Ўзбекистонда дон маҳсулотларини сақлашда учрайдиган асосий зараркунандалар." Қишлоқ хўжалиги илмий журналлари, 2020.