Short Communication

Gypsum - A suitable material for the mass multiplication of *Trichoderma viride*

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Accepted 25th June 2001

ABSTRACT

Different carrier materials were screened for the mass multiplication of *Trichoderma viride*. Talc and gypsum were significantly superior in maintaining the survival of *T. viride* even after 150 days of storage. Since gypsum is thirty times cheaper than talc it may be used for the mass multiplication of *T. viride*, for commercial purposes, to replace talc.

Key Words: Biocontrol, carrier, *Trichoderma viride*, survival

Trichoderma viride, a fungal biocontrol agent is widely used for the management of soil-borne diseases (Chung and Choi 1990; Ramakrishnan *et al.* 1994; Sankar and Jeyarajan 1996). For large scale field application of *Trichoderma* spp., different methods have been attempted. Application of *Trichoderma harzianum* in diatomaceous earth with molasses for the control of *Sclerotium rolfsii* (Backman and Rodriguez Kabana 1975) was the first successful attempt in the use of delivery systems in biological control of plant diseases. Subsequently, sand-corn meal (Lewis and Papavizas 1980), lignite and stillage (Jones *et al.* 1984) wheat bran, peat or combination of these (Howell 1982; Sivan *et al.* 1984; Papavizas 1985) were developed for the delivery of the biocontrol agents. But these methods require large quantities of inoculum of biocontrol agent and therefore not suitable for adoption in larger scale. Jeyarajan and Ramakrishnan (1995) developed a talc-based formulation of *T. viride* for seed treatment and soil application. They used molasses-yeast in the fermentor for the multiplication of *T. viride* and added talc (aluminium silicate ore) as the base material for the powder formulation. In recent years this method of preparation has been widely used in India for the mass multiplication of *T. viride* on commercial scale (Anahosur 1999).

In order to identify less costly base-material, different carrier materials were tested for the mass multiplication of *Trichoderma*. A native isolate of *T. viride*, effective against root rot *(Macrophomina phaseolina)* of sesamum *(Sesamum indicum* L.), was multiplied in molasses-yeast extract medium (Papavizas 1984) for 12 days and the entire biomass along with medium was incorporated into the sterile carriers *viz.*, talc, peat, lignite, kaolin, gypsum (calcium sulphate) and fly ash at 50 ml suspension per 100g. The contents were thoroughly mixed; shade dried for two days and stored in polythene bags at room temperature (30 ± 2°C) after adding 500 mg carboxy methyl cellulose (CMC) per 100g of carrier material (Jeyarajan *et al.* 1994). A sample of 1.0 g of the product was drawn from each of the carriers just before packing as well as on 30, 60, 90, 120 and 150 days of storage and the population of *T. viride* was estimated using *Trichoderma* special medium (Elad and Chet 1983). The experiment was conducted in completely randomised block design with five replications and the data were statistically analysed by DMRT after converting them into arc sine transformed values.

Results indicated that among the different carriers tested, gypsum and talc were significantly superior in supporting the survival of *T. viride* and these showed mean populations of 15.0×10^7 and 14.53×10^7 cfu g^{-1} product respectively (Table. 1). All the carriers tested showed decreasing trend in retaining the viability of *T. viride* with increasing period of storage. The mean population of *T. viride* gradually decreased from 24.5×10^7 cfu g^{-1} product on the day of preparation to 3.7×10^7 cfu g^{-1} product 150 days after storage. Among the carriers tested, the reduction in survival of *T. viride* was minimum in talc and gypsum-based products and these were on par with each other by recording significantly higher populations of respectively 5.2×10^7 and 4.8×10^7 cfu g^{-1} product even after 150 days of storage at room temperature.

Papavizas *et al.* (1984) recorded 90 per cent

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Table 1. Survival of *T. viride* on the carrier material on storage at room temperature (population in x 10^7 cfu g^{-1}.)*

Carriers	Days of storage						Mean
	0	30	60	90	120	150	
Gypsum	24.2^a	20.2^a	16.8^a	12.2^a	8.6^a	4.8^a	14.53
	(4.29)	(4.54)	(4.1)	(3.49)	(2.93)	(2.19)	(3.70)
Peat	24.6^a	19.6^a	14.8^b	9.6^b	6.8^b	3.2^b	13.1
	(4.96)	(4.43)	(3.85)	(3.10)	(2.6)	(17.8)	(3.45)
Kaolin	24.4^a	19.6^a	14.2^{bc}	9.2^b	6.4^{bc}	3.2^b	12.8
	(4.92)	(4.43)	(3.76)	(3.03)	(2.52)	(1.79)	(3.4)
Lignite	24.8^a	18.6^b	13.2^{bc}	8.8^b	5.6^{bc}	2.8^b	12.23
	(4.97)	(4.31)	(3.63)	(2.96)	(2.36)	(1.67)	(3.32)
Talc	24.8^a	20.4^a	17.2^a	13.4^a	9.0^a	5.2^a	15.0
	(4.96)	(4.51)	(4.15)	(3.66)	(3.01)	(2.28)	(3.76)
Fly ash	24.4^a	19.6^a	13.8^{bc}	9.2^{bc}	5.4^c	3.0^b	12.52
	(4.94)	(4.42)	(3.71)	(3.04)	(2.32)	(1.73)	(3.36)
Mean	24.5	19.72	15.0	10.4	6.9	3.7	
	(4.95)	(4.44)	(3.86)	(3.21)	(2.62)	(1.91)	

* Mean of five replications

(Figures in parentheses are mean arc sine transformed values)

viable propagules of *Trichoderma* spp. in powder formulation 180 days after storage when stored at 5°C. The alginite-pyrose pellets of *T. viride* retained 93 per cent of the original population 90 days after storage at 5°C (Fravel *et al.* 1985). The minimum population of *Trichoderma* spp. required for an effective powder formulation was 20 x 10^6 cfu g^{-1} as standardised by Jeyarajan *et al.* (1994).

The results of the present study indicated the suitability of gypsum and talc as carrier materials for the commercial preparation of *Trichoderma*. An ideal carrier material for the mass multiplication of biocontrol agents should be inexpensive and easily available (Gaind and Gaur 1990). Hence gypsum would form the best carrier material in terms of costwise as it is thirty times cheaper than talc. Therefore, gypsum can be advantageously used in the place of talc powder for the commercial preparation of *T. viride*.

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