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Trichoderma

(A potential bioagent for seed and soil-borne diseases)

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What is Bioagent?

A biological agent or biological agent is any organism that can be used as a weapon in the field of bio welfare. It can be bacteria, viruses, fungi or protozoa. Trichoderma harzianum, Trichoderma viride, Pseudomonas, Bacillus, white mushroom, green may mushroom etc. It is one of the important biological diseases.

Benefits

- It is environment friendly.
- No chemical residue is left behind.
- Effective against a wide range of plant pathogenic fungus.
- Producing is simple and inexpensive.
- Reduces the need for harsh, costly chemical fungicides.
- Reduces crop losses while increasing output.
- A possible source of income.

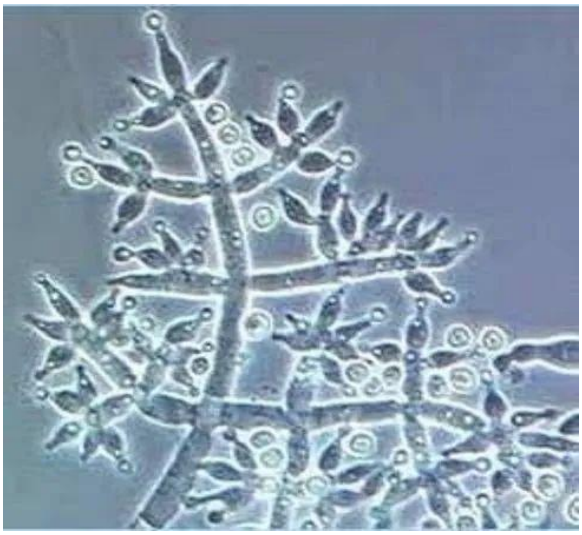

Fig. *Trichoderma harzianum* petri plate and microscopic view of *Trichoderma viride*

The *Trichoderma*

Trichoderma is a species of fungus that occurs in all agricultural and forest soils and habitats and is non-toxic to plants. It is also competitive and has an effect on many species of plant pathogenic fungi. Trichoderma species are excellent antagonists capable of hyper parasitizing plant pathogenic fungi. They grow quickly, have many pathogens, compete well with other soil organisms, are resistant to pesticides, and produce many antibiotics (such as gliotoxins and viroidins). Trichoderma spp. in many crops. He worked

on the control of soil and seed-borne fungal diseases such as Fusarium, Rhizoctonia, Pythium, Sclerotinia, Sclerotinia and Phytophthora.

***Trichoderma* species**

The genus Trichoderma contains more than 80 species that can be used to kill phytopathogenic bacteria. Trichoderma harzianum, Trichoderma viride and Trichoderma harzianum are the best anti-inflammatory drugs.

Seed and soil-borne diseases: Blight - Pythium, hauv paus rot - Rhizoctonia, vascular wilt - Fusarium, Verticillium wilt, Fusarium wilt - Alternaria, Curvularia, Phytophthora, mos rot - Erwinia spp., Smut - Ustilago spp., Plag chaw - Cercospora...

Biocontrol mechanism with *Trichoderma* spp.

- Antibiosis.
- Mycoparasitism.
- Induced resistance.
- Competition for nutrients or space.
- Tolerance to stress through enhanced root and plant development.
- Inactivation of the pathogen enzymes.

Preparation of *Trichoderma* Bioformulation

Trichoderma is often used in talc-based biologic form. Solid-state fermentation is a method for producing Trichoderma biologics.

Solid state fermentation

Some grains such as sorghum, millet and ragi are used as substrates for Trichoderma flowers. Rice is moistened, carefully washed and sterilized. Rice is contaminated with Trichoderma after sterilization. Spore suspension concentration is 2 x108 cfu/ml and incubated at 25±1°C for 10-15 days. After 15 days, Trichoderma forms a dark green spore layer on the grain. The spores are then ground into powder and mixed with pre-sterilized talc in a ratio of 1:9. 5 gm/kg carboxymethylcellulose (CMC) is used as an excipient during packaging.

Fig. *Trichoderma* powder

Mode of Application

A. Seed Application

a. Seed Treatment

Before sowing, 5-10 g of Trichoderma powder is applied to 1 kg of fresh seeds. Seed treatment is effective in preventing damping off and root rot.

b. Seed Biopriming

Seed biopriming is the process of treating seeds with Trichoderma biologic (@5gm/kg) and incubating them in warm, moist conditions until the seeds germinate. Bioprimer seeds are planted in the field after the roots appear. Seed bioprimers help

tomato, eggplant, soybean and chickpea crops.

A. Soil Application

Mix 1 kg of Trichoderma biological into 25 kg of farmyard manure (FYM). Mix well and store in a cool place for a week. Trichoderma-based FYM was applied to the field 15 days before planting. This mixture is sufficient for one hectare of land. 4-5 grams of trichoderma powder in 1 litre of water. Before planting, soak the seedling root for 5-6 hours. Rooting is used to prevent and control vegetable blight.

B. Seedling Application

In 1 litre of water, dissolve 4-5 gm Trichoderma powder. Before transplanting, soak seedling roots in the suspension for 5-6 hours. Root dipping is effective against damping-off disease in vegetables.

Precautions

- Don't use chemical fungicides after application of Trichoderma for 4-5 days.
- Maintain adequate moisture levels in Trichoderma-treated soil.
- Don't keep Trichoderma-treated seeds in direct sunlight.

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