

BIOLOGICALS IN INDIA

—

CHALLENGES & OPPORTUNITIES

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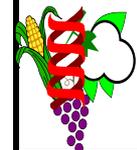
jivo jivasya jivanam

One living entity is food
for another in the
struggle for existence.



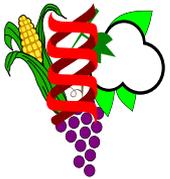
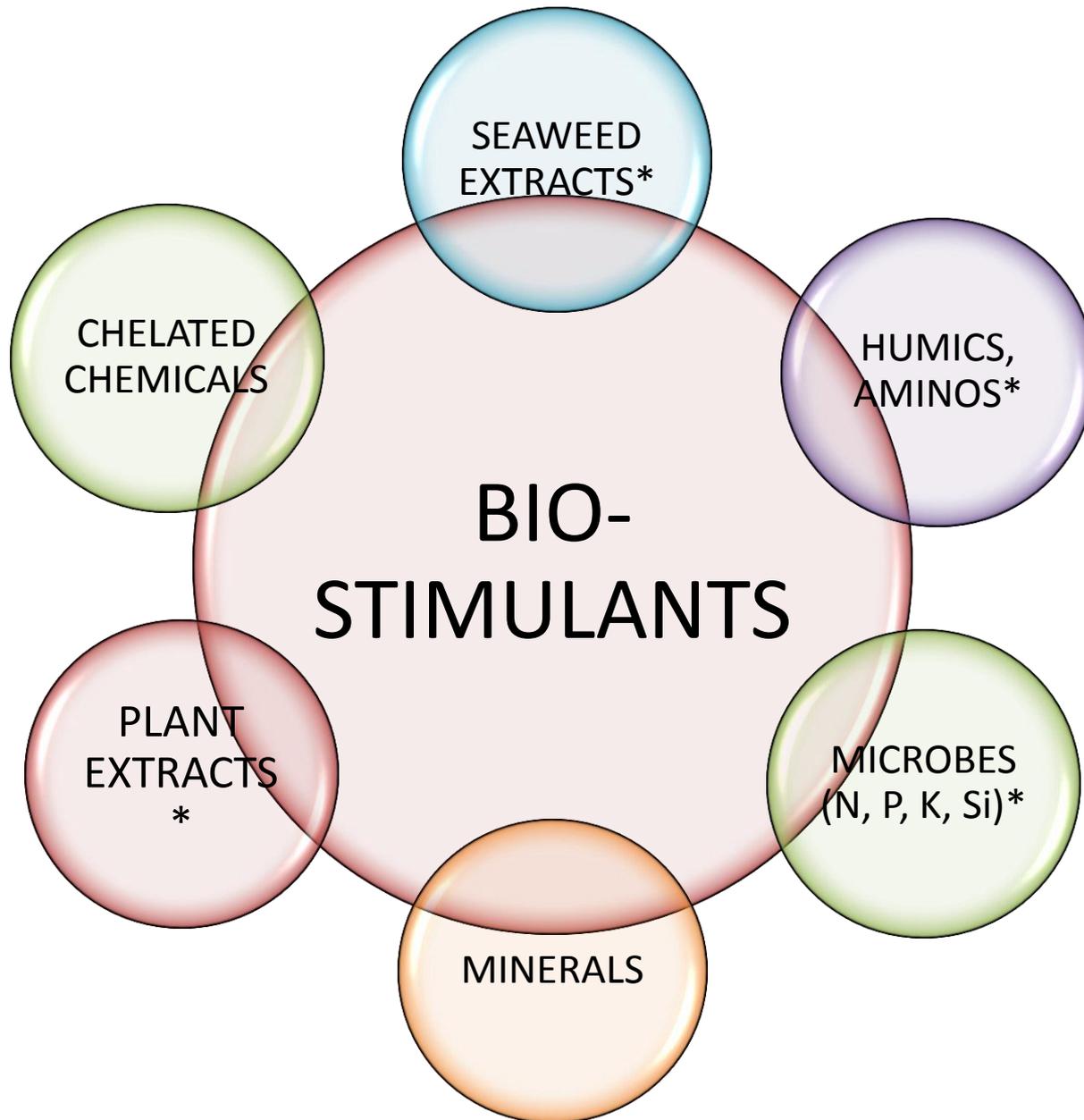
INDIAN BIOLOGICALS – MARKET & SEGMENTS

Biological Products – Segment	Mill \$
BIOSTIMULANTS :	
Mineral/ Natural/ Plant (Seaweeds, Humics, Aminos, Chelates, etc.)	230
Microbial/ Biological Nutrient Elicitors/ Enhancers	85
BIOCONTROLS :	
Plant Extracts : Neem, Pyrethrum, Karanjin, Garlic, etc. (Agriculture)	20
Plant Extracts : Pine, Citronella, Lemongrass, etc. (Home/Garden)	25
SemioChemicals : Pheromones for Agriculture and Storage	15
Microbials (Bacteria, Fungus, Virus, VAM, etc.)	115
Macrobials (Wasps, Nematodes, Beetles, Mites, etc.)	10
TOTAL VALUE (2014-15)	500



Source : Industry Estimates

BIO-STIMULANTS IN INDIA – PRODUCT SEGMENTS



INDIAN BIOSTIMULANTS – MARKET SEGMENTS

BioStimulants – Market	Percent
GOVERNMENT SCHEMES (Central, State, Societies, Agri-Commodity Boards)	20 – 30%
DISTRIBUTORS & RETAILERS (Conventional Marketing/ Distribution)	60 – 65%
SPECIALITY SEGMENT (Organic Farming, IPM Farming, Exporters, Greenhouses)	10 – 15%
SEED INDUSTRY (Seed Treatment, Seed Growing, R & D Activities)	2 – 3%

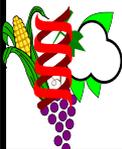
Major Players:

Government :

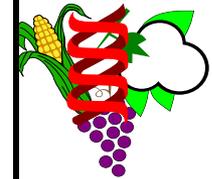
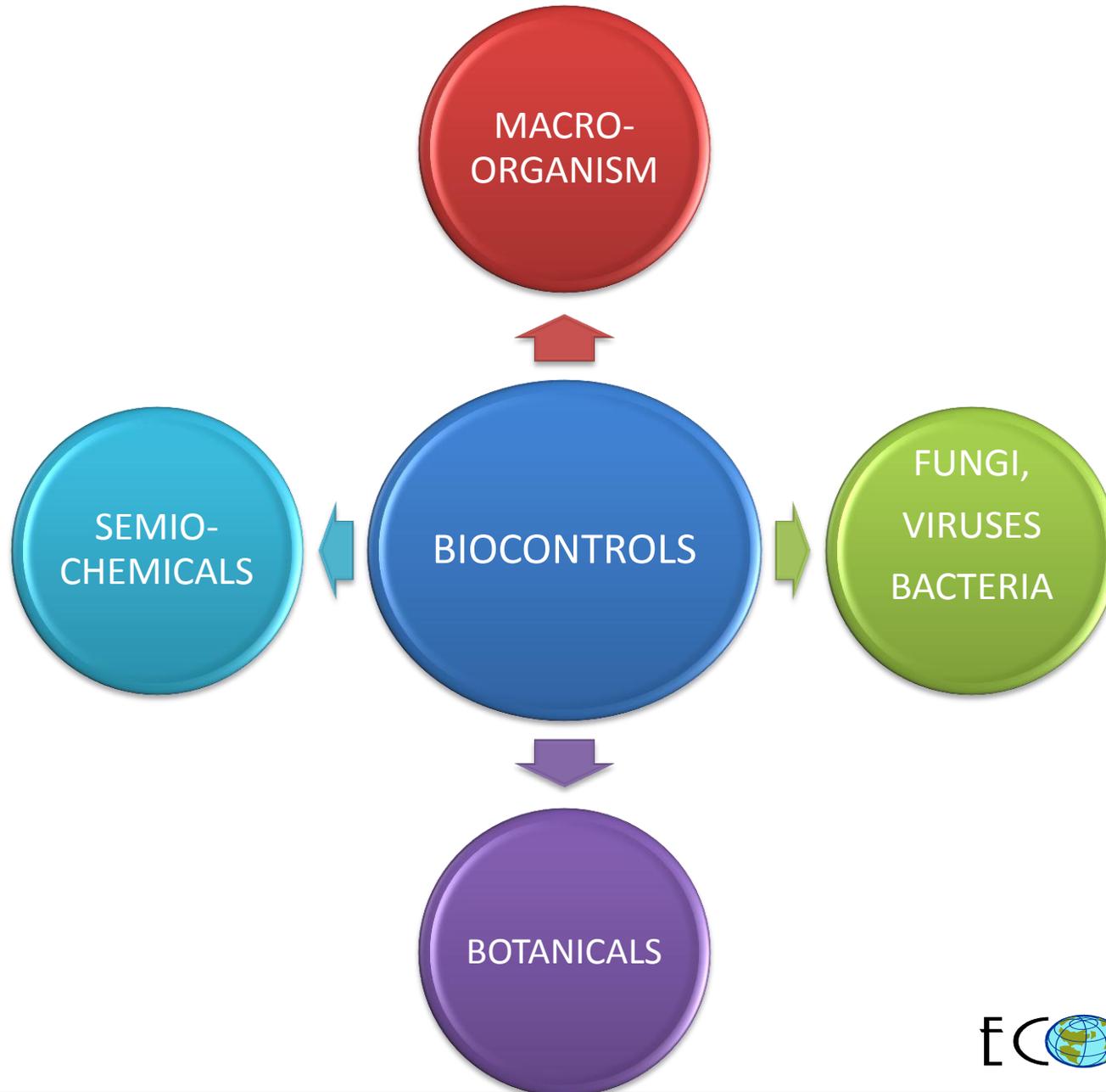
Govt. Corporations and Universities and Agriculture Depts.

Private Companies :

Mega, Large, Medium, Small and Micro



BIOCONTROLS IN INDIA – PRODUCT SEGMENTS



INDIAN BIOCONTROLS – MARKET SEGMENTS

BioControls – Market	Percent
GOVERNMENT SCHEMES (Central, State, Societies, Agri-Commodity Boards)	60 – 70%
DISTRIBUTORS & RETAILERS (Conventional Marketing/ Distribution)	15 – 20%
SPECIALITY SEGMENT (Organic Farming, IPM Farming, Exporters, Greenhouses)	5 – 10%
SEED INDUSTRY (Seed Treatment, Seed Growing, R & D Activities)	3 – 4%

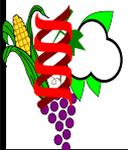
Major Players:

Government :

Govt. Corporations and Universities and Agriculture Depts.

Private Companies :

Large, Medium, Small and Micro



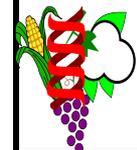
BIO-CONTROLS – INDIAN SCENARIO

- 150 + Registrants of Botanicals like:

Azaridachtin, Pyrethrum, Karanjin, Garlic, Anonin, etc., provide control of Caterpillars, Mites Sucking Pests, and Fungal Diseases.

- 200+ Registrants of Microbials like:

Trichoderma, Pseudomonas, Bacillus, Beauveria, Metarhizium, Verticillium, etc. provide control of Mites, Sucking Pests, Caterpillars and Fungal/Bacterial Diseases.



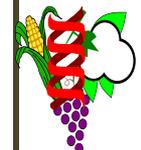
BIOCONTROLS – INDIAN SCENARIO

- **Botanicals** : Azadirachtin, Pyrethrum, Karanjin, Garlic, etc., provide control of Caterpillars, Mites Sucking Pests and Fungal Diseases.
- **Microbials** : Trichoderma, Pseudomonas, Bacillus, Beauveria, Metarhizium, Verticillium, etc. provide control of Mites, Sucking Pests, Caterpillars and Fungal/ Bacterial Diseases.
- **SemioChemicals** : Pheromones for Heliothis, Spodoptera, Fruit fly, Yellow/ Rice Stem Borer, Tuta absoluta, Pink Bollworm, Indianmeal Moth, Cigarette beetle, Sweet Potato Weevil, etc.
- **Macrobials** : Entomopathogenic nematodes, Predatory Beetles, Predatory Mites, Parasitic Wasps, Lacewings



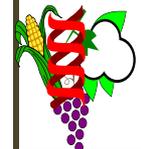
BOTANICALS – INDIAN SCENARIO

- **Botanicals** such as Azadirachtin, Pyrethrum, Karanjin, Garlic, etc.
- **Diseases Controlled** : Powdery Mildew, some Aphid transmitted Viruses.
- **Insects Controlled** : Caterpillars(Helicoverpa, Spodoptera, etc.), Mites(Red mites, Spider mites), Sucking Pests (Mealybugs, Jassids, Thrips, etc.)



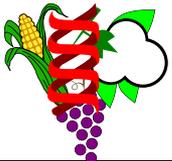
BOTANICALS – INDIAN SCENARIO

- **Botanicals** such as Neem, Citronella, Pine, Eucalyptus, Garlic, Marigold, Cinnamon, Clove, Orange oil, Rosemary, Thyme, etc.
- **Insects Controlled** : Flies, Cockroaches, Mosquitoes, Bedbugs, Dust Mites, etc.



BOTANICAL BIOCONTROLS – INDIAN SCENARIO

- SOURCE OF PLANT MATERIAL : AVAILABILITY – SEASONAL
- QUALITY STANDARDS :
PURITY OF ACTIVE INGREDIENT, CONTAMINANTS.
- EXTRACTION CAPACITIES : ADEQUATE
- TRADITIONAL DELIVERY MECHANISMS :
 - i) SOLVENTS AND EMULSIFIERS – PETROLEUM BASED AVAILABLE
 - ii) NATURAL/ PLANT BASED EMULSIFIERS – DESIRED
- PACKAGING INNOVATIONS : READY TO USE PACKAGING – DESIRED
- DISPERSION TECHNOLOGIES :
 - i) PLANT DERIVED SEED TREATMENT COATINGS – DESIRED
 - ii) MICRO / NANO EMULSIONS – DESIRED

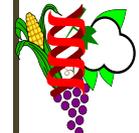


MICROBIAL-FUNGICIDES – INDIAN SCENARIO

Bio-Fungicides such as *Trichoderma*, *Bacillus*, *Pseudomonas*, *Ampelomyces*, etc.

Pathogens Controlled: *Fusarium*, *Pythium*, *Phytophthora*, *Rhizoctonia*, *Aspergillus*, *Alternaria*, *Macrophomina*, *Rhizopus*, *Sclerotium*, *Botrytis*, etc.

Diseases Controlled: Root rot, Seedling rot, Damping off, Collar rot, Wilt, Karnal Bunt, Loose Smut, Ring Rot, Sheath Blight, Blast, etc.



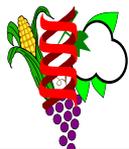
MICROBIAL-INSECTICIDES – INDIAN SCENARIO

Bio-Insecticides :

Bt-K, Verticillium, Beauveria, Metarhizium, Bacillus, Paecilomyces, etc.

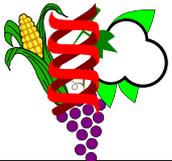
Insects Controlled:

Bollworms, Mites, Mealybugs, Aphids, Jassids, Thrips, Whitefly, Root grubs, Termites, Diamond Back Moth, Nematodes, etc.



MICROBIAL BIOCONTROLS - INDIAN SCENARIO – I

- SOURCE OF ISOLATION :
MAINLY PUBLIC/ GOVT. INSTITUTIONS.
- QUALITY STANDARDS :
PURITY OF ACTIVE INGREDIENT, CONTAMINANTS, MARKET SHELF- LIFE, ABSENCE OF PATHOGENS.
- FERMENTATION CAPACITIES :
 - i) MAINLY LIQUID STATE
 - ii) SOLID STATE] CAPACITY BUILD-UP IS NEEDED FOR BOTH
- TRADITIONAL DELIVERY MECHANISMS :
 - i) SOLID (Talc, Gypsum, Lignite, Peat, Organic, etc.)
 - ii) LIQUID (Oils, Aqueous Media Solutions, Emulsifying Agents, etc.)



MICROBIAL BIOCONTROLS - INDIAN SCENARIO – II

- NEW DELIVERY MECHANISMS : STRIPS & PELLETS.
- DISPERSION TECHNOLOGIES :
 - i) PLANT DERIVED SEED TREATMENT COATINGS – DESIRED
 - ii) ENCAPSULATING ORGANISM IN POLYMERS – AVAILABLE
 - iii) MICRO / NANO ENCAPSULATION OF ORGANISM – DESIRED
- STORAGE CONDITIONS :
 - i) NUTRITION FOR ORGANISMS IN SOLID FORMULATIONS
- PACKAGING INNOVATIONS :
 - i) INCREASING/ IMPROVING AIR EXCHANGE - DESIRED
 - ii) MOISTURE RETENTION – DESIRED
 - iii) READY TO USE PACKAGING – DESIRED



SEMIOCHEMICALS – INDIAN SCENARIO

TARGET INSECT PESTS

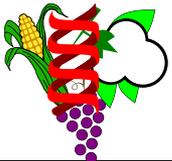
Agriculture: *Heliothis armigera*, *Spodoptera litura*,
Scripophaga incertulas (Rice Stem Borer), *Bactrocera dorsalis* (Fruit Fly), *Bactrocera cucurbitae* (Melon Fly), *Tuta absoluta*, *Pectinophora gossypiella* (Pink Bollworm), etc.

Storage: *Plodia interpunctella* (Indianmeal Moth),
Lasioderma serricorne (Cigarette beetle), *Cylas formicarius*
(Sweet Potato Weevil), *Tribolium confusum* (Confused Flour
Beetle), etc.



SEMIOCHEMICALS – INDIAN SCENARIO

- TECHNICAL SOURCING : AVAILABLE
- QUALITY STANDARDS : PURITY OF ACTIVE INGREDIENT (90 – 95%).
- CHEMICAL REACTION CAPACITIES : MORE THAN ADEQUATE
- DELIVERY MECHANISMS :
 - i) LURES/ TRAPS: RUBBERS, POLYMERS, CORK DISCS – AVAILABLE
 - ii) MATRIX, BEADS – DESIRED
- PACKAGING : TRI-LAMINATES, HDPE – AVAILABLE
- DISPERSION TECHNOLOGIES :
 - i) SOLVENTS / GLYCOLS – AVAILABLE
 - ii) MICRO-ENCAPSULATIONS – DESIRED



MACROBIALS – INDIAN SCENARIO

Predators/ Parasites/ Entomopathogens :

Beetles, Bugs, Lacewings, Mites, Nematodes, Wasps.

Insects Controlled:

*Aphids, Leaf Miners, Mealy Bugs, Mites, Root Grubs, Thrips,
Whitefly.*

Market Challenges:

Land Holdings, Spray Drift; Covered Agriculture; Insectaries.



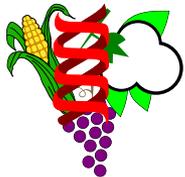
BIOLOGICALS IN INDIA – ONE STOP SOURCE

- HIGHLY TALENTED RESOURCE POOL.
- BIOLOGICALS - PUBLIC/GOVT. BODIES – PROVEN/ TESTED.
- EFFICACY IN VARIED CLIMATIC CONDITIONS – TROPICAL RAINFOREST, TROPICAL SAVANNAH, ARID, SEMI-ARID, TEMPERATE, MOUNTAIN.
- AVAILABILITY OF ALL TYPES OF CROPS – FIELD, GREENHOUSE, ORCHARDS.
- ADEQUATE CAPACITY : EXTRACTION, LIQUID FERMENTATION, CHEMISTRY
- DESIRED CAPACITY : SOLID FERMENTATION, INSECTARIES, FORMULATION.
- EASILY AVAILABLE SOLID CARRIER MATERIALS.
- EASY AVAILABILITY OF OILS AS INERT CARRIERS.
- **CONDUCIVE CLIMATE – HUMID/TEMPERATURE(Everything Grows!)**
 - **CAPTIVE MARKET - 195 Million Ha.**



Status of Seed Treatment in India

- Presently, about 70% seed requirement is the farmer's own stock, sown without treatment.
- Only Commercial Hybrid Seeds are 100% Treated at Processing Plant level.
- Govt. estimates an average 80% of seeds sown in India are Un-treated compared to 100% seed treatment practice in developed countries.
- State seed agencies supply treatment chemical in a small pouch – All may not be using it ?
- Only 10-15% of Self pollinated crops seeds are treated.
- Seed treatment estimated to enhance productivity by 8-10%.



INDIAN GOVT. INITIATIVES IN SEED CARE

Kheti Ki Nai Takneek

An essential information for the benefits of the farmers



TREAT the SEED & SOW
let the healthy crop grow.

Paddy, Wheat & Chickpea
be pest free
making you wealthy.

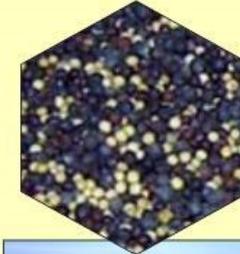
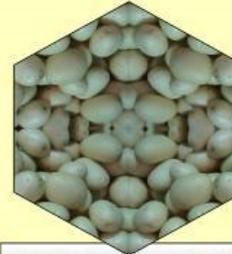


PROTECT every SEED
through
seed treatment

The way you protect
every child through
POLIO vaccination



Provide vaccination to Wheat, Mustard and Gram seed



Seed Treatment: Essential base for Healthy crop

Rabi crops like Wheat, Mustard, Gram, Pulses and Groundnut crops are attacked by different Seed and Soil borne diseases during different growth stages which reduces germination, heavy reduction in yield resulted in great losses to the crops and thus farmers profitability get reduced. Seed treatment is essential to overcome from these problems.



Treated Seed

Method of Seed Treatment:

Seed treatment should be done by seed treating drum. Weigh the seed and pour into the drum and after that recommended quantity of seed treating material should be sprayed on to the seeds and agitate the drum till all the seeds coated with chemicals.



Seed treating Drum



Ministry of Agriculture, Govt. of India, New Delhi

For more detail, Please contact:

Nearest Agricultural Center of state or Central Govt. / Regional Agriculture Center /

Office of Agriculture Department or farmer Call Center, Phone No.: 1551

www.agricoop.nic.in

SEED CARE CHEMICAL CONTROL Vrs. BIOLOGICAL CONTROL

Crop	Disease	Conventional Control	Biological Control
Wheat	Loose Smut/ False Smut	Tebuconazole/ Carbendazim	Trichoderma
Barley	Loose Smut/ False Smut	Carboxin/ Thiram	Trichoderma/ Pseudomonas
Maize/Millet	Charcoal Rot/ Root Rot	Carbendazim/ Thiram	Trichoderma
Rice	Root Rot/Sheath Blight	Carbendazim/ Kitazin	Trichoderma/ Pseudomonas
Chillies	Damping-off/Wilt	Carbendazim/ Captan	Trichoderma/ Pseudomonas
Potato	Blight/	Mancozeb/ Carbendazim	Trichoderma
Tomato	Damping-off/Wilt	Carbendazim/ Captan/ Thiram	Trichoderma/ Pseudomonas
Onion	Purple Blotch	Mancozeb	Trichoderma/ Pseudomonas
Sunflower	Root Rot/ Seedling Rot	Carbendazim/ Captan/ Thiram	Trichoderma
Mustard	Stem Rot	Carbendazim	Trichoderma/ Pseudomonas
Soybean	Root Rot/ Seedling Rot	Carbendazim/ Thiram	Trichoderma
Cruciferous vegetables	Damping-off/Wilt	Carbendazim/ Captan	Trichoderma/ Pseudomonas
Chickpea	Wilt/ Damping off	Carbendazim/ Thiram	Trichoderma
Groundnut	Root Rot/ Collar Rot/ Aflatoxins	Carbendazim/Mancozeb/ Thiram	Trichoderma



The image shows the Taj Mahal, a large white marble mausoleum in Agra, India. It features a central dome and four minarets. The building is reflected in the water of the reflecting pool in the foreground. A semi-transparent banner with the text "Welcome to India" is overlaid on the water.

Welcome to India



MAKE IN INDIA

THE SAVINGS ARE UP FOR GRABS



Thank You



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