Biocontrol Agents Production And Their Application

PRESENTED BY,

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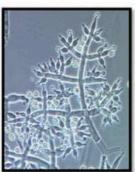
IPHD PLANT BIOTECHNOLOGY

What are bio-control agents?

Control of plant pathogens and diseases caused by them through

antagonistic microorganisms is termed biological control agents

Antagonistic microorganisms like species of *Trichoderma, Penicillium,*Bacillus, Pseudomonas are used









According to **Baker and Cook's** (1974) - "Biological control is the reduction of inoculum or disease producing activity of a pathogen accomplished by or through one or more organisms other than man."

- Predators,
- Microbes and
- parasites that feed upon them



Why we need biological control agents?

Chemical pesticides Implicated in environmental and human health problems

- Require yearly treatments and expensive
- Toxic to both beneficial and pathogenic species

Biological control agents

- Non-toxic to human and animal
- Not polluted
- III. Host specific
 - A. Only effect one or few species

Why use biological control agent?

WHEN:

Biological control agents are

- Low cost
- Labor intensive
- Host specific

WHILE:

Chemical pesticides are:

- cost-effective
- easy to apply
- Broad spectrum

Importance of plant diseases

Estimated annual crop production worldwide

\$1.2 - 1.3 trillion

Amount lost to disease, insects, weeds using current control measures

\$500 billion

Additional losses without current control measures

\$330 billion



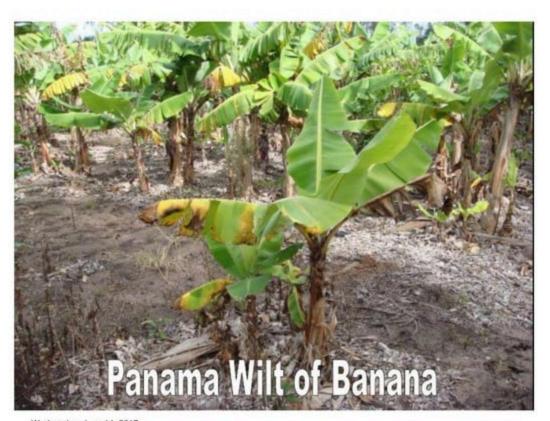
Current approaches to disease control

Chemical world spent \$43.4 billion on Identification of resistance genes Introgressing into commercial Of this, < 1% actually gets to where the pathogen is What happens to the rest? Ground water resistance, pyramiding genes

Biological Control is an attractive alternative/supplement

Biocontrol of Rhizoctonia on cucumber seedlings





Wednesday, June 14, 2017 Advances in Microbial Technology (1+1)



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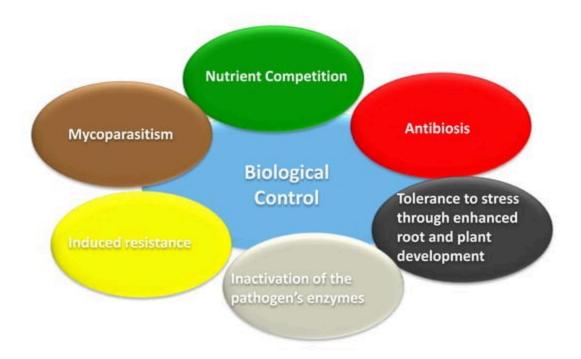
Control of Penicillium mould





Rice Weevil (Sitophilus oryzae) infected with Beauvaria bassiana

How does Biological Control works



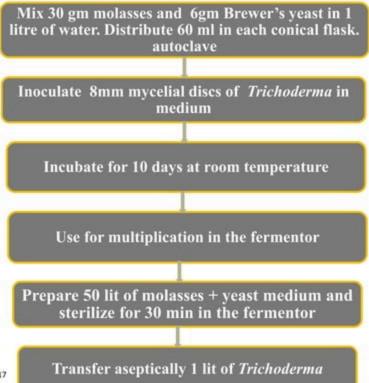
Attributes of successful biocontrol agents

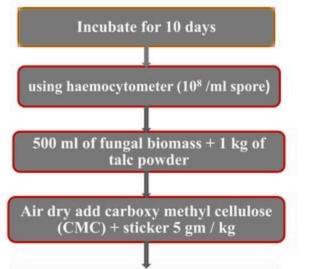
An ideal biocontrol agent should satisfy most all, of the following attributes

- Must not be pathogenic to plants and animals
- · Level of pathogen control must be high
- Should live longer in soil or host tissues
- Should have rapid reproductive capacity
- Should be a good competitor
- Should have high survival rate in soil or host tissues
- Should be capable of controlling more than one pathogen
- Should be suitable for long-term storage
 - Should be compatible to use with agro-chemicals viz. fertilizers, pesticides etc.

Mass production of biocontrol agents

Liquid fermentation method





Store in polythene bag







Substrates for mass multiplication: wheat bran, wheat straw, FYM, press mud, coir pith, ground nut shell, rice bran, etc.









Carrier/ food base materials: Talc, vermiculite, molasses, gypsum, kaolin, peat, sodium alginate, Cacl,





Available biocontrol agents on market

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Organism	Trade Name	Target	Crops
Trichoderma virens	SoilGard 12G3	Pythium, Rhizoctonia, and Root rots	Ornamental and food crop plants grown in greenhouses,
Trichoderma harzianum Rifai strain KRL-AG3	Plant Shield® HC	Fusarium, Pythium, and Rhizoctonia	Cucurbit vegetables, flowers, bedding plants,
Trichoderma harzianum Rifai strain KRL-AG2	T-22™ HC	Fusarium, Pythium, and Rhizoctonia	Agronomic field and row crops, alfalfa, hay and forage crops, bulb crops, cucurbits, fruiting vegetables, herbs, spices, leafy vegetables, cole crops, legumes, root crops, small grains and tuber crops
Trichoderma harzianum Rifai strain KRL-AG2	T-22™ Planter Box	Fusarium, Pythium, and Rhizoctonia	Agronomic field and row crops, alfalfa, hay and forage crops, bulb crops, cucurbits, fruiting vegetables
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Application methods

1.Seed treatment

- · Dose: @5 g /kg of seed
- Method: Make a paste or slurry adding 5 g in 10-20 ml of water.
 Pour 1kg 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

2.Tuber/Rhizome/Cutting treatment:

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

(Medhi,2009)



Seedling Treatment:

Dose: 300 g/ha.

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

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.
- 2) Mixed 250 g in 2 kg cow dung / compost/FYM and spread over 400 sq.m. nursery bed and irrigate the bed.

Soil treatment:

i) Direct broadcasting:

- Dose: 300 g/ha.
- . Method: Mix 300 g in 6 kg of FYM. Broadcast in one ha of land and irrigate the field.

ii) Awaited broadcasting

- Dose: 30 g/ha
- 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:300g /ha.
- 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

Advantages Of Biocontrol Agent

- · Decrease disease intensity.
- · Reduce the use of chemical fungicides.
- Reduce undesirable effects from chemical pesticide.
- Play a key role in integrated management of diseases
- Safe for the users and the farming community.
- Provide natural long term immunity to crops and soil

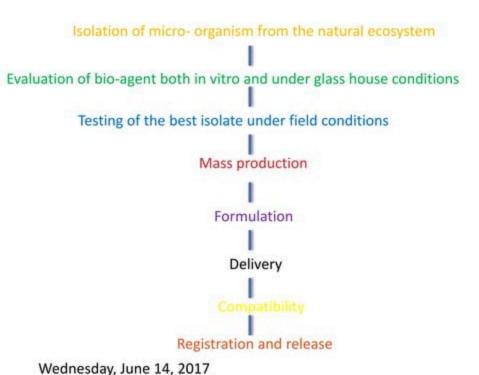
Disadvantages Of Biocontrol Agent

- Deleterious effects on non-target micro-organisms
- Pathogens may develop resistance to the biocontrol agent
- Pathogen replacement may follow control of target disease pathogen
- Seasonal/weather phenomena can make biocontrol agent ineffective

(Shrivastava, 1996).



Commercialization of bio-control products involves



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THANK YOU



ENDOPHYTIC MICROBES
THEIR INTERACTION
WITH PLANTS TO
ALLEVIATE ABIOTIC
STRESS



Mechanism of Disease Control by Endophytes

DOCTORAL SEMINAR -I (APP-788)

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PLANT PATHOGENIC BACTERIA

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HOST PATHOGEN INTERACTION

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