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Studies on the Efficacy of Different carriers for Antagonistic *Bacillus subtilis* (Cohn)

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Bacillus subtilis (Cohn) has been used for many years to control plant pathogens and to increase plant growth (Turner and Backman, 1991). This bacterial antagonist is known to produce extracellular antibiotics, that are inhibitory to some plant pathogens (Podile *et al.*, 1988). A commercial preparation of *B.subtilis* A.13 has been developed under the trade name Quantum 4000 and is recommended for treatment of peanut seeds for the control of soil borne diseases (Weller, 1988). With the intention of developing an inexpensive *B. subtilis* inoculant that can be easily applied, an experiment was conducted in our laboratory.

B. subtilis isolate 9 was used in this experiment. The efficiency of this isolate has been established in our laboratory (Sridar *et al.*, 1991). Carriers used in this investigation were talc, kaolin, soyflour + talc (1:1), kaolin + soyflour (1:1) and peat soil. *B. subtilis* (B.s.9) was grown in nutrient broth for 72 h and 40 ml of culture broth with a population of 10^{11} ml^{-1} was added to 100 g of each sterilized carrier. After the addition of culture broth, the carriers were packed in polythene bags and sealed. Four replications were maintained. Immediately after the addition of culture broth, *B. subtilis* population was estimated in all the carriers using serial dilution method (Sankaram, 1961). The population was estimated at fortnightly intervals and the population was recorded upto 90 days. The data were analysed statistically.

Among the different carriers tested, peat soil was found to be the best followed by soybean flour + talc (1:1) (Table 1). Peat soil is widely used as a carrier for legume inoculants (Chao and Alexander, 1984). Peat may be a useful carrier and peat formulation of *Pseudomonas fluorescens* (Migulina) shows promise for control of seedling pathogens of cotton (Weller, 1988). Peat-based *B. subtilis* was found to reduce the root

Table 1. Population of *B.subtilis* in different carriers after storage periods (10^9/g)

Carriers	Storage period (Days)							Mean
	0	15	30	45	60	75	90	
Talc	42.5	42.5	34.5	30.8	20.0	13.8	6.5	27.2
Soybean flour + Talc (1:1)	57.5	70.0	73.5	78.8	62.0	43.5	35.3	60.1
Kaolin	47.5	50.0	47.5	48.5	35.0	21.0	16.2	38.0
Soybean flour + Kaolin (1:1)	52.0	75.0	80.8	71.5	56.5	41.0	32.0	58.4
Peat soil	58.0	97.5	87.2	75.8	66.5	42.5	33.8	65.9
Mean	51.5	67.0	64.7	61.1	48.0	30.4	24.8	
CD (P = 0.05) Periods				5.4				
Carriers				4.6				
Periods x Carriers				12.1				

rot incidence in urdbean (Sridar *et al.*, 1991). The use of solid inert materials in preparations of microbial pest control agents continues to be a preferred approach in the control of diseases caused by soil borne plant pathogenic fungi (Lewis *et al.*, 1991). Acceptable materials include soybean flour as carrier for microbial pest control agents (Lisansky, 1985). For fungal biocontrol agents, different materials like peat soil, kaolin clay and talc powder were tested and talc powder was found to be a good carrier (Jeyarajan and Ramakrishnan, 1991). Based on the present findings, it can be concluded that peat can be used as a carrier for *B.subtilis* inoculum.

KEY WORDS: *Bacillus subtilis*, carriers, formulation

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