



WELCOME

BIOLOGICAL PEST MANAGEMENT

by

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Kalagam

- ✚ India 70% of the people are involved in Agriculture and it is a Backbone of our Indian Economy.
- ✚ Though all the crops are grown well (Cereals, Millets, Pulses, Oilseeds, vegetables and Medicinal Plants) but they are susceptible to pests and Diseases in various level.
- ✚ In earlier days to control the pest and diseases different chemicals were used, which all directly/Indirectly pollute the environment.

- Now, Organic Farming shows a wonderful way to minimize the hazardous effect of Chemicals.
- In Organic Farming Pest and Disease are controlled naturally by using the Plant Extract and Leaf extract of Medicinal Plants and by using the beneficial Micro organisms(Bio control agents).

Bio control agents:

PARASITES

- *Trichogramma chilonensis* and *T.japanicum*
- Braconids/Bethylids
- Red wud Bug
- Nuclear Polyhedrosis virus

Bio Fungal Agents

 *Trichoderma viridie*





 *Metarhizium anisolope*

 *Beauvaria bassiana*

BIO BACTERIAL AGENTS

 *Pseudomonas fluorescens*

Others

-  Vermicompost
-  Neem based products
-  Pasumaikaviya
-  Effective Micro organism

PARASITES

- ***Trichogramma chilonensis* and *T.japanicum*** are tiny wasps that prey on the eggs of more than 200 pests.

Sugarcane Early shoot borer

cotton pink boll worm

Paddy stem borer

Cabbageworm

Paddy leaf roller

Fruit worms

Sugarcane Early shoot borer and Parasite Release



Sugarcane Inter node Borer and *T. chilonensis* Parasite Release



Paddy Leaf Roller and Stem borer- Parasite Release: *T. chilonsis* & *T. japonicum*



| Crop & Pest | <i>Trichogramma</i> | No of stripes/Time interval |
|--|---|--|
| <p>Sugarcane Early shoot borer <i>Chilo infescatellus</i></p> <p>Stalk Borer/internode borer <i>(Chilo sp)</i></p> <p>Top shoot Borer <i>(Scirpophaga excerptalis)</i></p> | <p><i>T.chilonsis</i></p> <p><i>T.chilonsis</i></p> <p><i>T.japonicum</i></p> | <p>1cc/ac, 6 releases at 15 days interval from 50 DAS</p> <p>1cc/ac, 5 releases at 10-15 days interval from 90 DAS</p> <p>1cc/ac, 6 releases at 10-15 days interval from 120 DAS</p> |
| <p>Cotton Old world bollworm <i>(Helicoverpa armigra)</i></p> <p>Pink boll worm <i>(Pectinophora gossypiella)</i></p> <p>Spotted boll worm <i>(Earias spp)</i></p> | <p><i>T.chilonsis</i></p> | <p>3cc/ac, 4 releases at 15 days intervals from flowering onwards. Moths to be monitored by Pheromone traps.</p> |

Pulses/Oil seeds

Pod Borer (*Helicoverpa armigra*)

T.chilonsis

3 cc/ac, 3-6 times at 7-10 days interval from flowering onwards

Vegetables

Tomato & Brinjal borers

(*Helicoverpa armigra*
Leucinodes orbonalis)

T. chilonsis

3cc/ac, 4-6 releases at Fifteen days intervals from flowering onwards

Rice

Paddy stem borer
(*Scirpophaga incertulas*)

Leaf folder

(*Cnaphalocrosis medinalis*)

T.japonicum

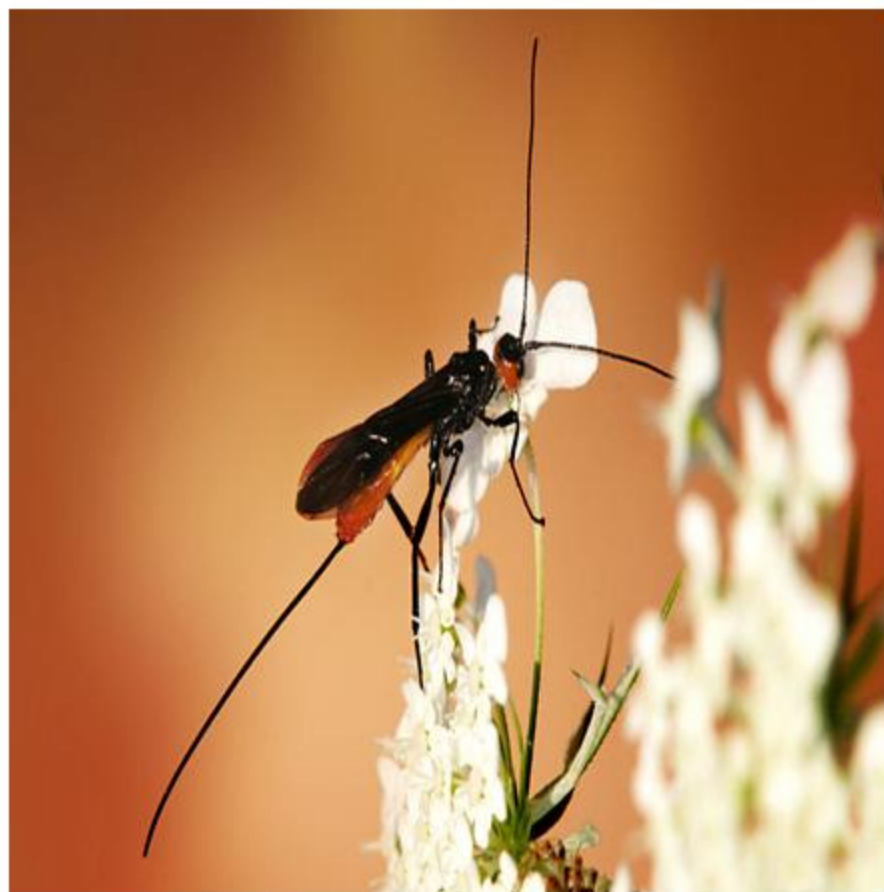
T.chilonsis

2cc/ac, 3-5 releases at 10 days interval from 35 days after transplanting

Coconut- Affected by Black Headed Caterpillar and Parasite Release



Braconids/ Bethilids



Control

✚ Coconut Black headed Caterpillar

✚ Braconids- 800
Number /acre

✚ Release 3 times at 25
days interval

Red Wud Bug- for Vegetables and Cotton



Control: *Helicoverpa*
Egg, Larva and Moths.

Recommendation:

400 No's /ac

Bio Fungal Agents – *Trichoderma viridie*



Effective against soil-borne diseases such as Root rot, **Rhizome** rot and Bulb rot.

Symptoms of Rhizome rot and Bulb rot

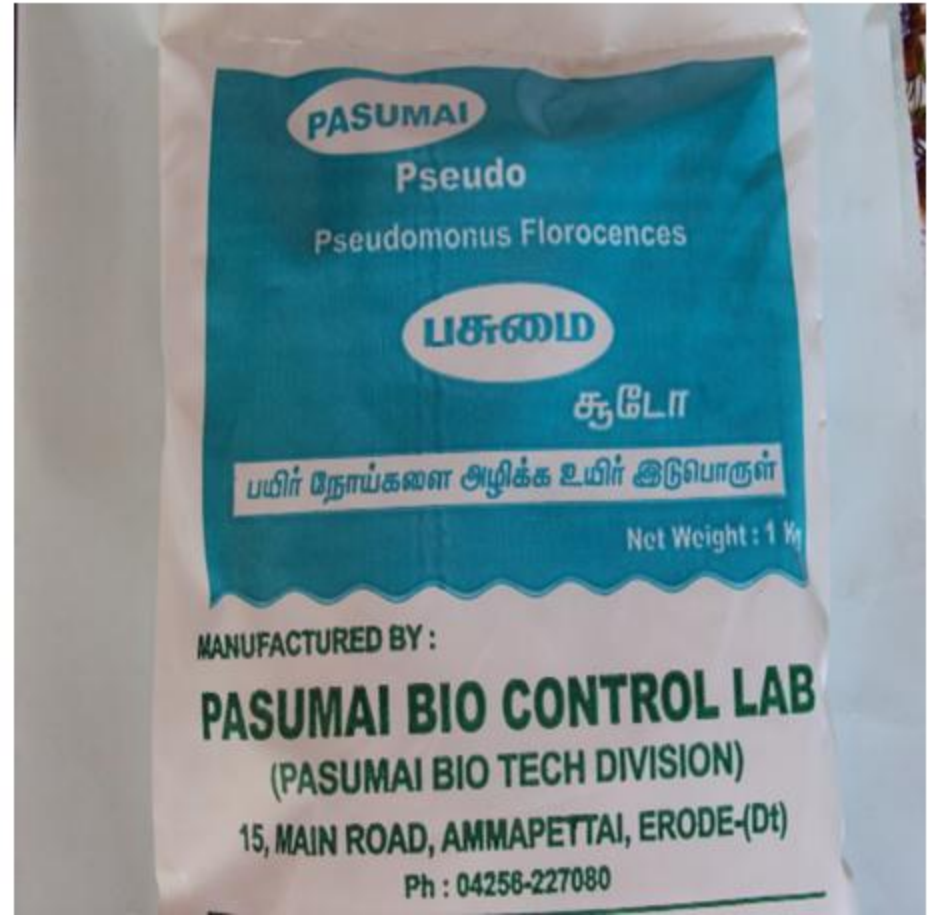


Mode of Application

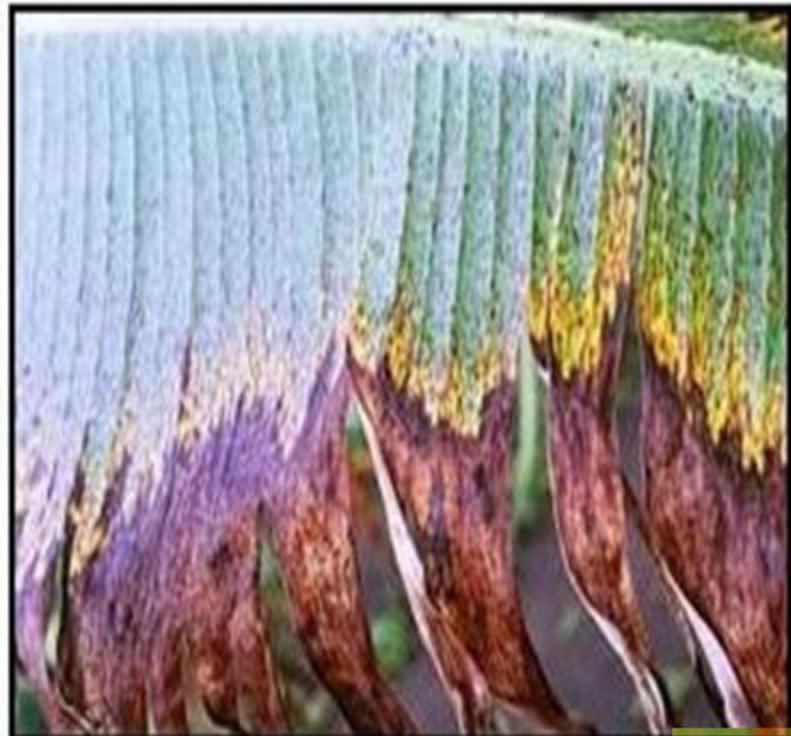
- Seed treatment of 4g of *T.viridie* with 1 Kg of seeds
- Soil treatment with 3-4Kg of *T.viridie* in 50 Kg of FYM and applied to the moistened soil.
- 1 Kg of *T.viridie* contains 2.5×10^{-9} CFU

BIO BACTERIAL AGENTS

Pseudomonas fluorescences







Mode of Application

Seed treatment:

- ✚ Mix paddy seeds with the formulation at the rate of 10 g / Kg of seeds and soak the seed in water for overnight. Decant the excess water and allow to sprout the seeds for 24 hrs and then sow.

Soil application:

- ✚ Apply the product at 2.5 Kg/ha after 30 days of Transplanting (This product should be mixed with 50 Kg of well decomposed Farm Yard manure)

***Spodoptera* affected cotton and Tomato**



Nuclear Polyhedrosis Virus



The virus is ingested by feeding caterpillars that become pale and start dying within 2-5 days in the characteristic “head down” position, hanging on only with their abdominal pro-legs.

NPV infected *Helicoverpa sp*

Control

- 🌿 Tobacco caterpillar (*Spodoptera litura*)
- 🌿 Cotton, Ground nut, Tomato, Soya bean and Castor and Banana

Recommendation

- NPV 250 ml/ac , Cane sugar 500g mixed with 100 ml of Teepol and sprayed in evening.

Metarhizium anisoploae

- ✚ Green muscardine fungus due to the green color of the sporulating colonies.
- ✚ It has been reported to infect approximately 200 species of insects and other arthropods.

Control :

- ✚ Aphids, Mites, Thrips and Sucking pests.

Recommendation:

- ✚ 50 g/tank for 15 days interval at 2 times.

Beauveria bassiana

- ✚ white muscardine disease
- ✚ It is being used as a biological insecticide to control a number of pests such as termites, whitefly, different beetles.



H. armigra infected with *B. bassiana*



B. bassiana
infected Grasshopper