

Trichoderma in Plant Disease Management



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Introduction

The population explosion has caused a need for more food with increasing amount of land devoted to crop production. Intensification and monocropping have resulted in increasing disease pressure. Although application of synthetic fertilizers and pesticides has given higher yields, environmental balances have been disrupted and considerable crop damage by insect and pathogens still occur. Plant diseases are one of the limiting factors in crop production and are causing 13-20 per cent of losses.

Management of the diseases by chemicals even though very effective, is relatively short term measure and the accumulation of harmful chemical residues is causing serious ecological problems. Moreover, use of such chemicals is also very costly and unaffordable. Biological methods, on the other hand can be economical, long lasting and free from residual side effects. The main purpose of the biological control of a plant disease is to suppress the inoculum load of the target pathogen to a level, which would not cause potential economic loss in a crop.

The major fungal groups as biocontrol agents are *Trichoderma*, *Metarrhizium*, *Beuveria* etc..and among bacteria *Pseudomonas* and *Bacillus* are important. *Trichoderma* is one of the potential Biocontrol agent which supresses many soil borne plant pathogens.

Biocontrol mechanism involving *Trichoderma* is by way of mycoparasitism, antibiosis and competition with pathogens.

Mass production of *Trichoderma*

1. Isolate the most promising effective strains from the soil using specific method and store this culture for future multiplication.
2. Isolates can be stored by culturing the fungi on PDA slants and keeping them in the refrigerator at a temp of 4-5° C.



3. This can be mass cultured on substrates such as potato jaggery broth and jowar grains.

A) Potato-jaggery broth as substrate

1. Potato jaggery broth method to prepare one litre of broth, take 200 g of good potatoes, remove the skin, wash them and cut into small pieces.
2. Take these pieces in 500 ml of water and cook them for about 20 minutes.



3. Remove these pieces by sieving and keep the keep its liquid in a beaker.
4. In another beaker take 500ml of water, boil it and add 20 g of jaggery.
5. Mix this, with the above solution and make up the volume to one litre.
6. Then pour 150 ml of this broth into conical flasks of 250 or 500ml size and sterilise them in a autoclave.
7. Next day incoulate the *Trichoderma* culture to this broth in a laminar flow.

8. The fungus will take 8-10 days to grow in the form of mat and the whole broth and mat is homogenised using a grinder.
9. Then mix talc powder to this @1kg/2lit of the broth-fungus mixture, dry under shade for one day.
10. Pack the talc formulation in poly bags it as per required quantity and seal it.

B) Jowar grain as substrate

1. Select good quality grains, wash them properly to remove all dirt particles.
2. Cook these grains for about 30 minutes to make the grains soft, drain off the excess water and dry under shade for about an hour.



3. Later grains are filled in a polypropylene bags @250g/bag, close the mouth with non-absorbant cotton and sterilise in autoclave.
4. Next day, take up inoculation with *Trichoderma* culture in lamminar flow by placing a pieces of fungal mat from the culture tube.
5. It takes about 15-20 days for the fungus to grow on all the grains. Later grind these grains using a grinder.

6. Add talc powder @1kg/100ml of mixture. This mixture is dried in shade for one day and packed as per requirement and seal it.

Recommendations

Trichoderma is effective against soil borne diseases like collarrot, damping off, foot rot, rhizome rot, rootrot, stemrot, wilts caused by different fungi genera like *Phytophthora*, *Rhizoctonia*, *Sclerotium*, *Macrophomina* etc.. in crops like brinjal, cardamom, cucumber, ginger, groundnut, bhendi, pepper, turmeric etc. Use of freshly prepared formulation is recommended as storing for long time may lead to loss of viability of the spores.

Application Methods

A) Seed treatment :

Seeds are made wet by sprinkling water and mixed with talc based *Trichoderma* @10 g/kg of seed, before sowing.



B) Seedling dip treatment : Seedlings of crops like brinjal and chilli are dipped in the solution of *Trichoderma* (50 g/lit of water.) for 10 minutes before transplanting in the main field.



C) Soil Drenching :

Prepare *Trichoderma* solution @ 50 g/lit of water and and drench to the base of the crops like pepper (200 ml), brinjal and chilli (50 ml).



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