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Soil moisture and rhizosphere mycoflora of groundnut *(Arachis hypogaea* L.) developed from fungicide treated seeds

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Rhizosphere mycoflora of groundnut plants developed from fungicides treated seeds were observed in three levels of soil moisture. Among the mycofloral populations *Penicillium* sp. was more in wet condition. *Aspergillus niger* and *A. flavus* were abundent in moisture stress condition of soil. Among the fungicides used, Bavistin reduced *Aspergillus niger* in wet soil. In general, rhizosphere mycoflora were reduced by Emisan than Bavistin and Dithane.

Key words : Rhizosphere, Mycoflora, Groundnut, Fungicides, Soil moisture.

INTRODUCTION

Moisture in soil is one of the prime most important factors for crop growth. It helps to solubilize the minerals and plant nutrients in soil for absorption by the plant root. It also helps in physiological process of plants on the other hand, microbial population in soil and the rhizosphere mycofloral population of the plant are very much interlinked with the moisture content of soil. *Aspergillus niger*, and *A. flavus* were more in number in water-stress condition of soil as shown by Lin (1982), Mehan *et al.* (1988) and Cole *et al.* (1985). *Colletotrichum* sp. were more in wet soil (Misra *et al.*, 1960). The experiment was designed to know the change in qualitative and quantitative nature of rhizosphere mycoflora of groundnut plants developed from Emisan, Bavistin and Dithane treated seeds in different moisture levels of soil. Secondly to find out the best suitable fungicide(s) under definite moisture level of the rhizosphere soil. Because, some of the mycoflora are responsible for causing diseases like seed-rotting, collar rotting or seedling blight of groundnut plants.

MATERIALS AND METHODS

The experiment was conducted using three different moisture levels by watering in different days' intervals. In one set, watering was done at two day's interval and in third set, watering was done at three days' interval. In each case measured quantity of water was given in the flats. Seeds were treated with Emisan$_6$ (Methoxy ethyl mercury chloride, manufactured by Excel Industries Limited) at 0.25 percent concentration. Bavistin 50 W.P. (Methyl-2 benzimidazole carbamate, manufactured by BASF India Limited) at 0.2 percent concentration and Dithane M45 (Zinc+Manganous ethylene bisdithiocarbamate, manufactured by Indofil Chemical Limited) at 0.2 percent concentration. For this purpose, seeds were soaked with sterile distilled water and shaked well with measured quantity of fungicides. Twenty seeds were sown in 30 cm earthen flats. Untreated seeds were sown for comparison served as control. For each treatment three replications were kept. Groundnut seeds cv. JL-24 were collected from Department of Agronomy, Faculty of Agriculture, Bidhan Chandra Krishi Viswavidyalaya, Kalyani. Samplings of rhizosphere soil were collected at 15, 30, 45, 60 and 90 days after sowing of seeds following Clark (1965). Mycoflora were isolated following Agar plate method using Martin's DPPE medium. Fungi were identified on the basis of clony characters and microscopic studies according to Gilman (1967). Number of colonies were recorded as per gram of oven dry soil basis. Date were analysed using Factorial randomised block design technique.

RESULTS AND DISCUSSION

Experimental observations revealed that more number of *Penicillium* colonies were isolated in stress condition (i.e. watering at 3 days interval) than in wet condition (i.e. watering at 1 day interval) throughout the experiment. *Aspergillus niger* and *A. flavus* were more in number in stress condition (i.e. watering at 3 days interval) throughout the whole period of study. This observation is similar to Lin *et al.* (1985).

Population of *Fusarium* spp. were less in wet soil than other two moisture levels throughout the whole experiment. *Colletotrichum* spp. were more in wet soil. Similar conclusion was also drawn by Misra *et al.* (1960).

Rhizospus spp. and *Alternaria* spp. were more in wet soil than in moisture stressed condition.

Trichoderma spp. were severely affected by moisture stress condition. In moist soil *Trichoderma* population were more than dry condition. This observation is similar to Cooke and Baker (1983).

It was also observed that Bavistin 50 WP reduced *Aspergillus niger*, and *A. flavus* very effectively in moist and moderately wet soil condition but in stress condition *Aspergillus niger*, and *A. flavus* were not reduced by Bavistin 50 WP.

Table 1 : Effect of soil moisture on total rhizosphere mycoflora of groundnut plants developed from treated and untreated seeds.

Watering at day's interval (Week)	Treatments	Mycofloral population				
		15 DAS	30 DAS	45 DAS	60 DAS	90 DAS
1	E	42.55**	60.42	67.10	74.17	57.42
	D	42.92	72.98	75.44	77.22	69.02
	B	64 20	81.32	95.20	93.53	94 40
	C	71.92	85.68	101.15	107.77	95.38
2	E	46.99	56.37	55.87	67.26	66.73
	D	45.18	59.57	63 28	66.45	72.64
	B	54.00	68.78	78 87	81.36	88.86
	C	61.56	76.66	88.89	86.01	116.77
3	E	19.72	23.57	22.88	28.26	23 54
	D	24.15	23.89	24.73	29.40	26.69
	B	31.03	31.80	32.86	33.97	36.85
	C	31.80	32.70	34 30	41.01	38.16

	S Em±	CD at 5%	S Em±	CD at 5%	S Em±	CD at 5%	S Em±	CD at 5%	S Em±	CD at 5%
Moisture level	8.35	25.04	13.88	40.72	13 31	39 04	18.24	53·51	16.79	45.30
Treatment	5.86	17.20	5.36	15.72	8.30	24.37	6.63	19.44	10.33	30.30

** Mycofloral population X10³/g of dry soil.
E-Emisan$_6$, D-Dithane M45 B-Bavistin 50 WP, C-Control (No treatment)

The data in Table 1 showed that generally maximum rhizosphere mycoflora were recorded in wet soil and less mycoflora were noted in stress condition. From statistical analysis it is clear that there is a significant difference between the mycofloral population at wet condition and at stress condition.

More reduction in rhizosphere mycoflora were observed with Emisan$_6$ treated seeds than other two fungicides used. More mycoflora obtained at wet soil condition because wet soil condition supply the most favourable conditions for better mycofloral growth.

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