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EFFECT OF SEED TREATMENT WITH FUNGICIDES AND INSECTICIDES ON THE INHIBITION OF *Macrophomina phaseolina* AND VIABILITY OF COWPEA SEEDS DURING STORAGE

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Root rot caused by *Macrophomina phaseolina* (Tassi) Gold. is one of the common diseases of cowpea (*Vigna unguiculata* L. Walp.). *M. phaseolina* infected seeds did play a major role in perpetuation of the disease. Treatment of seeds with fungicides and insecticides appeared to offer certain amount of protection against the seed borne pathogens (Minton, 1972, Sivaprakasam *et al.*, 1976a and Sohi, 1976). The present study reports the evaluation of seed treatment with fungicides and insecticides against *M. phaseolina in vitro* as well as the effect on the germination of cowpea seeds.

Freshly harvested cowpea seeds of cultivar C 152 were well dried to 8.0 per cent moisture content and treated with three fungicides viz., carbendazim, quintozene and TMTD and four insecticides viz., carbosulfan chlorpyriphos, phosalone and monocrotophos and also combinations. The seeds were treated with the different fungicides at the rate of 2g per kg of seed as dry seed dressing. The seeds were shaken with the fungicides in a plastic container for 15 minutes. Another lot of seeds was treated with different insecticides at the rate of 4 ml per kg of seed in a flask in which 0 125 g of gum and 5 ml of water were added to form a pellet. The treated seeds were shade dried for one day. In the combination of seed treatment with fungicides and insecticides, the seeds were treated first with fungicides at 2g per Kg of seeds and 24 hours later with insecticides at 4 ml per Kg of seeds. One lot of seed was left untreated to serve as control. Seeds were stored in gunny bags for five months at laboratory conditions (30±2°C) and relative humidity varying from 60 to 90 per cent.

Efficacy of seed treatment on the inhibition zone of *M. phaseolina* was assessed by the method described by Ramakrishnan *et al.*, (1965) using pototo dextrose agar. Molten potato dextrose agar medium, cooled to about 40°C was inoculated with a mycelial suspension in sterile water of the test fungus and poured in petri plates. Immediately after the seed treated with the chemical to be tested, was placed on the inoculated agar with one seed at the centre of each plate. The plates were then incubated at laboratory temperature, 30±2°C for 72 hours and observations recorded.

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Table 1 Effect of seed treatment with fungicides and insecticides on the inhibition of *M. phaseolina* in mm.

Fungicide	Insecticide					
	Control	Chlorpyriphos	Phosalone	Monocrotophos	Carbosulfan	Mean
Carbendazim	49.67	49.78	50.22	47.50	56 06	50.64
Quintozene	21.44	28.83	32.50	33.50	26.28	28.51
TMTD	25.94	24.50	23.89	22.72	18.83	23.18
Control	X	X	X	X	X	X
Mean	32.35	34.37	35.54	34.57	33.72	34 11

Comparison of significant effects

	S. E.	C. D. (P=0.05)
Fungicides	0.26	0.73
Insecticides	0.33	0.94
Fungicides and insecticides	0.58	1.62

X = Not analysed.

Three replications were maintained for each treatment. The diameter of the inhibation zone that developed around the seed was measured (Table 1). The germination test was conducted by roll towel method proposed by International Seed Testing Association (1976) (Table 2).

In general a gradual reduction in the efficacy of seed treatment with fungicides and insecticides was observed with the progress of storage period beyond three months. Carbendazim recorded an inhibition of 50.64 mm as against 28 51 and 23.18 mm with quintozene and TMTD respectively. Insecticides did not show any inhibition of *M. phaseolina* However, carbendazim in combination with carbosulfan exhibited highly synergistic action and recorded 56.06 mm inhibition zone as against 49.67 in carbendazim alone. Similarly, quintozene exhibited synergistic effect with all the insecticides viz., chlorpyriphos, phosalone, monocrotophos and carbosulfan in increasing the inhibition zone from 26.28 to 33.50 mm as against 21.44 in quintozene alone. In contrast TMTD recorded decreased inhibition zone in combination with carbosulfan, monocrotophos and phosalone, which were 18, 83. 22 72 and 23 89 mm respectively as against 25 94 mm in TMTD alone.

Seeds treated with carbosulfan, phosalone and monocrotophos recorded higher germination percentages of 91 20, 90.00 and 88.00 respectively as against 87.10 in the untreated

Table 2 Effect of seed treatment with fungicides and insecticides on seed germination in percentage

Fungicide	Insecticide					
	Control	Chlorpyriphos	Phosalone	Monocrotophos	Carbosulfa	Mean
Carbendazim	88.10(69.84)	88.30(70.02)	91.99(73.46)	86.50(68.48)	95.00(77.71)	90.45(71.90)
Quintozene	87.80(69.53)	87.20(69.04)	89.10(70.70)	89.30(70.82)	92.35(73.96)	89.02(70.81)
TMTD	89.50(71.07)	85.40(67.50)	93.40(75.12)	87.10(68.96)	88.30(70.02)	88.99(70.53)
Control	82.40(65.22)	88.45(70.14)	85.10(67.25)	89.10(70.70)	87.35(69.16)	86.55(68.49)
Mean	87.10(68.91)	87.35(69.17)	90.00(71.63)	88.00(69.74)	91.20(72.71)	

(Figures in parentheses represent the transformed values)

Comparison of significant effects	S. E.	C. D. ($P=0.05$)
Fungicides	1.13	3.15
Insecticides	1.26	3.53
Fungicides and Insecticides	2.52	7.05

ccontrol. Among the fungicides albendazim seed treatment recorded maximum germination. Seeds treated with carbendazim and carbosulfan recorded germination percentages of 88 10 and 87.35 respectively. It is interesting to note that the rate of germination of seeds treated with the combination of carbosulfan and carbendazim was superior (95.00) than that of either carbendazim or carbosulfan alone, indicating the synergistic effect between the two chemicals.

There are many reports on the efficacy of seed dressing chemicals in inhibiting the growth of *M. phaseolina*. Seed treatment with carbendazim (Prakasam, 1976) and TMTD (Sivaprakasam *et al*, 1976) was found effective in inhibiting the growth of *M. phaseolina*. For the first time the seed treatment with carbendazim + carbosulfan was found highly inhibitory to *M. phaseolina* due to synergistic effect in the present study.

The beneficial effect of seed treatment with fungicides on germination was reported by Sivaprakasam *et al*, (1976 and 1976a) in sunflower and sorghum and sohi (1976) in cowpea. Chandrasekaran (1979) found that seed treatment with carbendazim had benefical effects on germination in bengalgram. Minton (1972) reported that seed treatment with quintozene and disulfoton used alone and in combination reduced germination of cotton seeds. In the present study, germination in seeds treated with quintozene did not differ significantly rom that of untreated seeds.

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