J. Sci. Trans. Environ. Technov. 2009, 3(3): 150-151

Short Communication

In vitro compatibility test of organic biocides and biocontrol agents

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Abstract

Extracts of different oil cakes *viz*., castor (*Recinus communis*) cake, gingelly (*Sesamum indicum*) cake, neem (*Azadirachta indica*) cake, mahua (*Madhuca longifolia* var. *latifolia*) cake and pungam (*Pungamia pinnata*) cake irrespective of their concentration encouraged the growth of fungal and bacterial antagonists. The maximum mycelial dry weight of *Trichoderma viride* (TVB1) was observed in 10 per cent neem cake, followed by mahua cake, pungam cake and castor cake, which recorded 0.980, 0.940, 0.920 and 0.890 g, respectively. Minimum mycelial dry weight (0.85g) was recorded in 5 per cent gingelly cake as against control (0.840g). Similar trend was observed with *T. harzianum* (THB1), *T. viride* (TVB2), and *T. koningi*.

Keywords : biocontrol, biocides, fungal antagonists, *in vitro* capability, organic amenments

INTRODUCTION

The decomposition of any organic matter provides the food source on which the antagonistic fungi thrive and multiply rapidly because of continuous supply of nutrients from the substrate. Fungal antagonistic organisms are capable of rapid colonization on the organic material for their multiplication. The mechanism of suppression of pathogenicity might probably due to the presence of antagonistic microorganisms in the composts soil amended with oil cake, which increased the activity of antagonistic microorganisms. This paper deals with the effect of oil cake amendments on the growth of selected biocides and biocontrol agents.

MATERIALS AND METHODS

The growth of antagonists in extracts of oil cake was tested by following poisoned food technique (Schmitz, 1930). Ten per cent concentrations of different oil cake extracts was prepared and tested for their compatibility with *Trichoderma viride* (TVB1), *T. harzianum* (THB 1) *Pseudomonas chlororaphis* (PA 23) and *Pseudomonas fluorescens* (SBHRPF 2). The Petri plates containing PDA medium and King's B medium were inoculated with 9 mm disc of TVB1and streaked with PA 23 and SBHRPF 2, respectively. They were incubated at room temperature. The radial growth of *T.viride* (TVB1) and the growth of *P.chlororaphis* (PA 23) and *P.fluorescens* (SBHRPF 2) were recorded after 3 days of incubation.

Potato dextrose broth containing 5 and 10 per cent extracts of each oil cake were prepared separately. Potato dextrose broth without any oil cake extract served as control. The flasks were inoculated each with nine mm PDA culture disc of the respective antagonistic fungi separately. Each treatment was replicated thrice. The flasks were incubated at room temperature (28±2ÚC), for10 days. Then the mycelial mat of each antagonistic fungus was harvested on a previously weighed filter paper, dried at 60^{o}C for 48 h in a hot air oven till a constant weight was obtained, cooled in a desiccator and then the dry weight was recorded and expressed in mg/100 ml of liquid medium.

RESULTS AND DISCUSSION

The results on the compatibility in solid medium on the compatibility of fungal antagonists with extracts of oil cakes are presented in Table 1. The maximum mycelial dry weight of *T. viride* (TVB1) was observed in 10 per cent neem cake, followed by mahua cake, pungam cake and castor cake, which recorded 0.980, 0.940, 0.920 and 0.890 g, respectively. Minimum mycelial dry weight (0.85g) was recorded in 5 per cent gingelly cake as against control (0.840g). Similar trend was observed with *T. harzianum* (THB1), *T. viride* (TVB2), and *T. koningi* (Table 1).

The results revealed that the growth of *T. viride* isolate TVB1 and *T. harzianum* isolate THB1 were found to be not sensitive to the extracts of neemcake, mahua cake and pungam cakes (Table 2). TVB1 recorded 8.90, 8.80 and 8.40 cm and THB1 recorded 8.80, 8.60, and 8.20cm mycelial growth, respectively. *P. fluorescens* (SBHRPF2), *P. chlororaphis* (PA 23) and *B. subtilis* (SBHRBS1) were not affected by the extracts of pungam cake and neem cake and also showed high degree of compatibility. However, *T. viride* (TVB1), *T. harzianum* (THB1) *P. fluorescens* (SBHRPF2) and *P. chlororaphis* (PA 23) were partially sensitive to the extracts of castor cake and produced very minimum mycelial growth of antagonists (Table 2).

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Table 1. Compatibility of fungal biocides with oil cake extracts in liquid media (*in vitro*)

S No	Oil cakes	Concentration (%)	Mycelial dry weight (mg)*			
			T. viride (TVB1)	*T. viride* (TVB2)	*T. harzianum* (THB1)	*T. koningii*
1	Castor cake	5	0.860	0.680	0.720	0.680
		10	0.890	0.720	0.750	0.700
2	Gingelly cake	5	0.850	0.660	0.710	0.690
		10	0.870	0.710	0.740	0.720
3	Neem cake	5	0.900	0.710	0.740	0.760
		10	0.980	0.780	0.800	0.790
4	Mahua cake	5	0.880	0.710	0.740	0.700
		10	0.940	0.760	0.780	0.750
5	Pungam cake	5	0.870	0.650	0.730	0.690
		10	0.920	0.720	0.760	0.730
6	Control	-	0.840	0.700	0.710	0.720

* values are means of three replications

Table 2. Compatibility of oil cakes with bio control agents in solid medium (*in vitro*)

S. No	Oil cakes (10%b)	Mycelial radial growth diameter (cm) TVB1	Mycelial radial growth diameter (cm) THB1	Growth of *P.fluorescens* (SBHRPF2)	Growth of *P.chlororaphis* (PA23)	Growth of *B.subtilis*- (SBHRBS1)
1	Castor cake	7.10	7.20	+	+	+
2	Gingelly cake	8.3	8.10	+	+	+
3	Neem cake	8.9	8.8	++	++	++
4	Mahua cake	8.8	8.6	+	+	+
5	Pungam cake	8.4	8.2	++	++	++
6	Control	9.00	9.00	++	++	++

+ Low growth; + + full growth; * extracts at 10 % concentration
TVB-1 = *Trichoderma viride*; THB- *Trichoderma harzianum*

The experimental results revealed that all oil cake extracts irrespective of their concentration encouraged the growth of the fungal and bacterial antagonists and therefore they were compatible with these antagonists (Table 1 and 2). Baby and Rao (1990) reported an increased population of *Trichoderma* in the presence of neem cake. However, Rajappan *et al*. (1995) reported that the growth of *P. fluorescens* was not affected by neem based formulation. Rajappan *et al*., (2000) also reported that while it inhibited the growth of *Helminthosporium oryzae, Sarocladium oryzae* and *Pyricularia oryzae* it had no inhibitory effect on *P. fluorescens* and *B. subtilis* and appeared to promote the growth of *T.viride*. The inhibitory effect of the oil cake extracts might be attributed to the presence of some antifungal ingredients in them. But fungal antagonistic organisms are capable of rapid colonization on the organic material for their multiplication.

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