

Biological Control Agents for *Chilo partellus*

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Biological control involves the use of natural predators, parasitoids, and pathogens to control pest populations. For *Chilo Partellus*, several biocontrol agents have been identified as effective in managing its population. These agents target various life stages of the pest, including eggs, larvae, and adults, and offer an environmentally friendly alternative to chemical pesticides.

Here are the key biocontrol agents for controlling *Chilo Partellus*, along with their recommended doses and application methods:

1. *Trichogramma* spp. (Egg Parasitoid)

Target: *Trichogramma* spp. are parasitoid wasps that parasitize the eggs of *Chilo Partellus*. They lay their eggs inside the host eggs, killing the developing larvae.

Application

- **Release Rate:** Release 40,000–50,000 parasitoid wasps per hectare for effective control.
- **Frequency:** Apply every 7–10 days during the egg-laying period of the pest, usually in the early part of the cropping season, when the first generation of *Chilo Partellus* moths are laying eggs.

Method of Application: *Trichogramma* egg cards or sachets containing the parasitoid eggs can be distributed throughout the field.

2. *Telenomus* spp. (Egg Parasitoid)

Target: Like *Trichogramma*, *Telenomus* spp. are egg parasitoids that specifically target the eggs of *Chilo Partellus*.

Application

- **Release Rate:** Release 30,000–50,000 parasitoids per hectare.
- **Frequency:** The release can be made at intervals of 10–15 days, depending on the pest population.

Method of Application: Release parasitoid wasps directly into the field in egg cards or sachets.

3. *Steinernema carpocapsae* (Entomopathogenic Nematodes)

Target: These nematodes attack the larvae of *Chilo Partellus*. When the nematodes come into contact with

the larvae, they enter their bodies and release bacteria that kill the host.

Application

- **Dose:** Apply 10–20 million nematodes per hectare in a water solution.
- **Method of Application:** Apply nematodes as a soil drench or spray around the base of the plants, particularly where larvae are likely to be present.
- **Time of Application:** The best time to apply nematodes is during the early stages of the larval infestation, generally in the first few weeks after sowing.

4. *Bacillus thuringiensis* (Bt) - Biological Insecticide

Target: *Bacillus thuringiensis* is a bacterium that produces toxins harmful to insect larvae. It works by producing proteins that disrupt the digestive system of the larvae, leading to their death.

Application

- **Dose:** Use 1–2 kg/ha of Bt (typically in the form of 1% or 2% WP formulations).
- **Frequency:** Apply Bt during the early larval stages (as soon as the pest is observed) or when significant feeding damage is detected.
- **Method of Application:** Bt can be applied as a foliar spray to the leaves, stems, and other parts of the plant.

5. Predators (Ants, Birds, and Spiders)

Target: Various natural predators, including ants, spiders, and birds, feed on the larvae and pupae of *Chilo Partellus*.

Application: These predators do not require direct introduction since they are naturally present in the ecosystem. However, their populations can be encouraged by maintaining diverse vegetation and providing shelters for birds and insects.

Method of Application: Encourage the presence of these predators by promoting biodiversity and minimizing the use of broad-spectrum insecticides that can harm beneficial species.

Key Considerations for Successful Biological Control

- **Timing:** Biological agents should be applied early in the season, during the egg-laying and early larval stages, for maximum effectiveness.
- **Environmental Conditions:** Biological agents such as *Trichogramma* and *Telenomus* are sensitive to weather conditions, so applications should be timed according to local weather forecasts (e.g., not during extreme heat or rain).
- **Application Equipment:** For nematodes and Bt, use a backpack sprayer or irrigation system to ensure even distribution. For parasitoids, specialized release equipment like cards or sachets may be used.

Conclusion

The biological control of *Chilo Partellus* using agents like *Trichogramma* spp., *Telenomus* spp., *Steinernema carpocapsae*, and *Bacillus thuringiensis* offers an environmentally sustainable method to manage this pest. Integrated with other control measures such as crop rotation and judicious use of chemical control, biological agents can help maintain pest populations at manageable levels, ensuring minimal crop damage.

References

Kfir, R., Overholt, W. A., Khan, Z. R., & Polaszek, A. (2002). Biology and management of economically important lepidopteran cereal

stem borers in Africa. *Annual review of entomology*, **47** (1), 701-731.

Khan, Z. R., Pickett, J. A., Berg, J. V. D., Wadhams, L. J., & Woodcock, C. M. (2000). Exploiting chemical ecology and species diversity: stem borer and striga control for maize and sorghum in Africa. *Pest Management Science: Formerly Pesticide Science*, **56** (11), 957-962.

Okosun, O. O., Allen, K. C., Glover, J. P., & Reddy, G. V. (2021). Biology, ecology, and management of key sorghum insect pests. *Journal of Integrated Pest Management*, **12** (1), 4.

Patel, C. T., Patel, C. C., & Varma, C. B. (2021). Biochemical basis of resistance to stem borer, *Chilo partellus* (Swinhoe) infesting forage sorghum, *Sorghum bicolor* (L.) Moench. *Journal of Entomology and Zoology Studies*, **9**(1), 834-839.

Radadiya, N. V., Davda, B. K., Ghevariya, T. V., Kanzariya, K. G., Der, H. N., & Varma, A. D. (2023). Evaluation of insecticide and botanical combination for management of sorghum shoot fly and stem borer.

Ramesh, S., Maheswaramma, S., Prasad, G. S., Shankar, M., & Kumar, M. P. (2023). Efficacy of granular insecticides against sorghum stem borer, *Chilo Partellus* (Swinhoe) in Sorghum. *Journal of Entomological Research*, **47**, 926-929.
