

Short Scientific Report

Evaluation of Carrier Media for Field Application of *Trichoderma* sp. in Cardamom Growing Soils

'Azhukal' or capsule rot caused by *Phytophthora meadii* is a serious disease of small cardamom (*Elettaria cardamomum* Maton) resulting in heavy crop losses during monsoon seasons. Apart from fungicidal control, the recent attempts are being focussed on the use of bio-control agents in managing this disease. Joseph Thomas *et al.* (1991) observed that *Trichoderma* could inhibit the pathogen under *in vitro* conditions and reduce seedling infection in pot cultures. The efficacy of *Trichoderma* in controlling Azhukal disease under field conditions was further confirmed by Suseela Bhai *et al.* (1992). Various types of agricultural wastes and crop residues have been shown as effective carrier media for the mass multiplication and field application of antagonists (Mukopadhyay, 1987, Kousalya and Jeyarajan, 1990). Since most of these materials are not easily available in the vicinity of cardamom growing areas, there

was a need to look for locally available and comparatively less expensive materials for the mass culturing of antagonists.

Agricultural wastes and by-products easily available in cardamom growing areas such as coffee husk, tea wastes, neem cake *etc.* and these in combination with well decomposed farm yard manure were used for the study (Table I). Coffee husk used includes both decomposed and fresh materials. The tea waste obtained from instant tea factory as 'spent leaf' was selected as one of the carrier media. These materials were soaked in water to get a moisture level of 50 per cent. Fifty grams of each of the substrates were taken in 500 ml conical flasks and plugged tightly with cotton and sterilised under pressure for three consecutive days. These were inoculated with three 5 mm discs of three-day old cultures of *Trichoderma viride* and *T. harzianum* respectively. The

Table I. Comparative sporulation of *Trichoderma* sp. in different carrier media.

Carrier media	<i>T. harzianum</i> × 10 ⁶ cfu/g	<i>T. viride</i> × 10 ⁶ cfu/g
1. Farm Yard Manure (FYM)	0.19	83.33
2. Neem Cake (NC)	0.13	0.67
3. NC + FYM 1:1	0.11	0.67
4. NC + FYM 1:3	0.06	0.32
5. Coffee husk (fresh)	5.00	86.67
6. Coffee husk (decomposed)	29.00	107.33
7. Coffee husk + FYM 1:1 (fresh)	16.00	146.67
8. Coffee husk + FYM 1:1 (decomposed)	5.67	122.67
9. Tea waste	18.67	168.67
10. Tea waste + FYM 1:1	30.00	53.33
11. Tea waste + FYM 3:1	17.33	105.33
12. Soil (control)	3.00	3.00
GM	10.43	73.22
SE	1.77	22.82
CD	5.20	66.93

cultures were incubated at room temperature (27+3°C) for 20 days. Observation on the growth and sporulation was recorded and assesment of spore counts made by dilution plate technique (Pramer and Schmidt, 1956).

The antagonists grew fairly well and sporulated in tea waste and coffee husk media as compared to soil, farm yard manure or neem cake. *Trichoderma viride* produced maximum number of colony forming units (cfu), $168.67 \times 10^6/g$, and $146.67 \times 10^6/g$ in tea waste and coffee husk farm yard manure mixture respectively. However, *T. harzianum* produced maximum spores in decomposed coffee husk and tea waste with farm yard manure. The multiplication and sporulation were generally poor in neem cake, farm yard manure or soil except *T. viride* which readily multiplied and sporulated in farm yard manure. The two species of *Trichoderma* exhibited wide variability in their multiplication rate in different carrier media combinations. In general, the multiplication rate of *T. viride* was higher than that of *T. harzianum*. This could be due to the differential ability of various combinations of carrier materials to support the growth rate of *Trichoderma* sp.

Wheat bran and saw dust mixture have been used as carrier media for the mass multiplication of *T. harzianum* (Elad *et al.* 1980; Mukopadhyay *et al.* 1986). Padmanabhan and Alexander (1987) reported the use of sand sorghum mixtures for mass culturing of *T. viride* in the bio-control of seedling rot of sugarcane. However, all the materials are expensive and not easily available near the vicinity of cardamom plantations. The present study shows that easily available and the least expensive products such as spent tea leaf waste and coffee husk can be best utilised in combination with farm yard manure as the carrier media for large scale culturing of *Trichoderma* spp. Coffee husk has earlier been shown as a good carrier medium for mass culture of *Trichoderma* spp. (Anonymous, 1991). The FYM as contaminant in the carrier medium, will also serve as a good manure to support plant growth in addition to favouring the growth of *Trichoderma* spp.

ACKNOWLEDGEMENT

The authors express their sincere thanks to Miss S. Sreelatha and Shri. N. Thulasidas for helping in statistical analysis and typing the manuscript, respectively.

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