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# Evaluation of different organic materials as carrier for formulated product of *Trichoderma*

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**ABSTRACT**: Four locally available organic materials *viz.*, farm yard manure, rice bran, saw dust and wheat bran were evaluated for their suitability as a carrier for a talc based formulation of *Trichoderma viride*. Mixtures of *T. viride* and these carriers were applied in soil to control root diseases of sunflower. The results revealed that saw dust + *T. viride* mixture significantly reduced plant mortality caused by root pathogens with commensurate increase of achene yield in sunflower.

**KEY WORDS**: Biocontrol, organic materials, root diseases, sunflower, *Trichoderma viride*

Several species of *Trichoderma* have been successfully used in the biological control of important soil borne root pathogens *viz.*, *Fusarium* spp. (Sivan and Chet, 1986; Carver *et al.*, 1996), *Pythium aphanidermatum* (Sivan *et al.*, 1984), *Rhizoctonia bataticola* (Vyas, 1994), *R. solani* (Elad *et al.*, 1981) and *Sclerotium rolfsii* (Elad *et al.*, 1980). These pathogens cause damping off, root rot, collar rot and wilts in several field, oilseeds and vegetable crops. Seed treatment with spores of *Trichoderma* protects the seedlings of cotton (Alagarsamy *et al.*, 1987) and chickpea (Mukhopadhyay, 1995) from these pathogens. A talc based commercial formulation of *T. viride* was found effective in controlling root-rot diseases of urdbean when used for seed treatment (Ramakrishnan *et al.*, 1994). Combined use of seed treatment followed by soil application of formulated product of *T. viride* has effectively controlled damping off and root rot diseases in cotton (Mathivanan *et al.*, 1997).

The talc formulation can be used directly for seed treatment. But for soil application in large areas, a suitable organic carrier material is required especially when

small quantities of commercial formulation of *Trichoderma* is used. The carrier material should be readily available and cost effective. To this end, therefore, four locally available materials were selected and investigated for their suitability as carriers for soil application of *Trichoderma*.

Talc-based formulation of *T. viride* was obtained from the Centre for Plant Protection Studies, Tamil Nadu Agricultural University, Coimbatore. The population of *T. viride* was $1x10^8$ colony forming unit (cfu) per gram of product, at the time of application. The field experiment was laid out in a randomised block design (RBD) with four replications during Rabi, 1996 at Nagarjuna Agricultural Research and Development Institute, Wargal, Medak district, Andhra Pradesh. Sunflower hybrid SSH-999 was used. Each plot measured 5.4 x 4.2 $m^2$. Rows were separated by 60 cm with plant spacing of 30 cm.

Seeds were treated with talc formulation of *T. viride* @ 10g/kg seeds, in all treatments except control. Formulation of *T. viride* @ 2.5 kg/ha was mixed separately with 100 kg each of farm yard manure (FYM), rice bran (RB), saw dust (SD) and wheat bran (WB). This mixture was applied in the furrows of main field before sowing. Small quantity of the mixture (same quantity as mentioned above for one ha) was applied once again near the plants at 30 days after sowing (DAS) and covered with soil. The initial plant population was recorded at 20 DAS. Progressive plant mortality due to damping off and collar rot was assessed at different intervals. Ten heads were sampled in each plot at 75 DAS and their size was measured. At maturity, all the heads were harvested from each plot, threshed and weight of seed recorded. Application of *T. viride* and organic material mixtures in soil significantly reduced plant mortality in sunflower as compared to untreated control. However, minimum plant mortality (0.4%) was recorded in *T. viride* + SD mixture applied plots as against 11.2 per cent in control. The head size of sunflower was significantly large in the above treatment. This was followed by treatments consisting of mixture of *T. viride* + WB, RB and FYM. Maximum seed yield was recorded in plots applied with *T. viride* + SD mixture, followed by WB, FYM and RB (Table 1). Increment in yield could be due to higher plant population in treated plots as compared to control. The talc formulation of *T. viride* was found to be an effective biofungicide for protecting cotton and legume plants from root diseases caused by many soil-borne pathogens (Ramakrishnan *et al.*, 1994; Mathivanan *et al.*, 1997). Elad *et al.* (1980) and Sharma (1994) observed that a wheat bran: saw dust: tap water mixture of *T. harzianum* significantly reduced diseases caused by *S. rolfsii* or *R. solani* in beans, cotton, tomato and chickpea.

In saw mixture, *T. viride* might have established and grown faster by secreting cellulolytic enzymes. These enzymes consequently would have degraded the cellulose present in the saw dust. Therefore, the antagonist could combat the pathogens effectively when mixed with saw dust and provide better control of soil-borne diseases in sunflower.

Table 1. Effect of *T. viride* + carrier materials on plant mortality, head size and seed yield in sunflower

| *T. viride* + Carrier | Plant mortality (%) | Head size (cm) | Seed yield (kg/ha) |
|---|---|---|---|
| FYM | 1.7 (7.5)b | 16.9c | 1625ab |
| Rice bran | 3.3 (10.5)c | 17.6bc | 1538b |
| Saw dust | 0.4 (3.2)a | 19.2a | 2133a |
| Wheat bran | 2.3 (8.7)b | 18.2b | 1875ab |
| Control | 11.2 (19.6)d | 13.6d | 1509b |
| CD (P = 0.05) | (1.4) | 0.7 | 514 |

In a column, means followed by common letter are not significantly different at P = 0.05.
Figures in bracket are angular transformed values.

## REFERENCES


Alagarsamy, G., Mohan, S. and Jeyarajan, R. 1987. Effect of seed pelleting with antagonists in the management of seedling disease of cotton. *Journal of Biological Control*, **1**: 66-67.

Carver, C. E., Pitt, D. and Rhodes, D. J. 1996. Aetiology and biological control of *Fusarium* wilt of pinks (*Dianthus carryophylus*) using *Trichoderma aureoviride*. *Plant Pathology*, **45**: 618-630.

Elad, Y., Chet, I. and Katan, J. 1980. *Trichoderma harzianum*: a biocontrol agent effective against *Sclerotium rolfsii* dn *Rhizoctonia solani*. *Phytopathology*, **70**: 119-121.

Elad, Y., Hadar, Y., Hadar, E., Chet, I. and Henis, Y. 1981. Biological control of *Rhizoctonia solani* by *Trichoderma harzianum* in carnation. *Plant Disease*, **65**: 675-677.

Mathivanan, N., Srinivasan, K. and Chelliah, S. 1997. Evaluation of *Trichoderma viride* and carbendazim for integrated management of root diseases in cotton. *Indian Journal of Microbiology*, **37**: 107-108.

Mukhopadhyay, A. N. 1995. Biological seed treatment with *Gliocladium* and *Trichoderma* for control of chickpea wilt, pp. 18-20. In: Fifth International *Trichoderma/Gliocladium* Workshop, USDA, Beltsville, USA.

Ramakrishnan, G., Jeyarajan, R. and Dinakaran, D. 1994. Talc-based formulation of *Trichoderma viride* for biological control of *Macrophomina phaseolina*. *Journal of Biological Control*, **8**: 41-44.

Sharma, B. K. 1994. Efficacy of biocontrol agents for the control of chickpea stem rot. *Journal of Biological Control*, **8**: 115-117.

Sivan, A. and Chet, I. 1986. Biological control of *Fusarium* species in cotton, wheat and muskmelon by *Trichoderma harzianum*. *Journal of Phytopathology*, **116**: 39-47.

Sivan, A., Elad, Y. and Chet, I. 1984. Biological control effects of a new isolate of *Trichoderma harzianum* on *Pythium aphanidermatum*. *Phytopathology*, **74**: 498-501.

Vyas, S. C. 1994. Integrated biological and chemical control of dry root rot on soybean. *Indian Journal of Mycology and Plant Pathology*, **24**: 132-134.