

Nematodes or Small Hive Beetle Control

The small hive beetle (*Aethina tumida*) is a pervasive pest that poses significant challenges to beekeepers worldwide. Originating from sub-Saharan Africa, this beetle has spread to various regions, including the United States, causing extensive damage to honeybee colonies. Traditional chemical control methods often present risks to bees and the environment, leading to the exploration of alternative, eco-friendly solutions. One such promising method is the use of beneficial nematodes for biological control.

Understanding Beneficial Nematodes

Beneficial nematodes are microscopic, soil-dwelling roundworms that parasitize and kill various insect pests. Among the species effective against small hive beetles is *Heterorhabditis indica*. These entomopathogenic nematodes actively seek out beetle larvae and pupae in the soil. Upon locating a host, they enter through natural openings and release symbiotic bacteria (*Photorhabdus* species) into the host's bloodstream. This bacterial infection leads to the host's death within 24-48 hours, after which nematodes reproduce inside the cadaver and release a new generation of infective juveniles into the soil, perpetuating the cycle of control.

Application Strategies for Effective Control

To maximize the efficacy of *Heterorhabditis indica* in controlling small hive beetle populations, proper application techniques are crucial. Research and recommendations from various sources provide a comprehensive guide:

1. Timing and Environmental Conditions:

- **Soil Moisture:** Nematodes require a moist environment to move and locate hosts. It's essential to irrigate the area around the hives both before and after application to maintain adequate soil moisture.
- **Temperature:** The optimal soil temperature for *Heterorhabditis indica* activity is around 24°C (75°F). Applications should be timed during periods when soil temperatures consistently fall within this range to ensure nematode survival and effectiveness.
- **UV Sensitivity:** Nematodes are sensitive to ultraviolet light, which can be lethal. Therefore, it's advisable to apply them during early morning or late evening hours to minimize UV exposure.

2. Application Technique:

- **Coverage Area:** Studies indicate that approximately 82% of small hive beetle larvae exit the hive within 24 inches, and nearly all within 36 inches. Thus, nematode applications should cover the ground directly beneath and extending up to 36 inches around each hive.
- **Dosage:** A standard recommendation is to apply 5 million nematodes for every 10 hives. This ensures an adequate population to effectively target and reduce beetle larvae and pupae in the soil.
- **Application Method:** Mix the nematodes thoroughly in water to create a uniform suspension. Using a watering can with a sprinkler head facilitates even distribution. Continuous agitation of the mixture during application prevents nematodes from settling at the bottom, ensuring consistent coverage.

3. Integration with Other Control Measures:

- **Mechanical Traps:** Combining nematode applications with in-hive traps, such as the Freeman Beetle Trap, can address both soil-dwelling and adult beetle stages, enhancing overall control efficacy.
- **Hive Management:** Maintaining strong, healthy colonies is vital. Regular hive inspections, prompt removal of infested materials, and ensuring colonies are not overly stressed can reduce beetle infestations.

Considerations and Best Practices

While beneficial nematodes offer a natural and effective means of controlling small hive beetles, beekeepers should consider the following:

- **Storage and Handling:** Nematodes are living organisms and require proper storage. It's recommended to use them as soon as possible upon receipt. If immediate application isn't feasible, they can be stored for a short period under specific conditions, but prolonged storage can reduce their viability.
- **Soil Type and Conditions:** Nematode effectiveness can vary with soil type. Sandy soils, for instance, may require more frequent irrigation to maintain adequate moisture levels.
- **Environmental Impact:** Unlike chemical pesticides, beneficial nematodes are specific to their target hosts and do not harm bees, plants, or humans, making them an environmentally friendly option for pest control.

In conclusion, the integration of *Heterorhabditis indica* nematodes into small hive beetle management programs offers a sustainable and effective strategy. By adhering to recommended

application practices and combining biological control with other integrated pest management techniques, beekeepers can protect their colonies from the detrimental effects of small hive beetle infestations.

Sources:

1. Arbico Organics. “Heterorhabditis indica Beneficial Nematodes for Small Hive Beetle Control.”
2. Southeastern Insectaries. “Small Hive Beetle Control.”
3. Nematode Information. “When and How to Apply Heterorhabditis indica for Small Hive Beetle Control.”
4. University of Georgia, Bee Program. “Small Hive Beetle.”
5. Mid-Atlantic Apiculture Research and Extension Consortium. “Small Hive Beetle Fact Sheet.”
6. Bugs for Growers. “Heterorhabditis indica Nematodes.”
7. Wikipedia. “Small Hive Beetle.”
8. Wikipedia. “Heterorhabditis bacteriophora.”

These sources provide comprehensive information on the use of *Heterorhabditis indica* nematodes for controlling small hive beetle populations, including application methods, environmental considerations, and integration with other control measures.