

Available Biopesticides and its use in Agriculture**1. *Trichoderma spp.***

Trichoderma spp. Viz. *Trichoderma viride*, *T. harzianum*, *T. koningii*, *T. hamatum*, etc have been in use to produce various biopesticides under different trade or commercial names. It is highly active on root rot, foot rot, collar rot, stem rot, damping off, wilt, blight/leaf spot, of crops like patchouli, coleus, melissa and pulses, oil seeds, cucurbitaceous crops like cucumber, pumpkin, bottle gourds, ridge gourds: *Solanaceous* crops like tomato, brinjal, chillies, capsicum: Cole crops i.e. cabbage, cauliflower: root crops diseases like tuber, rhizome rot of potato, ginger, turmeric along with rotten diseases of garlic, flowers etc, the product is also effective against sheath rot, sheath blight and bacterial leaf blight (BLB) of rice.

Treatments:**A. Seed treatment:**

Dose: 5 g /kg of seed or as prescribed on container.

Method: Make a paste or slurry adding 5 g in 10-20 ml of water or rice gruel. Pour 1 kg of seed on to the paste or slurry and mixed properly to coat the seeds uniformly. Shade dry the coated seeds for 20-30 minutes before sowing.

B. Tuber/Rhizome/Cutting treatment:

Dose: As prescribed in the treatment / recommendation.

Method: Dip the tuber / rhizome/cuttings in the suspension prepare @ 10 g /litre of water. Shade dry for 15 minutes before planting.

C. Seedling Treatment:

Dose: 300 g. To treat seedling roots to cover one bigha.

Method: Prepare a suspension @ 5-10 g/litre of water. Dip the roots of seedling or 15 minutes and shade dry for 15 minutes before transplanting.

D. Nursery bed treatment:

Dose: 250 g for 400 sq.m nursery bed.

Method: 1) prepare a suspension by adding 250 g in 50 litres of water and drench the nursery bed soil. ii) Mixed 250 g in 2 kg cowdung / compost/FYM and spread over 400 sq.m. nursery bed and irrigate the bed.



E. Soil treatment:

i) Direct broadcasting:

Dose: 300 g for one bigha of land.

Method: Mix 300 g in 6 kg of FYM. Broadcast in one bigha of land and irrigate the field.

ii) Awaited broadcasting

Dose: 30 g for one bigha of land

Method: Mixed 30 g in 6 kg of FYM. Cover the mixture with polythene sheet for 7-15 days and broadcast in the field.

iii) Furrow application:

Dose: Any one of E (i) or E(ii) as above.

Method: It is highly effective in root crops like potato, ginger, turmeric etc and sugarcane. The mixture is applied in furrows at the time of earthing up or after 30 days of planting.

F. Foliar application:

Dose: 500 g/bigha

Method: Make a paste by adding 10 g in 15 ml water and then add the paste to 1.5 litre of water. Mixed properly before spraying on the plant parts.

2. *Bacillus thuringiensis serover kurstaki*:

The biopesticides produce from B.t. is highly active on Diamond back moth of cabbage, army worm and semiloopers of Cole crops, pod borer of Bengal gram, fruit borer of tomato, shoot and fruit borer of brinjal, bhendi, red hairy caterpillar and *Spodoptera spp.* of groundnut, lemon butter fly etc.

Treatments:

Dose: i) 100 – 150 g/ bigha for field crops.

ii) 150-200 g /bigha for orchards.

Method: The powder is first mixed with small quantity of water to prepare a uniform suspension. Then the required quantity of water is added and thoroughly mixed before spray.

NB: If the plants to be sprayed have waxy coating, a sticker or surfactant should be used in the suspension. The crops like cabbage, cauliflower contained waxy coating on leaves.

3. *Nuclear polyhedrosis virus* (NPV)

- A. NPV (*Helicoverpa*): It is highly active on *Helicoverpa armigera* pest of cotton, gram, pea, pigeon pea, tomato, cabbage, groundnut, millets, oil seeds and roses.
- B. NPV (*Spodoptera*): The biopesticides prepared from this bioagent is highly effective against *S. litura* caterpillar, pest of cotton, gram, pigeon pea, cabbage, tomato, chillies and oil seed crops.

Treatments: Dose: 250 – 500 ml/ha.

Method: i) Shake the bottle properly and prepare a solution @ 1 ml/litre of water.

ii) Spray the solution 2-3 times at 10-15 days interval.

iii) Spray preferably in the evening and on young larval stages or on sighting of egg laying.

4. *Beauveria bassiana*:

This bio pesticide is prepared from entomopathogenic fungus *B. bassiana* that infects insect pests. It is most effective against lepidopteron caterpillar pest of vegetables and fruit plants and sucking pests like mites and spiders of vegetables and flowers, borer, white flies on cotton and vegetables, aphids, scale insect, Colorado beetle of potato. It is also highly effective against rice hispa.

Treatment:

i) Foliar spray:

Dose: 400-500 g in ½ bigha

Methods: Mixed 5 g in 1 litre water and spray on the plant parts.

ii) For soil drench:

Dose: 250-500 g/3 bigha or as prescribed.

5. *Neem based pesticides* (Azadiractin 0.15 % EC)

This insecticide acts as excellent broad spectrum control of aphids, jassids, white flies, beetles, caterpillar, cutworm on vegetables, pulses, oil seeds, fruit trees, sugarcane. It acts on insect through multiple action as repellent, antifeedant, insect growth regulator and oviposition treatment.

Treatment:

Dose: 1 litre / ha

Method: i) Prepare a solution @ 3-5 ml/litre of water and spray at the time of hatching eggs and young stages of pests.

ii) Repeat the spray at 15 days intervals based on population.



BIPM and State Bio control Laboratory:

State Bio control Laboratory (SBCL), Assam is at present producing the following Bio agents.

SI	Name of the Bio Agents	Crop	Pest	Status
	<i>Trichogramma japonicum</i> (T.j)	Paddy	Paddy pest, mainly yellow stem borer (YSB)	Rearing, mass production and distribution
	<i>Trichogramma chilonis</i> (T.j)	Brinjal, Sugarcane and maize	Brinjal shoot and fruit borer, Sugarcane borers and maize borer	Rearing mass production and distribution
	<i>Trichogrammatoidea bactri</i>	Cole crops	Diamond, black moth	Rearing of mother culture
	<i>Trichoderma viridae/ harzanium</i>	Almost all crops	Soil borne pathogens	Rearing, mass production and distribution
	<i>Chrysoperla carnea</i>	Almost all crops	Soft bodied insects	Rearing of mother culture
	<i>Pseudomonas fluorescense</i>	Horticultural crops	Bacterial wilt mainly	Rearing of mother culture

Moreover, the State Bio control Laboratory (SBCL) is enriched with a Plant Health Clinic (established under IDHTM) having facilities of Diagnose the biotic stress (pest, disease etc) of all crops along with the available IPM tactics to manage the same. It has counseling facilities on field problems for the farmers.

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