

## Novel insecticidal WP formulations of *Heterorhabditis indica* (NBAlI Hi101) *Heterorhabditis bacteriophora* (NBAlI Hb105) and for the biological control of white grubs and other soil insect pests



White grub parasitized by EPN

### Technology Description

Entomopathogenic nematodes (EPN) refer to beneficial nematodes that are parasitic to more than 200 species of insects and belong to Steinernematidae and the Heterorhabditidae. The infective juveniles of EPN infect insect hosts by entering via natural body openings, mouth, anus, spiracles or areas of thin cuticle, and in association with mutualistic bacterium cause host mortality within 48 h. The use of EPN has now become an integral part of crop protection. Several EPN species are already available in the market as formulations in the world. Paradoxically in India, several native germplasm of EPN belonging to the species of *Heterorhabditis* and *Steinernema* have been isolated and characterized, which due to lack of effective technologies for evolving commercial formulations with effective levels of nematode concentrations and prolonged shelf-life, are yet to gain entry in to the market. Major constraints perceived in utilization of bioagents can be summarized as time-place-quantity-efficacy-biosafety-shelf-life. Large-scale and timely availability of cost-effective viable formulations of biopesticides with long shelf-life is seriously lacking in the country.

### Background

The wettable powder formulation of nematodes developed is effective for controlling a variety of insects. This is especially true for the soil insect pests & in particular whitegrubs belonging to scarabaeidae on a number of crops, non-exclusively including arecanut, banana, sugarcane, potato, corn, etc. Novel bio-pesticidal wettable powder formulations comprised of beneficial nematodes, *Heterorhabditis indica* (strain NBAlI Hi101) and *Heterorhabditis bacteriophora* (NBAlI Hb105) for the control of white grubs and other soil insect pests with improved shelf-life and the method for its preparation.

### Benefits /Utility

- These novel wettable powder formulations of *Heterorhabditis indica* (NBAIL Hi101) and *Heterorhabditis bacteriophora* (NBAIL Hb105) comprising of infective nematode juveniles mixed with a specific proportion of amorphous, wettable silicate mix powder, wherein at least 90% are viable even after eight to twelve months of storage at a temperature of between 25°C and 37°C.
- The method can be scaled up to different capacities depending on the requirements.
- Management of white-grubs/other soil insect pests: An effective solution for the management of white-grubs associated with areca nut, sugarcane, banana, cardamom, groundnut, potato, corn and turf grass, other soil insect pests such as ash weevil, grubs cutworms, *Spodoptera* species and FAW.



*Heterorhabditis indica*

### Scalability

Around 120 tonnes per annum.

### Business and commercial potential

- Shelf-life: 80-90% viability for 6-8 months at NTP at Bengaluru.
- Methods to use in field: simplified and normal for whitegrub control, no additional agronomic practices.
- Biologically active wettable powder formulations of *H. indica*(NBAIL Hi101) and *H. bacteriophora* (NBAIL Hb5), on a combination of silicates-mixture of carrier material and defining specific physical properties.
- The semi-synthetic media and protocols that improves/enhances bio-mass production of *G. mellonella* by identifying ideal physical conditions for growth, larval weight and fecundity.



Nematode emergence

### Financial requirement

- Cost of Production: Rs. 80 – 96 per kg
- Expected Sales: 120 tonnes @ Rs 350

- Initial costs excluding buildings: Rs. 20 lakhs
- Recurring costs: Rs. 1.5 – 2.0 lakhs/month depending on the scale.

### Advantages

- Entomopathogenic nematodes are exceptionally safe biological control agents. They are specific to insects and are not a threat to the environment unlike chemical insecticide.
- Farmer friendly and easy to apply with conventional equipment.
- Infective juveniles of EPNs are tolerant to most agrochemicals including herbicides, fungicides and insecticides.
- Shelf-life is 8-12 months and exempted from CIB registration and can reduce use of synthetic chemicals applied to soil.



EPN Formulation

### Target Market/Customer

- The formulation is ecologically safe and non-toxic to humans and beneficial insects or organisms. The formulation can be used for soil application in different agro climates. However, soil moisture is critical. This technology already commercialized to 19 firms.

### Social Impact of the Technology

- Use of EPN for management of soil insect pests significantly reduce use of pesticides and also save cost of input use as they are recyclable in soil.
- Soil and water body contamination is reduced considerably, better health