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Eco-Friendly Pest Removal: Sustainable Approaches for Integrated Pest Management

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Editorial

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ABSTRACT

Eco-friendly pest removal refers to sustainable pest control methods that minimize harm to the environment, non-target organisms, and human health. It emphasizes the use of biological, mechanical, cultural, and natural chemical strategies instead of synthetic pesticides. This article explores the principles of eco-friendly pest management, its major techniques, ecological benefits, and practical applications in agriculture and urban settings. It also highlights challenges and future directions in adopting sustainable pest control practices. Eco-friendly pest removal is essential for maintaining ecological balance and promoting long-term agricultural productivity.

Keywords

Eco-Friendly Pest Removal, Integrated Pest Management, Biological Control, Sustainable Agriculture, Pest Ecology

INTRODUCTION

Eco-friendly pest removal is based on the principle of controlling pest populations while minimizing environmental damage. Traditional chemical pesticides, though effective, often lead to soil degradation, water pollution, pest resistance, and harm to beneficial organisms. In contrast, eco-friendly approaches aim to maintain ecological balance by using natural predators, habitat management, and safe biological agents. This approach is a key component of Integrated Pest Management (IPM) strategies [1].

BIOLOGICAL CONTROL METHODS

Biological control involves the use of natural enemies such as predators, parasitoids, and pathogens to regulate pest populations. Ladybird beetles, lacewings, and parasitic wasps are commonly used in agricultural systems. Microbial agents like Bacillus thuringiensis (Bt) also play a significant role in controlling insect pests without harming beneficial species [2].

CULTURAL AND MECHANICAL CONTROL PRACTICES

Cultural control methods include crop rotation, intercropping, and proper field sanitation to reduce pest habitats. Mechanical methods involve physical removal of pests using traps, barriers, or manual collection. These techniques reduce pest populations without chemical inputs and are widely used in organic farming systems [3].

BOTANICAL AND NATURAL PESTICIDES

Plant-derived substances such as neem (Azadirachta indica), garlic, and pyrethrum are effective natural pesticides. These compounds act as repellents, antifeedants, or growth inhibitors for pests. Botanical pesticides degrade quickly in the environment, reducing long-term ecological risks compared to synthetic chemicals [4].

INTEGRATED PEST MANAGEMENT (IPM)

Integrated Pest Management combines multiple eco-friendly strategies to achieve effective pest control. It emphasizes monitoring pest populations, using threshold-based interventions, and prioritizing non-chemical methods. Chemical pesticides are used only

as a last resort to minimize environmental impact.

ENVIRONMENTAL AND ECONOMIC BENEFITS

Eco-friendly pest removal improves soil health, protects pollinators, and maintains biodiversity. It reduces chemical residues in food and lowers production costs in the long term. Additionally, it supports sustainable agriculture by enhancing ecosystem resilience and reducing dependence on synthetic inputs [5].

CHALLENGES AND LIMITATIONS

Despite its benefits, eco-friendly pest control faces challenges such as slower action compared to chemical pesticides, lack of awareness among farmers, and limited availability of biological agents. Adoption requires training, policy support, and incentives for sustainable farming practices.

CONCLUSION

Eco-friendly pest removal is a vital approach for sustainable agriculture and environmental protection. By integrating biological, cultural, and botanical methods, it reduces reliance on harmful chemicals and promotes ecological balance. Widespread adoption of these practices can enhance food security while preserving biodiversity and ecosystem health for future generations.

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CONFLICT OF INTEREST

None.

REFERENCES

1. Kogan M. Integrated pest management: Historical perspectives and contemporary developments. Annual Review of Entomology,1998;43, 243–270.
2. van Lenteren C. The state of commercial augmentative biological control. BioControl,2012; 25;57, 1–20.
3. Pimentel D. Environmental and economic costs of pesticide use. BioScience, 55:7, 573–590.
4. Isman B. Botanical insecticides, deterrents, and repellents in modern agriculture. Annual Review of Entomology, 2006; 51, 45–66.
5. Pretty, J. Agricultural sustainability: Concepts, principles and evidence. Philosophical Transactions of the Royal Society B,2008;363, 447–465.