

EDITORIAL

HARNESSING PARASITOIDS FOR SUSTAINABLE AND ECO-FRIENDLY PEST CONTROL

Agriculture faces continuous pressure to intensification productivity while minimizing environmental harm. The need for sustainable pest control methods has never been greater in last several decades. Among the most promising nature-based solutions are arthropod- parasitoids, viz. insects, wasps and flies. They lay their eggs on or in other insect hosts, that in their life cycle killing them.

Parasitoids offer a target-specific, self-propagating, and chemical-free alternative to synthetic pesticides, which often lead to resistance in pests, environmental contamination, and non-target species mortality. Integrated approaches towards biological control programs, arthropod-parasitoids have shown remarkable success in managing crop-damaging pests such as aphids, whiteflies, and caterpillars.

This eco-friendly approach using agroecology aligns with the goals of Integrated Pest Management (IPM) by applying ecological principles to control pests sustainably. It emphasizes minimizing chemical inputs by promoting natural pest predators, enhancing biodiversity, improving soil health, and using practices like crop rotation and intercropping to prevent pest outbreaks. This approach strengthens ecosystem resilience and supports long-term agricultural sustainability, aligning with IPM's goal of balancing effective pest control with minimal environmental impact.

As researchers and practitioners deepen our understanding of parasitoid-host dynamics, there is an urgent need for policy support, farmer education, and investment in biocontrol infrastructure. Embracing parasitoids is not just a scientific advancement—it is a critical toward a more resilient, sustainable, and health-conscious future in agriculture pest control.

Bangladesh, with its dense population and agriculture-driven economy, faces a growing challenge in balancing food security and environmental sustainability. Excessive reliance on chemical pesticides has led to soil degradation, water pollution, pest resistance, and health hazards for both farmers and consumers.

In this context, parasitoids—natural enemies of insect pests—offer a powerful and eco-friendly alternative for pest control. These beneficial insects, especially parasitic wasps and flies, target specific pests like aphids, stem borers, whiteflies, and caterpillars that commonly threaten major crops in Bangladesh, including rice, vegetables, and fruits.

Research institutions along with academia from universities have begun exploring the potential of biological control agents, including native and introduced parasitoid species. Successful examples include the use of *Trichogramma spp.* against lepidopteran pests in rice and vegetables. Zoologist, especially the entomologist has to look for more of the natural-control candidates for other pests, if possible.

Adopting parasitoid-based pest control aligns with Integrated Pest Management (IPM) strategies should be promoted by the government and NGOs. It reduces pesticide dependency, improves biodiversity, and enhances farmers' income by lowering input costs and improving crop quality.

By understanding the benefits, effective training and farmer's awareness programs, field trials should be expanded. Local support from academia or scientists must be in place. With the right policy support and scientific collaboration, parasitoids can become a cornerstone of sustainable agriculture in Bangladesh—protecting both crops and ecosystems in future. Zoologist will be the lighthouse of the knowledge.

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