

Sprinkle the heap with water intermittently. Turn the mixture in every 3-4 days interval and then broadcast in the field.

- Plant Treatment: Drench the soil near stem region with 10g Trichoderma powder mixed in a litre of water.

Precautions:

- Don't use chemical fungicide after application of Trichoderma for 4-5 days.
- Don't use trichoderma in dry soil. Moisture is an essential factor for its growth and survivability.
- Don't put the treated seeds in direct sun rays.
- Don't keep the treated FYM for longer duration

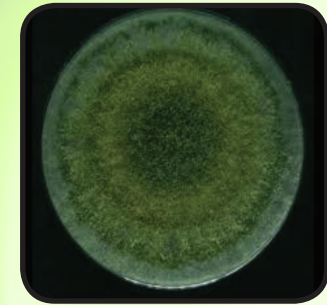
Diseases controlled by Trichoderma

Crops	Diseases	Method of Application
Rice	Sheath Blight, Bacterial Leaf Blight, Sheath rot	Foliar Application
Potato	Damping off, Black Scurf, Charcoal Rot	Tuber Treatment
Tomato	Stem rot, Damping off	Soil treatment, Seedling treatment
Cauliflower	Damping off	Soil treatment
Peas	Damping off	Soil treatment
Turmeric, Ginger	Rhizome rot	Rhizome treatment
Soyabean	Damping off	Soil treatment
Egg plant	Collar rot	Seed treatment

Onion	Root Rot	Soil treatment
Banana	Wilt	Rhizome treatment
Tea	Collar rot, Black Root Rot	Soil treatment
Cucumber	Wilt	Soil treatment
Black Pepper, capsicum	Root rot	Soil treatment, Seedling treatment
Betel vine	Root rot	Soil treatment
Strawberry	Damping off	Soil treatment

TRICHODERMA

A BIO-CONTROL AGENT FOR MANAGEMENT OF SOIL BORNE DISEASES



About Trichoderma:

Trichoderma is a very effective biological mean for plant disease management especially the soil borne related diseases. It is a free-living fungus which is common in soil and root ecosystems. It is highly interactive in root, soil and foliar environments. It reduces growth, survival or infections caused by pathogens by different mechanisms like competition, antibiosis, mycoparasitism, hyphal interactions, and enzyme secretion.

Biocontrol mechanisms of Trichoderma:

The Trichoderma may suppress the growth of the pathogen population in the rhizosphere through competition and thus reduce disease development. It produces antibiotics and toxins such as trichothecin and a sesquiterpine, Trichodermin, which have a direct effect on other organisms. The antagonist (Trichoderma) hyphae either grow along the host hyphae or coil around it and secrete different lytic enzymes such as chitinase, glucanase and pectinase that are involved in the process of mycoparasitism. Examples of such interactions are *T. harzianum* acting against *Fusarium oxysporum*, *F. roseum*, *F. solani*, *Phytophthora colocaciae* and *Sclerotium rolfsii*. In addition, Trichoderma Enhances yield along with quality of produce. Boost germination rate. Increase in shoot & Root length Solubilizing various insoluble forms of Phosphates Augment Nitrogen fixing. Promote healthy growth in early stages of crop. Increase Dry matter Production substantially. Provide natural long term immunity to crops and soil.

Benefits of Trichoderma

Disease Control: Trichoderma is a potent biocontrol

agent and used extensively for soil borne diseases. It has been used successfully against pathogenic fungi belonging to various genera, viz. *Fusarium*, *Phytophthora*, *Sclerotia* etc.

Plant Growth Promoter: Trichoderma strains solubilize phosphates and micronutrients. The application of Trichoderma strains with plants increases the number of deep roots, thereby increasing the plant's ability to resist drought.

Biochemical Elicitors of Disease:

Trichoderma strains are known to induce resistance in plants. Three classes of compounds that are produced by Trichoderma and induce resistance in plants are now known. These compounds induce ethylene production, hypersensitive responses and other defense related reactions in plant cultivars.

Transgenic Plants: Introduction of endochitinase gene from Trichoderma into plants such as tobacco and potato plants has increased their resistance to fungal growth. Selected transgenic lines are highly tolerant to foliar pathogens such as *Alternaria alternata*, *A. solani*, and *Botrytis cinerea* as well as to the soil-borne pathogen, *Rhizectonia* spp.

Bioremediation: Trichoderma strains play an important role in the bioremediation of soil that are contaminated with pesticides and herbicides. They have the ability to degrade a wide range of insecticides: organochlorines, organophosphates and carbonates.

Benefits of Trichoderma:

- Improves soil fertility
- It kills the soil pathogens

- Improves roots and Shoot growths
- Enhances flowering of the crops
- Increases phosphate uptake
- Developing plants' resistance and tolerance against diseases and pests.

Secondary benefits

- No transplanting shock due to longer root
- Improve the post harvest quality storage

Indirect Benefits

- Cost of production will be reduced
- Improve soil fertility
- Eco-friendly, beneficial for environment
- Sustainable agriculture
- Organic Farming

Method of application:

1. **Seed treatment:** Mix 6 - 10 g of Trichoderma powder per Kg of seed before sowing.
2. **Nursery treatment:** Apply 10 - 25 g of Trichoderma powder per 100 m² of nursery bed. Application of neem cake and FYM before treatment increases the efficacy.
3. **Cutting and seedling root dip:** Mix 10g of Trichoderma powder along with 100g of well rotten FYM per litre of water and dip the cuttings and seedlings for 10 minutes before planting.
4. **Soil treatment:** Apply 5 Kg of Trichoderma powder per hectare after turning of sun hemp or dhaincha into the soil for green manuring. Or Mix 1kg of Trichoderma formulation in 100 kg of farmyard manure and cover it for 7 days with polythene.