

***Trichoderma harzianum*—A potential bioagent for seed and soil borne diseases management in Upper Krishna project command area of Karnataka, India**

V.B. NARGUND, Y. S. AMARESH*, A.G. SREENIVAS¹ AND SUSHILA NADAGOUDA¹

Dept. of Plant Pathology, College of Agriculture, UAS, Bheemarayanagudi, GULBARGA (KARNATAKA) INDIA

ABSTRACT

Trichoderma spp, a potential bio agent is very commonly used in the management of seed and soil borne diseases. *Trichoderma harzianum* a local isolate was used in the present study. Polythene bags (20 µ), Tarsons and Borosil conical flasks were tested to reduce the cost of production of *Trichoderma* on PDB. Polythene bags lost the strength and there was very poor growth of the *Trichoderma*. Two-carrier materials viz., fly ash and talc powder were tested for seed treatment formulation. Talc powder was found better. Presently, *Trichoderma* is multiplied on PDB. Product so produced is popularized with the help of Extension Education Unit, Bheemarayanagudi, State Department of Agriculture, and Krishi Vigyana Kendras, among farmers in managing the seed and soil borne diseases of many field and horticultural crops in UKP Command area .

Key words : *Trichoderma* spp, Soil borne diseases, Management, Mass multiplication.

INTRODUCTION

In recent years, biological control of plant diseases has attracted more attention and created awareness. Antagonistic fungi were established as useful bio agents in the management of crop diseases. Of these, potential species of *Trichoderma* have been extensively exploited by the plant pathologists due to their high efficacy, broad spectrum, ease in cultivation and mass multiplication. The abundance of *Trichoderma* in various soils, coupled with their ability to degrade various organic substrates in soil, their metabolic versatility and their resistance to microbial inhibitors, suggests that they possess the ability to survive in many ecological niches depending on prevailing conditions and the species of strain involved (Sundarbabu,1998).

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), *Pythium aphanidermatum* (Sivan *et al.* 1984), *Rhizocotonia bataticola* (Vyas,1994), *R. solani* (Elad *et al.*, 1981) and *Sclerotium rolfsii* (Elad *et al.*, 1980). These pathogens causes damping off, root rot, collar rot and wilt in several field, oilseeds and vegetable crops.

Seed treatment with spores of *Trichoderma* protects the seeds and seedling from these soil borne pathogens. Combined use of seed treatment followed by soil application of formulated product of *Trichoderma* effectively controlled many damping off and root rot

diseases of cotton and various crops (Nargund *et al.*, 2004 & Mathivana *et al.*, 1998.) . The talc formulation can be used directly for seed treatment. But for soil application in large areas a suitable organic carrier material is required. The carrier material should be readily available and cost effective. Keeping in view of the increase in awareness on the use of biological control agent and the hazardous impact of pesticides. The present study was made to reduce cost on mass multiplication of different materials and carrier materials and popularization of these bioagents through various extension wings of UAS Dharwad and state development department.

MATERIALS AND METHODS.

Trichoderma harzianum a local isolate was grown on Potato Dextrose Agar (PDA) media and was used in the present study. An experiment was carried to identify the low cost material or container for mass multiplication of *T. harzianum* . They were

- 1) Polythene bags (20 m thickness).
- 2) Tarsons conical flasks.
- 3) Borosil conical flasks.

Potato Dextrose Broth (PDB) media was used for the multiplication of the bioagent. To identify low cost and effective carrier material for multiplication, talc powder and fly ash (waste of thermal power station) were tested for seed treatment formulation of *Trichoderma*.

The bioagent is popularized among the farmers of Upper Krishna Project (UKP) Command Area in managing the seed borne diseases of many field, horticulture crops, through trainings, meeting with farmers

* Author for correspondence.

¹Dept. of Entomology, College of Agriculture, UAS, Bheemarayanagudi, GULBARGA (KARNATAKA) INDIA

and Demonstrations were done with help of :

- 1) Extentsion Education Unit Bheemaranagudi and Gulbarga.
- 2) KVK Gulbarga and Bidar.
- 3) Stats Department of Agriculture (GOK)

RESULTS AND DISCUSSION

The *Trichoderma harzianum* local strain was isolated and identified based on conidial structure and maintained on PDA. For mass multiplication of bioagents on Potato Dextrose broth is used. Three different containers Viz Polythene bogs (20 microns), Tarsons conical flask and Borosil conical flask were used. The results indicated that that among the containers Borosil conical flask and Tarnson conical flask are better and good growth *Tricoderma* was noticed. The polythene bags lost the strength and there was a poor growth of *Trichoderma*. Two carrier materials Viz fly ash (waste of thermal power station) and talc powder were tested for seed treatment formulation. Talc powder was found to be better than fly ash due to smoothness and light weight of particles. Earlier many scientist (Ramakrishnan *et al.*, 1994; Elad *et al.*, 1980, 1981; Singh & Singh, 1994;

species and causing diseases like root rot of cotton, protects plants from root rot, damping off, wilt and seedling blight. It is ecofriendly, and no pollution problem to soil or to plants. When it is used as seed treatment it has got an ability to establish in soil and give protection to plants against disease for a longer period than the seed treatment chemicals. Presently *Trchoderma* is multiplied on sterile PDB in conical flask for three weeks and macerated with grinder and mixed with sterilized talc powder (1:1.5 V/W) finally shade dried and sieved to achieve 10^7 cfu/g of talc.

The product so produced is popularized in Upper Krinshna Project Command Area through trainings, group meeting with farmers with the help of Extension Education Unit of Bheemaranagudi, Gulbarga KVK, Gulbarga, Bidar and Karnataka State Department of Agriculture. During the 3 years total 249 kg of talc formulated *Trichoderma* powder was sold to about 396 farmers of UKP Areas in managing the various seed and soil borne disease of field crop like groundnut, cotton, sunflower, chilli, wheat, bengal gram, tur, green gram and horticulture crops like jasmine, citrus, tomato, brinjal etc. The recommended *Trichoderma* formulation is @ 4.0 gram/kg of seed.

Table 1: Sale of Trichoderma in UKP Area during 2003 – 04 , 04-05 and 2005 - 06

S. No.	Year	Sale of Trichoderma through (in KGs)			
		KVK	EEU's	KSDA	Directly farmer
1	2003-04	10 (7*)	9.0 (8)	-	24 (48)
2	2004-05	20 (25)	20 (40)	12 (2)	40 (120)
3	2005-06	8 (12)	32 (43)	18 (18)	56 (73)
Sub Total		38 (44)	61 (91)	30 (20)	120 (241)
Grand Total		249 (396)			

* Indicates number of farmers.

Patel & Mishra, 1994) showed talc based formulation is very effective and cheaper for seed treatment.

Kaur and Mukhopadhyay (1992) reported that chickpea wilt was effectively managed by the *Trichoderma viride*. The granular formulations of *Trichoderma harzianum*, and *Trichoderma viride* isolates have recorded better chickpea plant stands than fungicide(captan) treatment and these were more effective in reducing saprophytic growth of the pathogen (*Rhizoctonia solani*) compared to other bioagents (Prasad and Rangeshwaran,1997). Among the *Rhizoctonia* species, *Rhizoctonia solani* Kuhn and *Rhizoctonia bataticola* (Taub).Butler (*Macrophomina phaseolina*) (Tassi.) Goid. are the most universally distributed, parasitising a wide range of different plant

Internat. J. agric. Sci. (2007) 3 (2)

REFERENCES

- Elad, Y., Chet, I. and Katan, J. (1980). *Trichoderma harzianum* a biocontrol agent effective against *Sclerotium rolfsii*. on *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 Diseases*, **65** : 675-677.
- Kaur, N.P. and Mukhopadhyay, A. N. (1992). Integrated control of chickpea wilt complex by T, viride and chemical methods in India. *Tropical Pest Management*, **38** : 372-375
- Mathivanan, K., Srinivasan, K. and Chelliah, S. (1998). Evaluation of different organic materials as carrier for formulated product of *Trichoderma*. *Journal of biological control*, **12**: 67-70.

- Nargund, V.B., Patil, M.B., Bheemanna, M., Hiremath, S.V., Sreenivas, A.G. and Vendan, T. (2004).** *Trichoderma* spp.– a potential bioagent in the management of root rot of cotton caused by *Rhizoctonia bataticola* (Taub.)Butler .In *International Symposium on Strategies for Sustainable cotton Production – a Global Vision*.23-25 November 1004 UAS, Dharwad pp 360-361
- Patel, S.I. and Mishra, A. (1994).** Exaluation of cheap and easily available substrates for mass multiplication of *Trichoderma hanzanum* Rifai. *Gujarat Agricultural University Research Journal.*, **20** :185 – 186.
- Prasad, R.D. and Rangeshwaran, R. (1999).** Granular formulations of *Trichoderma* and *Gliocladium* spp.in Biocontrol of *Rhizoctonia solani* of chickpea.. *Journal of Mycology and Plant Pathology* , **29** : 222-226.
- Ramakrishnan, G., Jeyarajan, R. and Dinakaran, D. (1994).** Talc based formulation of *Trichoderma viride* for biological control of *Macrophnia phaseolina*. *Journal of biological control*, **8** : 41-44.
- Sivan, A. and Chet, I. (1986).** Biological control of Fusarium 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.
- Singh, A. and Singh, D. (1994).** Biocontrol of *Sclerotium rolfsii* Sacc. Causing collar rot of brinjal. *Journal of biological control* ,**8**:105-110
- Sunderbabu, P.C. (1998).** Biological control in India In : *National training on mass multiplication of bio control agents*. PP- 7 – 73
- 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

Received : May, 2006; Accepted : February, 2007