Available online at
http://agrospheresmagazine.vitalbiotech.org/

ISSN (E): 2582 – 7022

Agrospheres:e- Newsletter, (2025) *6*(12), 86-90

Article ID: 854

Beneficial Insects in Agriculture: Friends of The Farmer

Avinash Reddy Chaduvula[1*], Chaman Kumar[2], Dhane Ankur Sudam[3], P. Ellampirai.M[4] and Bipin Verma[5]

[1]Research Scholar, Department of Entomology, Assam Agricultural University, Jorhat, Assam
[2]Assist. Prof. cum jr. Scientist, Department of Entomology, R.N.T.A.C. Deoghar, Birsa Agricultural University, Ranchi
[3]Assistant Professor, Department of Entomology, Dr. B. S. Kokan Krishi Vidyapeeth, Dapoli, Maharashtra
[4]Research scholar, Department of Horticulture, Central University of Tamil Nadu
[5]Assistant professor, Department of Agricultural Plant Pathology, Doon (PG) College of Agriculture Science and Technology, Selaqui, Dehradun, Uttarakhand

*Corresponding Author
Avinash Reddy Chaduvula*

Article History
Received: 10. 12.2025
Revised: 15. 12.2025
Accepted: 20. 12.2025

INTRODUCTION

In agriculture, insects are usually blamed for crop losses, reduced yields and poor-quality produce. While it is true that many insects damage crops, this is only part of the picture. A large number of insects are actually beneficial and work silently to support farmers by controlling pests, pollinating crops and maintaining environmental balance. These insects are nature's helpers and play a crucial role in sustainable agriculture.

Before the widespread use of chemical pesticides, farming systems depended largely on natural processes. Fields surrounded by trees, grasses and flowering plants provided shelter and food for beneficial insects. However, modern intensive farming practices and excessive pesticide use have greatly reduced their populations. As a result, pest outbreaks have increased, forcing farmers to rely even more on chemicals.

Recognizing the importance of beneficial insects is essential for reducing pesticide dependence, lowering production costs and protecting the environment. By understanding their role and conserving them, farmers can improve crop productivity in a natural and sustainable way.

1. What Are Beneficial Insects?

Beneficial insects are those insects that contribute positively to crop production rather than causing damage. They help farmers in three major ways:

i. By feeding on crop pests
ii. By parasitizing pest insects
iii. By pollinating crops

2. Major Types of Beneficial Insects

2.1 Predatory Insects

Predators are insects that hunt, attack, and consume pests directly. Many predatory insects feed on pests during both larval and adult stages, making them highly effective.

Key characteristics:

- They consume a large number of pests
- They are active hunters
- They quickly respond to pest population increases

Examples and roles:

- Ladybird beetles feed on aphids, mealybugs and scale insects
- Green lacewing larvae consume aphids, whiteflies and thrips
- Spiders trap flying and crawling insects in their webs

Predators help keep pest populations under control naturally and prevent sudden outbreaks.

2.2 Parasitoids

Parasitoids are small insects, mainly wasps and flies, that lay their eggs on or inside pest insects. The developing larvae feed on the pest and eventually kill it.

Why parasitoids are important:

- They are highly specific to their host pests
- They do not disturb beneficial insects
- They are effective even at low population levels

Examples:

- Trichogramma wasps attack the eggs of caterpillar pests
- Braconid and ichneumonid wasps control borers and leaf feeders

Parasitoids are widely used in biological control and IPM programs.

2.3 Pollinating Insects

Pollinators are insects that help in fertilization of crops by transferring pollen from one flower to another. This process is essential for fruit and seed development.

Major pollinators include:

- Honey bees (*Apis* species)
- Bumble bees
- Butterflies and moths
- Hoverflies

Many crops such as fruits, vegetables, oilseeds and pulses depend heavily on insect pollination. Proper pollination results in higher yield, better fruit size and improved quality.

3. Conceptual View: How Beneficial Insects Help Crops

Crop Field
|
├── **Ladybird beetle → Eats aphids**
├── **Honey bee → Pollination**
├── **Trichogramma → Parasite of pest eggs**
└── **Spider → Traps flying pests**
↓
Healthy plants, fewer pests, higher yield

This simple interaction shows how beneficial insects work together to support crop health.

4. Benefits of Beneficial Insects

4.1 Natural Pest Control

Beneficial insects naturally suppress pest populations and keep them below economic damage levels. This reduces the frequency and intensity of pest outbreaks.

4.2 Reduced Cost of Crop Protection

When beneficial insects are present, farmers spend less on pesticides, spraying equipment, fuel and labor. This directly increases farm profit.

4.3 Environment-Friendly Agriculture

Beneficial insects do not pollute soil, water or air. Their presence promotes biodiversity and protects natural ecosystems.

4.4 Improved Crop Yield and Quality

Pollinating insects improve fruit set, seed formation and uniformity, leading to better market value and higher returns.

4.5 Supports Sustainable and Organic Farming

Beneficial insects are the backbone of organic farming and Integrated Pest Management (IPM), helping farmers achieve residue-free food production.

5. Table: Common Beneficial Insects and Their Roles

Beneficial Insect	Type	Main Role	Crops Benefited
Ladybird beetle	Predator	Aphid control	Vegetables, cereals
Green lacewing	Predator	Controls whiteflies, thrips	Cotton, vegetables
Trichogramma spp.	Parasitoid	Egg parasite of caterpillars	Rice, maize, cotton
Honey bee	Pollinator	Improves pollination	Fruits, oilseeds
Hoverfly	Pollinator/Predator	Pollination and aphid control	Vegetables
Spiders	Predator	Controls flying pests	All crops

6. Challenges in Conserving Beneficial Insects

Although beneficial insects play a vital role in agriculture, their populations are declining rapidly due to several human-induced and environmental factors. These challenges reduce their effectiveness and disturb the natural balance in agro-ecosystems.

6.1 Excessive Use of Chemical Pesticides

The indiscriminate use of broad-spectrum chemical pesticides is the biggest threat to beneficial insects. These chemicals do not differentiate between harmful pests and helpful insects. As a result, predators, parasitoids and pollinators are often killed along with target pests. Continuous pesticide use can lead to pest resistance while wiping out natural enemies, causing pest resurgence.

6.2 Loss of Natural Habitats

Modern farming practices have reduced hedgerows, flowering plants and wild vegetation around fields. Beneficial insects require shelter, alternative food sources and breeding sites, which are often found in non-crop vegetation. The removal of these habitats forces beneficial insects to leave the area or perish.

6.3 Monocropping and Reduced Biodiversity

Large-scale monocropping creates uniform environments that favour pest multiplication but offer little support for beneficial insects. Lack of crop diversity limits nectar, pollen and prey availability, making it difficult for beneficial insects to survive throughout the year.

6.4 Climate Change and Weather Extremes

Rising temperatures, irregular rainfall and extreme weather events disturb the life cycles of beneficial insects. Climate changes can lead to mismatches between pest populations and their natural enemies, reducing biological control efficiency.

6.5 Limited Awareness Among Farmers

Many farmers are unable to identify beneficial insects and mistakenly consider them as pests. Due to insufficient training and extension support, these insects are often destroyed unintentionally during pest control operations.

7. How Farmers Can Encourage and Conserve Beneficial Insects

Protecting beneficial insects does not require expensive technology. Simple, practical changes in farming practices can greatly enhance their survival and effectiveness.

7.1 Judicious Use of Pesticides

Farmers should avoid unnecessary pesticide sprays, especially during flowering stages when pollinators are most active. When pest control is necessary, selective or bio-pesticides should be preferred over broad-spectrum chemicals.

7.2 Adoption of Integrated Pest Management (IPM)

IPM combines cultural, mechanical, biological and chemical methods to manage pests. By using economic threshold levels and biological control agents, IPM helps conserve beneficial insects while effectively controlling pests.

7.3 Providing Flowering Resources

Planting flowering crops, border plants, and cover crops provides nectar and pollen for adult predators and parasitoids. Crops such as sunflower, mustard, marigold

and coriander attract beneficial insects and support their survival.

7.4 Maintaining Field Borders and Refuges

Leaving grassy strips, hedgerows or small patches of natural vegetation near fields provides shelter and overwintering sites for beneficial insects. These refuges act as reservoirs from which insects can recolonize crop fields.

7.5 Crop Diversification

Mixed cropping, intercropping, and crop rotation create a diverse environment that supports different insect species. This diversity stabilizes pest-predator relationships and reduces pest outbreaks.

7.6 Farmer Education and Training

Training programs, field demonstrations and awareness campaigns help farmers identify beneficial insects and understand their role. Knowledge empowers farmers to make informed pest management decisions.

8. Role of Beneficial Insects in Sustainable Agriculture

Beneficial insects are a cornerstone of sustainable and climate-smart agriculture. Their contribution goes beyond pest control and pollination, influencing the overall health and resilience of farming systems.

8.1 Strengthening Natural Pest Regulation

By keeping pest populations under natural control, beneficial insects reduce the need for chemical interventions. This leads to stable pest management and prevents sudden pest outbreaks.

8.2 Promoting Ecological Balance

Beneficial insects maintain balance in agro-ecosystems by interacting with pests, plants, and other organisms. This balance helps preserve biodiversity and prevents dominance of any single pest species.

8.3 Enhancing Soil and Crop Health

Reduced pesticide use protects soil microorganisms and earthworms, improving soil fertility and structure. Healthy soils lead to healthier crops and improved yield stability.

8.4 Supporting Climate-Resilient Farming

Diverse insect populations make farming systems more resilient to climate stress. Beneficial insects help crops recover from pest pressure under changing climatic conditions.

8.5 Ensuring Long-Term Food Security

By promoting sustainable crop protection and improved pollination, beneficial insects contribute directly to food security. Their conservation ensures continuous agricultural productivity without harming the environment.

CONCLUSION

Beneficial insects are truly the farmer's best friends. They protect crops naturally, reduce production costs, increase yields and safeguard the environment. By understanding their role and adopting insect-friendly practices, farmers can work with nature rather than against it. Conserving beneficial insects is not just good farming-it is the foundation of sustainable agriculture.

REFERENCES

DeBach, P., & Rosen, D. (1991). *Biological control by natural enemies* (2nd ed.). Cambridge University Press.

Gurr, G. M., Wratten, S. D., Landis, D. A., & You, M. (2017). Habitat management to suppress pest populations: Progress and prospects. *Annual Review of Entomology, 62*, 91–109.

Hajek, A. E., & Eilenberg, J. (2018). *Natural enemies: An introduction to biological control* (2nd ed.). Cambridge University Press.

Heimpel, G. E., & Mills, N. J. (2017). *Biological control: Ecology and applications*. Cambridge University Press.

Koul, O., Dhaliwal, G. S., & Cuperus, G. W. (2007). *Integrated pest management: Potential, constraints and challenges*. CABI Publishing.

Landis, D. A., Wratten, S. D., & Gurr, G. M. (2000). Habitat management to conserve natural enemies of

arthropod pests in agriculture. *Annual Review of Entomology, 45*, 175–201.

Losey, J. E., & Vaughan, M. (2006). The economic value of ecological services provided by insects. *BioScience, 56*(4), 311–323.

Sharma, H. C. (2016). *Biological control of crop pests*. CRC Press.

Van Driesche, R. G., Hoddle, M. S., & Center, T. D. (2008). *Control of pests and weeds by natural enemies: An introduction to biological control*. Blackwell Publishing.

Wäckers, F. L., van Rijn, P. C. J., & Bruin, J. (2005). *Plant-provided food for carnivorous insects: A protective mutualism and its applications*. Cambridge University Press.