BIO-PESTICIDES/BIO-CONTROL AGENTS AND HOW TO USE THEM

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GROW & PROTECT
THESE BENEFICIAL AND FRIENDLY FLOWERS AND INSECTS

These flowers and insects reduce the incidence and damage caused to crops from destructive pests which leads to economic losses to the farmers. They are also an eco-friendly means to control pests in the field.

FRIENDLY FLOWERS


COSMOS


SUNFLOWER

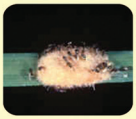

ZINNIA


SNAP DRAGON


MARIGOLD


MORNING GLORY

FRIENDLY INSECTS


TELENOMUS


CHAROPS


DAMSELFLY


FUNGAL DISEASES


GONIOSUS


LADY BEETLE


MEADOW GRASSHOPPER


XANTHOPIMPLA


GRUB


MIRD BUG


OPHIONEA


WATER BUG


SPIDER


PAEDERUS


WOLF SPIDER


DRYINID

Biological control is the method of controlling pests such as insects, mites, weeds and plant diseases by exposing them to their natural enemies like predators, parasitoids and pathogens. It is an environmentally safe and efficient means of reducing pests by the use of natural enemies. Biological control agents are predators, parasitoid insects and pathogens.

- Biological control is an important component of Integrated Pest Management program of IPM.

Advantages of Biological Control

- Biological control can help reduce the environment and health hazards associated with the use of chemicals.
- Unlike most chemicals, biological control is often very specific for a particular pest. People, animals or helpful insects may be completely unaffected or undisturbed by their use.
- There is less danger of contamination to the environment and water quality.

Disadvantages of Biological Control

- Biological control requires more intensive management and planning.
- It can take more time and demand more patience, education and training.
- No immediate result is seen with their use as compared to the use of chemical pesticides.

Do's

The use of bio-control agents requires record keeping in order to understand more about their effectiveness and follow up procedures.

Don'ts

Many bio-agents are susceptible to chemical pesticides. Hence they cannot be used together or along with chemical pesticides.

Even though Biological control is a slow process but the advantages we derived in terms of safeguarding our health, protecting the environment and the decrease in the use of harmful chemical pesticides are factors that are important enough for one to adopt this type of control measure.

Photos for Biological control

Fig. 1: Ladybird beetle (Grub stage)

Fig. 2 : Ladybird beetle (Adult stage)

Fig.3 : Dragon fly

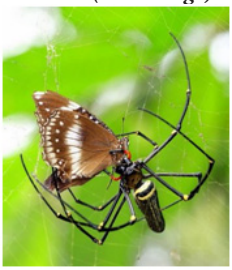


Fig.4 : Spider

Fig.5 : Hyposoter ebininus

Fig.6 : Preying mantis

Fig.7 : Green lacewing

I. Trichogramma

Trichogrammas are minute parasitic wasps. They are egg parasitoids and effective against many Lepidopteran pests. The female *Trichogramma* lay their eggs inside the eggs of the host or pest, complete their life cycle inside the host eggs thus killing the host from inside. One *Trichogramma* adult can destroy around 90-100 eggs in its lifespan.

Species available at State Bio-Control Laboratory (SBCL),Upper Shillong and their action against pests:

There are 4 species of *Trichogramma* that are being mass multiplied in SBCL and these are as follows:

1. *Trichogramma chilonis* – These are use to control leaf folders in rice, boll worm in cotton, maize stem borer etc.
2. *Trichogramma japonicum* – These are used for the control of stem borers of paddy.
3. *Trichogramma brassicae* – These are used against cabbage butterflies.
4. *Trichogramma pretiosum* – These are used against many borers in vegetables and army worm caterpillar in maize.

Methods of use

1. *Trichogrammas* are supplied from our lab in the form of tricho cards.
2. Cut along the lines in such a way that you get 24 bits from a single card.
3. Clip the small bit in the underside of leaves of any vegetable at a distance of 5-8 metres.

4. In case of paddy, clip the bit inside a disposable cup to prevent from heavy rain.
5. At least 3 releases in a particular crop are needed @ 2 cards each release in the first and second time and 1 card in the third at 15 days interval from each release.

Fig.8 Trichogramma

Fig.9

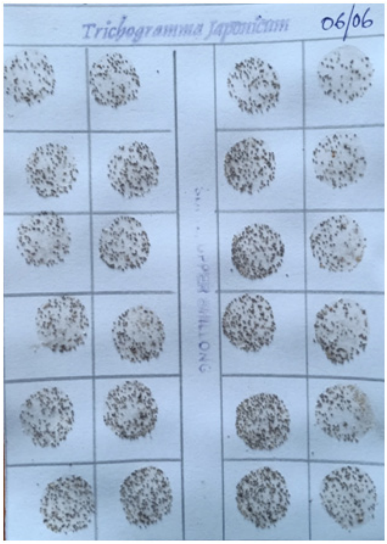


Fig.10 Trichogramma spp.

Fig.11

Fig.12

Tricho cards placed in a disposable cup in standing crops

II. Metarhizium anisopliae

- *Metarhizium anisopliae*, also known as Green Muscardine fungus is a fungus that grows naturally in soils throughout the world and causes disease in various insects by acting as a parasitoid.
- When the spore of this fungus comes in contact with the cuticle (skin) of the target insect pests, it germinates and grows directly

through the spiracle cuticle in to the inner body of the host. The fungus proliferates throughout the insect's body, draining the insect of nutrients and the infected insects eventually die.

***Metarhizium* can control soil insect pests like whitegrubs, cutworms, lepidopterans etc.**

How to use?

a. **Seed treatment:** Mix five grams or five ml *Metarhizium* with one Kg of seeds. Make a slurry, leave it for 15-20 minutes and then shade dry for 15-20 minutes before sowing.

b. **Foliar spray:** Mix five grams or five ml *Metarhizium* with one litre of water (i.e 75 grams in a 15 Litre sprayer) and then spray.

c. **Soil application:** During land preparation drench the soil by mixing five grams or five ml *Metarhizium* in one litre of water.

d. **Multiplication in the Compost:** Mix one kg of *Metarhizium* with 100 kg well decomposed dried manure/compost/FYM. Sprinkle the mixture with water and cover with polythene and leave it for at least three weeks. Turn the mixture at alternate days and check the moisture content. The compost will be enriched with the Bio-pesticides after the end of three weeks and ready for use in the field. Then apply this enriched compost as you would normally do for any crop.

Fig.13

Fig.14

Fig.15

Metarhizium anisopliae

III. Pseudomonas fluorescens

- Fluorescent Pseudomonads belong to Plant Growth Promoting Rhizobacteria (PGPR).
- They play a major role in the plant growth promotion, induced systemic resistance, biological control of pathogens etc.
- *P. fluorescens* is a common non-pathogenic saprophyte that colonises in soil, water and on plant surfaces.
- *P. fluorescens* suppress plant diseases by protecting the seeds and roots from fungal infections.

***Pseudomonas fluorescens* can control fungal and bacterial diseases like blast, blight diseases, wilt, root rot, damping off etc.**

How to use?

a. **Seed treatment:** Mix five grams or five ml of *Pseudomonas* with one Kg of seeds. Make slurry, leave it for 15-20 minutes and then shade dry for 15-20 minutes before sowing.

b. **Seedling dip treatment:** Mix five grams or five ml of *Pseudomonas* with one litre of water, dip the seedling roots for 15-20 minutes and then shade dry for 15-20 minutes before sowing.

c. **Foliar spray:** Mix five grams or five ml of *Pseudomonas* with one litre of water (i.e 75 grams in a 15 Litre sprayer) and then spray.

d. **Soil application:** During land preparation drench the soil by mixing five grams or five ml of *Pseudomonas* with one litre of water.

e. **Multiplication in the Compost:** Mix one kg or one litre of *Pseudomonas* with 100 kg well decomposed dried manure/ compost/FYM. Sprinkle the mixture with water and cover with polythene and leave it for at least three weeks. Turn the

mixture on alternate days and check the moisture content. The compost will be enriched with the Bio-pesticides after the end of three weeks and ready for use in the field. Then apply this enriched compost as you would normally do for any crop.

Fig.16

Fig.17

Pseudomonas fluorescens

IV. Trichoderma

- *Trichoderma* spp. are free-living fungi that are common in soil and root ecosystems. These fungi are well known for their ability to produce a wide range of antibiotic substances and for their ability to parasitize other fungi.
- Root colonization by *Trichoderma* spp. also frequently enhances root growth and development, and can therefore improve crop productivity.
- *Trichoderma* spp. also increase nutrient uptake and the efficiency of nitrogen use, and can solubilize nutrients in the soil.
- They help fasten decomposition of FYM/Compost.

***Trichoderma* can control soil-borne diseases like root rot, rhizome rot, damping off, etc.**

How to use?

a) **Seed treatment:** Mix five grams or five ml Trichoderma with one Kg of seeds. Make slurry, leave it for 15-20 minutes and then shade dry for 15-20 minutes before sowing.

b) **Seedling dip treatment:** Mix five grams or five ml of Trichoderma with one litre of water, dip the seedling roots for 15-20 minutes and then shade dry for 15-20 minutes before sowing.

c) **Foliar spray:** Mix five grams or five ml Trichoderma with one litre of water (i.e 75 grams in a 15 Litre sprayer) and then spray.

d) **Soil application:** During land preparation drench the soil by mixing five grams or five ml Trichoderma in one litre of water.

e) **Multiplication in the Compost:** Mix one kg of Trichoderma with 100 kgs well decomposed dried manure/compost/FYM. Sprinkle the mixture with water and cover with polythene and leave it for at least three weeks. Turn the mixture alternate days and check the moisture content. The compost will be enriched with the Bio-pesticides after the end of three weeks and ready for use in the field. Then apply this enriched compost as you would normally do for any crop.

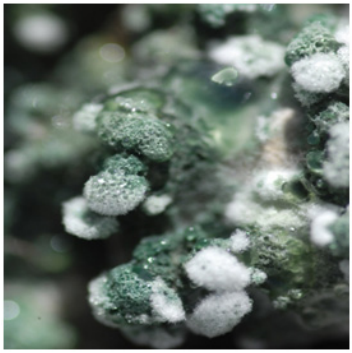


Fig.18

Fig.19

Trichoderma harzianum

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