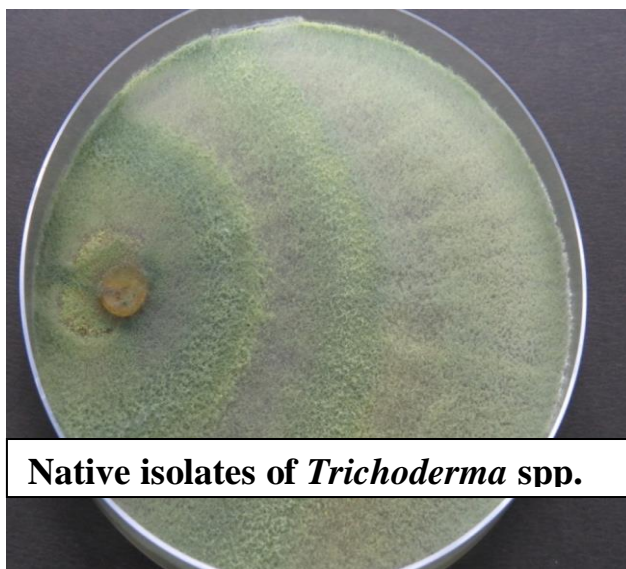


# Use of native isolates of *Trichoderma* spp. for efficient control of Soil borne diseases

## Background:

*Trichoderma* spp. are among the most frequently isolated soil fungi and present in plant root systems. *Trichoderma* produce lytic enzymes like chitinase and  $\beta$ -1,3-glucanase break down cell wall polysaccharides into short oligomers and by this way facilitate the hyperparasite to penetrate into the cytoplasm of the target fungi. The aim of this study was to isolate native *Trichoderma* spp. and screening for their antagonistic ability by dual cultures against test pathogens as well as their capability to manage crop diseases in standing crop in the field. Species of *Trichoderma* protect plants against the attack of soil-borne plant pathogens by competing for nutrients and inhibiting or killing plant pathogenic fungi and Oomycetes, through the production of antibiotics and/or hydrolytic enzymes. In addition to the role of species of *Trichoderma* as biocontrol agents, they have other beneficial effects on plants, including the stimulation of plant defences and the promotion of plant growth.



Southern districts of Rajasthan has high cropping intensity %. Main crops growing in this region are Maize, Cotton, Paddy, Chickpea, Soybean, Wheat, Pigeonpea, mungbean, blackgram, ginger, tomato, cabbage, cauliflower, pea, onion, mango, papaya etc. But these crops are widely affected by various biotic and abiotic stresses. Farmers are spraying number of chemicals but unaware with the fact that these chemicals with higher residue are dangerous to their health and environment. Various seed and soil borne disease affecting the crops and causing high economic loss every year. The disease management through chemical is costly and is not eco-friendly therefore application of *Trichoderma* formulation is an easy and most

suitable measure to tackle soil borne pathogens. For this farmers of the region need consistent supply of *Trichoderma* formulation. Moreover native strains of this region yet not isolated and characterized thereby no bioformulation is available. Therefore there is an urgent need of *Trichoderma* formulation made from native strains.

### Interventions:

We have collected soil samples from crop rhizosphere of seven districts of southern Rajasthan. The districts included were Banswara, Dungarpur, Rajasamand, Pratapgarh, Udaipur, Sirohi and Chittorgarh. Isolated 74 *Trichoderma* isolates in the laboratory. To identify the species of the isolates we did microscopic observations of fungal conidia, conidiophores and Phialides branching pattern and matched with the available literature. The 74 isolates available with us comprise eight species of *Trichoderma*. The morphologically identified species were examined at molecular level to confirm the species of *Trichoderma*. For this we have extracted DNA of all isolates and applied molecular identification tools, which are based on DNA fingerprinting and sequence analysis of multiple genes. We have screened these *Trichoderma* isolates against soil borne pathogen *Sclerotium rolfsii* (*Sr*), *Rhizoctonia solani* (*Rs*) and *Fusarium verticillioides* (*Fv*). In this assay the efficacy of *Trichoderma* isolates to inhibit the growth of pathogen in *in vitro* was studied. Results showed that *T. harzianum* (BThr29 ) and *T. asperellum* (BTas25 ) performed well against soil borne pathogens.

### Outcome:

A talc based bioformulation was prepared using *T. harzianum* BThr29 with  $2 \times 10^8$  cfu/g. This formulation can be used as for seed treatment @ 10g/kg seeds. For soil application, it can be enriched with FYM (1:200) and for drenching 10g/lit water can be used. This formulation we used for field trials. We have evaluated the



best *Trichoderma* isolates in field conditions at Agricultural Research Station, Banswara to study the effect of most potent *Trichoderma* isolate obtained after *in vitro* studies, against pathogens causing post flowering stalk rot in maize. Results of the study showed that the soil application with *T. harzianum* BThr29 ( $1 \times 10^8$  cfu/g) enriched FYM + Seed treatment with *T. harzianum* BThr29 ( $1 \times 10^8$  cfu/g) + Furrow application of *T. harzianum* BThr29 ( $1 \times 10^8$  cfu/g) at the time of sowing reduce disease severity to 13.3% as compared with control and there was 72.2% reduction in disease over control.

The formulation developed has been tested at farmers' field against diseases like post flowering stalk rot in maize, root rot and wilt in chickpea. The encouraging results obtained in experimental trials help to include application of *Trichoderma harzianum* formulation in package of practice for zone IVB of Rajasthan. Department of Agriculture has widely distributing the formulation as demonstration to the farmers for its application in the field.

### **Future Potential and Impact:**

With the implementation of this project, this is for the first time in Rajasthan we have isolated large number of isolates from 7 districts of southern Rajasthan. It helped to delineate the *Trichoderma species* available in crop rhizosphere of southern Rajasthan. We have also did the diversity analysis of these *Trichoderma* isolates which helped to assess the diverse nature of the isolates. This helped to provide the most potent native *Trichoderma* isolate to farmers. This isolate will be further utilized for production of bioformulation in large scale which will not only be useful for farmers from southern Rajasthan but can also be useful for farmers from entire Rajasthan.

### **Additional information:**

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