Trichoderma - A fungal biological agent

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Trichoderma spp. is the saprophytic fungi that are present in all soils and other diverse habitats. They are known for their production of several lytic enzymes and antibiotics, In addition, certain strains can induce systemic and localized resistance to several plant pathogens. Moreover, some strains may enhance plant growth and development, among them *T. viride* and *T. harzianum* are commercialized. Strains of these species are widely used in biocontrol of soil borne plant-pathogenic fungi occurring in the most extreme to the most mundane of habitats. Many physiological, antifungal and insecticidal activities have been attributed to this species. Trichoderma fungus is well known for disease and nematode control of crop plants. The genus *Trichoderma* act as biological control agents and the antagonistic properties of them are based on the activation of multiple mechanisms. It depends on the crop plants and the environmental conditions including nutrient availability, pH, temperature, light and iron concentration.

Mode of disease control:

– *Mycoparasitism:* During early parasitism Trichoderma releases cellulases and chytinases, so dissolves cell wall of the target fungi then produces haustoria intracellularly to the fungal mycelia and gain nutrition, making them unfit for reproduction and even death.

– *Competition:* These fungi compete with other disease causing microbes for nutrients and space.

– *Production of lytic enzymes:* Trichoderma controls diseases by the production of several lytic enzymes *viz*., β-1-3 glucanases and chytinases.

– *Trichoderma harzianum* produces enzymes such as protease which controls *Botrytis cinerea*.

– *Antibiosis*: *T. viride* produces antibiotics (Viridine) controlling disease causing microbes.

– Trichoderma also solubilizes phosphates and micronutrients.

– Production of toxin: Trichothesin a toxin produced by this bioagents affects the target fungi.

– Trichoderma are also helpful in solubilization and sequestration of inorganic nutrients.

– Induces defense responses in crop plants (Induced resistance).

– Inactivation of the pathogen's enzymes.

– Trichoderma controls nematode infestation by feeding on infective nematodes.

– This bioagent increase the rate of plant growth and development, by developing more robust roots. These deep roots cause crops, such as corn, and ornamental plants to become more resistant to drought.

– Blocks soil pores: Trichoderma mycelia and conidia blocks the movement of zoospores and other soil borne fungal spores through soil pores.

– It blocks the early signal transduction phenomenon between host and parasites.

Method of application:

*Seed treatment***:** For one kg of seeds about 40 grams of *Trichoderma* product is required. Mix required quantity of *Trichoderma* with equal quantity of Rice gravel .With this mixture, mix the required amount of seeds shade dry and after 24 hours, use the seeds of sowing. Some of the examples of seed borne diseases: Anthracnose of beans, Brinjal phomopsis blight, Ragi blast, black gram blight etc.

*Seedling Root dip***:** Mix 2 Kg of Trichoderma with 50 lits of water. In this mixture, keep the seedling roots in immersed condition for 10 minutes and use the seedlings for transplantation in the field. Some of the examples:Tamoto, Brinjal, Redgram, Banana against wilt disease.

Soil application: Mix about 5 kgs Trichoderma with 100 kgs of organic manure, keep the mixture under shade for one week and apply to the soil.

Recommended crops:Trichoderma viride along with *Pseudomonas fluorescens* is recommended for all crops in all the seasons for disease control and plant growth promotion. Trichoderma is effective against almost all soil borne fungal pathogens *viz*. Pythium, Phytophthora, Rhizoctonia, Sclerotium, Colletotrichm, Fusarium species etc.

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