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EFFICACY OF SOME FUNGICIDES AGAINST *FUSARIUM MONILIFORME* AND *MACROPHOMINA PHASEOLINA*

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Fusarium moniliforme Sheld. and *Macrophomina phaseolina* (Tassi) Goid are important soil-borne pathogens which attack a large number of crop plants. In maize, they are known to cause stalk rots which take a heavy toll every year. Hitherto, the control measures suggested for these soil-borne fungi included mostly improved cultural practices. In recent years, several industries have developed numerous soil fungicides, a few of which have proved economical in controlling diseases of certain crops in other countries. In the present study, an attempt was made to test the efficacy of some of the fungicides against these fungi both *in vitro* and in soil.

The test fungi *Fusarium moniliforme* and *Macrophomina phaseolina* were isolated from infected stems of maize, variety G 16 at agricultural college farm, Dharwad. Monoconidial cultures were obtained from the isolates and these were maintained on potato dextrose agar (PDA) slants. The pathogenicity of the fungi was tested on susceptible variety G 16 of maize in a greenhouse by inoculating at the tasseling stage following toothpick method (Rao *et al.*, (1978). The fungicides tested against *F. moniliforme* are given in Table 1.

In Vitro evaluation : The fungicides were tested at 500, 1000, 2000, and 3000 ppm concentrations on ai.. basis, following posioned food technique (Schmitz, 1930). Suspensions of the chemicals were prepared in molten PDA by adding required quantities of chemicals to obtain desired concentrations. Twenty ml of medium was poured in each sterilized petriplate. The controls were maintained without fungicides. Each plate was inoculated with mycelial discs (0.5 cm dia.) from the periphery of 5 day-old culture and incubated at 30°C. Three replications were maintained. Radial growth of the colony was measured on 7th day after inoculation.

Evaluation in soil : The efficacy of fungicides in soil was tested in laboratory at 1000, 2000, 3000, and 4000 ppm concentrations on a.i. basis (Shukla *et al.*, 1972) with a little modification. Fine black soil was dried and autoclaved for 30 minutes at 20 lb pressure in conical flasks for three consecutive days. A thick layer of 0.5 cm sterilised soil was spread in petriplates. Suspensions of different concentrations of the chemicals prepared in sterile water were added separately to petriplates to saturate the soil. The mycelial discs (0.5 cm dia.) were placed on the surface of the soil. The discs were then covered with 0.5 cm thick layer of sterilized soil which then was saturated with respective suspensions. The experiment was replicated three times with suitable controls. The petriplates were incubated at 30°C and after 10 days, the discs were taken out, washed in sterile water and placed on solidified PDA in petriplates. Radial growth of the colony was measured after 5 days. The percent inhibition of growth was calculated using the formula :

TABLE 1 Percent inhibition of mycelial growth of *Fusarium moniliforme* and *Macrophomina phaseolina* at different concentrations of fungicides (*in vitro*).

Fugicide & Dosage	Concentration (ppm) 500		1000		2000		3000		Mean	
	FM[1]	MP[2]	FM	MP	FM	MP	FM	MP	FM	MP
Carbendazim	90.0	90.0	90.0	90.0	90.0	90.0	90.0	90.0	90.0	90.0
Quintozene	42.2	44.6	44.1	51.5	47.5	54.0	49.7	58.9	45.9	52.2
Captan	57.7	——	62.1	——	64.3	——	67.8	——	62.8	——
Copper oxychloride	——	53.5	——	59.6	——	63.2	——	66.9	——	60.8
Cholorothalonil	46.1	23.6	47.5	41.4	49.3	47.9	51.8	55.9	49.7	42.2
Emisan	90.0	90.0	90.0	90.0	90.0	90.0	90.0	90.0	90.0	90.0
Thiram	77.5	69.7	87.9	74.4	90.0	76.9	90.0	82.0	86.4	75.8
Carboxin	46.8	53.1	49.1	60.4	49.1	63.7	49.7	71.0	48.7	62.1
Mean	64.3	60.7	67.2	66.8	68.6	69.4	69.9	73.5		

1—*F. moniliforme*

	Fungicide	Conc.	F × C
S.E.	±0.3	±0.3	±0.7

2—*M. Phaseolina*

S.E.	±0.5	±0.4	±1.0

TABLE 2 Percent inhibition of mycelial growth of *Fusarium moniliforme* and *Macrophomina phaseolina* at different concentrations of fungicides in soil.

Fungicide & Dosage	Concentration (ppm) 1000		20000		3000		4000		Mean	
	EM[1]	MP[2]	FM	MP	FM	MP	FM	MP	FM	MP
Carbendazim	41.1	78.2	48.6	90.0	51.1	90.0	54.5	90.0	48.9	87.1
Quintozene	27.6	22.0	33.6	24.3	45.6	27.2	49.1	29.9	39.0	25.9
Captan	30.4	32.7	42.0	35.1	46.7	36.8	52.7	42.5	43.0	37.5
Copper oxychloride	——	42.1	——	47.1	——	48.7	——	49.8	——	46.9
Benomyl	90.0	——	90.0	——	90.0	——	90.0	——	90.0	——
Emisan	90.0	90.0	90.0	90.0	90.0	90.0	90.0	90.0	90.0	90.0
Thiram	41.4	26.4	45.6	29.9	48.8	30.9	53.6	32.1	47.3	29.9
Mean	48.8	48.5	58.3	52.7	62.1	54.4	65	55.7		

1—F.moniliforme

	Fungicide	Con.	F × C
S.E.	±0.5	±0.4	±1.0

2—M.phaseolina

S.E.	±0.4	±0.9	±2.1

$$I = 100 \ (C-T) / C$$

Where I - percent inhibition of radial mycelial growth
C - rate of growth in control
T - rate of growth in treatment

The data were subjected to angular transformation and analysed statistically.

Both under *in vitro* and in soil conditions, the chemicals, the concentrations, and their interactions differed significantly. Among the fungicides tested *in vitro* against *F. moniliforme*, carbendazim and emisan were most effective providing complete control. Among the other fungicides, thiram, and captan differed significantly. However, quintozene was least effective (Table 1). Emisan and benomyl controlled total mycelial growth in soil. Carbendazim and thiram were next best while quintozene was least effective (Table 2).

It was recorded that benomyl and emisan completely inhibited the mycelial growth of *M. phaseolina in vitro*. Further, thiram, carboxin and copper oxychloride differed significantly. The least effective chemical was chlorothalonil (Table 1). In soil, emisan and carbendazim were effective and were significantly superior over others. The next best chemical was copper oxychloride while the least effective was quintozene (Table 2).

Carbendazim and benomyl proved most effective against the test fungi. Similar results were also obtained by several workers (Bollen and van der Hoe Ven, 1973; Cassini *et al.*, 1973; Al-Beldawi *et al.*, 1973). Carbendizim though was found effective *in vitro* and in soil, should be tested in the field before recommending for its field application. There is a reduction in the efficiacy of chemicals in soil compared to *in vitro*. This may be due to the adsorption of the chemical to the soil particles there by rendering them biologically inactive.

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