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Biodynamic Preparation: A Novel Way to Manage Plant Diseases

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ABSTRACT

Food crops (grains, fruits, vegetables) grown without the use of chemical fertilizers and pesticides are generally termed as "organic food". Demand for organic food is growing rapidly, particularly in the developed world. Farmers growing food use alternative sources of fertilizers and pesticides. Microorganisms with the ability to suppress plant pathogenic fungi and insect pests are potentially important alternatives to chemical pesticides. Organic farmers have reported reduced incidence of diseases and insect pests **(Fukuoka, 1993)**. It has been hypothesized that some of alternatives (BD preparations), used have a high population of microorganisms that suppress the growth of disease causing fungi. Therefore, to verify this hypothesis, the present investigations were undertaken.

The two BD preparations i.e. BD 500 (008) and (018) [collected from Dr. B. K. Pandey (senior scintist) CISH, Rehmankhera, Lucknow] were used in the present investigation. Total fungi were isolated from these BD preparations, using dilution plate technique **(Krassilnikov, 1950)**. Dilution plate technique was slightly modified from the original one, in the present investigation. 0.5 gm of material was placed in 250 ml

capacity flask and then 100 ml of sterilized distilled water was poured into it. Thereafter, it was rotated both clockwise and anticlockwise by a glass rod to make uniform suspension. One ml of freshly prepared suspension was poured into Petri plates containing medium at different time of intervals i.e. 0, 15, 30, 45 and 60 minutes. The total fungi were isolated on two media i.e. (a) Martin's medium (b) *Trichoderma* specific medium (TSM).

All the plates were incubated at 28 ± 1°C for 5 days. Total number of colonies of fungi was estimated and the data obtained were transformed into $\log_{10}$ values (i.e. $\log_{10}$ g^{-1} of material). A total of 63 fungal isolates were selected (on the basis of colony colour and type) to test their biocontrol potential against two fungal pathogens i.e. *Rhizoctonia solani* and *Helminthosporium sativum*, under *in vitro* conditions. These isolates were screened using Bangle technique.

Ten days old culture tubes of isolates were used to prepare spore suspension. Ten ml of 2 per cent gelatin (2 gm gelatin in 100 ml of distilled sterilized water) solution was poured into the culture tubes and shaken thoroughly.

Flame sterilized bangles were dipped into the spore suspension and inoculated aseptically to the PDA plates, 24 hours prior to pathogen inoculation. The actively growing pathogen plates were used to prepare fungal discs (5 mm diameter). The discs were inoculated into the plates, at the centre of bangle and then incubated at 28 ± 1°C. Observations were recorded on the pathogen growth both in treatments and check. Per cent inhibition in radial growth of pathogen was recorded as described by **Mc Kinney (1923)**.

RESULTS AND DISCUSSION

A total of 571 colonies of fungi were recorded on the plates, used for counting microorganisms. Sixty-three fungal isolates were selected on the basis of colony colour and type, to test their bicontrol potentials against *R. solani* and *Helminthosporium sativum*, under *in vitro* conditions. The population of such antagonists ranged from 20.00 to 71.42 per cent against *R. solani*, being highest (71.42%) in 45 minute's isolates of BD 500 (018), while, it was 20.00 to 57.14 per cent against *Helminthosporium sativum* being highest (57.14%) in 45 & 60 minutes isolates of BD 500 (018). The results obtained from the present studies are in accordance with the work of **Rupela *et al.* (2003)** who used six specific compost samples (called biodynamic or BD preparations by organic farmers and reported that the antagonistic population of fungi was highest (5.60 $\log_{10}$ g^{-1} of soil) in organic material collected from leaf axils of *Billbergia* spp. and lowest (2.74 $\log_{10}$ g^{-1} of soil) in termataria soil.

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Table 1: Fungal population in different BD preparations and their screening against *R. solani* and *H. sativum* under *in vitro.*

BD preparations	Pouring time (minute)	Fungal population (log_{10} g^{-1})		Total no. of colonies on replicate plates used for counting	% of fungi showing complete inhibition	
		Martin's	TSM		*R. solani*	*H. sativum*
	0	2.60	3.00	32 (10)*	30.00	40.00
	15	2.76	2.30	17 (3)	0.00	0.00
BD 500(008)	30	3.26	2.97	43 (6)	0.00	0.00
	45	2.95	3.00	30 (7)	0.00	0.00
	60	3.16	1.69	29 (5)	20.00	0.00
	0	3.85	2.95	126 (10)	50.00	50.00
	15	3.84	0.86	130 (5)	20.00	20.00
BD 500(018)	30	3.15	0.00	47 (3)	33.33	33.33
	45	3.62	0.86	68 (7)	71.42	57.14
	60	3.48	0.76	49 (7)	57.14	57.14
CD(P=0.05)						
BD preparations		0.56	0.28			
Time intervals		0.89	0.45			
Interaction		0.13	0.64			

*Data in parentheses are total number of fungi used for screening against *R. solani* and *H. sativum*