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Introduction to biopesticides



INTRODUCTION

- Biopesticide is a formulation made from naturally occurring substances that controls pests by non toxic mechanisms and in ecofriendly manner.
- Biopesticides may be derived from animals (e.g. nematodes), plants (Chrysanthemum, Azadirachta) and micro-organisms (e.g. Bacillus thuringiensis, Trichoderma, nucleopolyhedrosis virus), and include living organisms (natural enemies) etc.
- However, biopesticides are generally less toxic to the user and are non-target organisms, making them desirable and sustainable tools for disease management.



Advantages of biopesticides

- ✓ Inherently less harmful and less environmental load,
- ✓ Designed to affect only one specific pest or, in some cases, a few target organisms,
- ✓ Often effective in very small quantities and often decompose quickly, thereby resulting in lower exposures and largely avoiding the pollution problems .
- ✓ When used as a component of Integrated Pest Management (IPM) programs, biopesticides can contribute greatly.



Types of biopesticides

- Microbial pesticides
- Plant-incorporated-protectants (PIPs)
- Biochemical pesticides
- Botanical pesticides
- Biotic agents (parasitoids and predators)





Microbial Pesticides



- Microbial pesticides are composed of microscopic living organisms (viruses, bacteria, fungi, protozoa, or nematodes) or toxin produced by these organisms
- Applied as conventional insecticidal sprays, dusts, or granules.
- Their greatest strength is their specificity as most are essentially nontoxic and non pathogenic to animals and humans.
- Microbial pesticides includes insecticides, fungicides, herbicides and growth regulators of microbial origin.



Microbial Pesticides



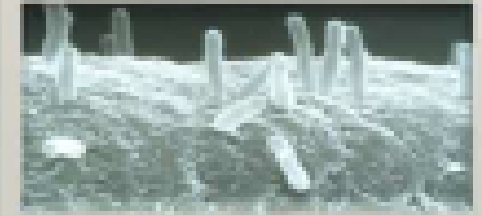
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b. *Agrobacterium radiobacter* (Agrocin)



- *Agrobacterium radiobacter* is used to treat roots during transplanting, that checks crown gall.
- Crown gall is a disease in peaches, grapevine, roses and various plants caused by soil borne pathogen *Agrobacterium tumefaciens*.
- The effective strains of *A. radiobacter* possess two important features:
 - ✓ They are able to colonize host roots to a higher population density.
 - ✓ They produce an antibiotic, agrocin, that is toxic to *A. tumefaciens*.



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c. *Pseudomonas fluorescens* (Phenazine)

- This bacteria is used to control damping off caused by *Pythium sp.*, *Rhizoctonia solani*, *Gaeumannomyces graminis*.

- It has ability to grow quickly in the rhizosphere

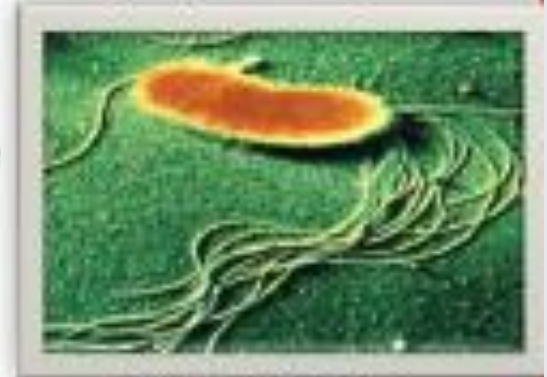


Fig. *Pseudomonas*

d. *Trichoderma*

- *Trichoderma* is a fungicide effective against soil born diseases such as root rot.

- This is also used against *Necteia galligena*, that causes silver leaf disease of fruit trees by entering through pruning wounds.



Fig. spores of *Trichoderma*



Biotic agents/Natural enemies

Predators

- They consume several to many prey over the course of their development, they are free living and they are usually as big as or bigger than their prey.
lady beetles, rove beetles, many ground beetles, lacewings, true bugs such as Podisus and Orius, syrphid fly larvae, mantids, spiders, and mites such as Phytoseiulus and Amblyseius.



Fig:lady bird beetle



Fig: Lacewings



SCOPE OF BIO-PESTICIDES MARKET

❑ Product Type Segments

- Bio-fungicide
- Bio-emetics
- Bio-insecticides
- Bio-herbicide

❑ Active Ingredient Type Segments

- Biochemical Pesticides
- Microbial Pesticides
- Plant-Based Pesticides

❑ Crop Type Segments

- Arable Crops
- Permanent Crops
- Others

❑ Application Segments

- On-Farm Application
- Post-Harvest
- Seed Treatment Application