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TOLERANCE OF CERESAN AND DIFOLATAN BY RHIZOSPHERE MICROFUNGI OF GROUNDNUT (*Arachis hypogea* L) C.V. SB-11

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ABSTRACT
Use of fungicides has become an integral and economically essential part of agriculture when resistance against a pathogen in a variety fails. Many fungicides are directly introduced into agricultural lands for management of soil borne diseases. Some part of the fungicide compounds administered as spray or dusts ultimately reaches into the soil as run off or drift and thus influence the microbial balance of soil. Therefore, the study of tolerance of pesticides by micro-organisms has got much practical importance in maintaining the survival of saprophytic micro flora in soil. Now- a-days, the necessity of such study is emphasized all over the world. In order to understand tolerance of Ceresan and Difolatan present study under taken. These fungicides are generally used in the management of groundnut leaf spot and rust diseases of groundnut. Ceresan and Difolatan were used and tolerance was studied by serial soil dilution plate count technique. Altogether 21 and 18 fungal species were recorded respectively in Ceresan and Difolatan. Out of 21 fungal species of which 14 were from the rhizosphere (R) where as 17 were from soil (S). Only *Aspergillus carbonarius* (R & S) showed resistance 80 µg/ml compound Ceresan from both rhizosphere and soil. A total of 18 species of fungi were recorded from Difolatan. Only *Aspergillus carbonarius* (R & S) showed tolerance up to 80 µg/ml. 10 µg/ml tolerance shown by *Mucor circinelloides* (R) , *Rhizopus stolonifer* (R), *Aspergillus niger* (R) , *Trichoderma viride* (R) while 30 µg/ml tolerance was shown by *Aspergillus fumigatus* (R) , *Fusarium oxysporum* (S) . Eleven fungal species did not tolerate 10 µg/ml of the fungicide including a potential pathogen *Rhizoctonia bataticola.*

KEY WORDS: Tolerance, Rhizosphere , Soil , Fungi, Fungicide.

INTRODUCTION

Soil microorganisms play a very important role in maintaining soil fertility. However, concern has been expressed that agricultural chemicals may harm the soil micro flora (Martin,1950;Bollen,1979; Domsch,1964; Gangawane,1972; Subba Rao, 1977; Greaves, 1979; Saler and Gangawane, 1980 ; Gangawane and Saler, 1988 ; Saler and Gangawane , 1993,1994 ; Gangawane et al 1995 ; Saler and Reena Chauhan,2006) although the use of agricultural chemicals including pesticides has become an integral and economically essential part of agriculture. Anderson (1978) and Saler (1982) has reviewed the pesticide effect on soil microorganisms and it is clear that pesticides (herbicides, fungicides, insecticides) effect on soil microorganisms (bacteria, actinomycetes as well as fungi).The concept of rhizosphere effect where by the roots clearly bring out the beneficial effect of seed and soil mycoflora on growth of plant (Rangaswami, 1972). Therefore, tolerance of pesticides by these organisms is grate practical importance as far as their survival is concerned . Present communication reports the tolerance of Ceresan and Difolatan both non-target and target organisms in the rhizosphere of groundnut SB-11.

MATERIALS AND METHODS

Groundnut (Arachis hypogea L.) C.V. SB-11 was used in this study. Seeds were sown in earthen were pots (6"x 6"x 6") using garden soil. They were then observed for the germination after 15 days. Plants were collected to study the tolerance of Ceresan and Difolatan by rhizosphere micro fungi. Tolerance of rhizosphere micro fungi to Ceresan and Difolatan was studied by modified food poisoning soil dilution (FPSD) technique (Saler and Gangawane, 1980) using Waksman's acid agar medium. Equal volume of 2X above medium (served as food) and 2 X concentration of Ceresan and Difolatan (served as poison) along with 1ml of spore suspension from dilution flask (Served as soil dilution) . Thus, the medium has the final concentration 10,30, 50 and 80 µg /ml. Media with single strength without Ceresan and Difolitan served as control. Observation for the number and types of micro fungi present on the plate was made from seven days on wards.

RESULTS AND DISCUSSION

It was observed that quantitatively fungal populations were reduced in both rhizosphere and soil, as the concentration increased in the medium (Table–1). There were about 8 and 2 fold reductions in the fungal population of rhizosphere and soil respectively. Statistically this negative correlation was non- significant for rhizosphere (r = - 0.76) and soil (r = - 0.77). This fungicide did not show its tolerance limit beyond 100µg /ml. Hence the concentrations were arranged below 100µg /ml in the medium. However fungal colonies appeared only 10 µg/ml except *Aspergillus carbonarius* which showed its final tolerance limit up to 80 µg /ml to this fungicide.

Qualitatively a total of 21 fungal species were recorded during this experiment (Table-2). Of these, 14 were from the rhizosphere where as 17 were from soil. Only Aspergillus carbonarius (R & S)showed tolerance up to

80 µg /ml. Species tolerated up to 10 µg /ml were: *Mucor circinelloides* (R), *Rhizopus stolonifer* (R *), Aspergillus aculeatus* (S), *A. A.flavus* (*R), A.fumigatus* (R & S), *A.niger* (R & S), A. terreus (R& S), Fusarium oxysporum(R & S *), Penicillium funiclosum(R & S).* Remaining 11 micro fungi did not tolerate 10 µg /ml , of the fungicide Ceresan including *Rhizoctonia bataticola* (R).

TABLE 1: Number of fungal colonies (10^3/ g oven dry soil) tolerant to different concentrations (µg/ml) of Ceresan in the rhizosphere and soil of groundnut-SB-11

	Control	10	30	50	80
Rhizosphere (R)	11.61	4.20	0.14	0.14	0.14.
Soil (S)	3.15	1.35	0.11	0.11	0.11
R/S	3.60	3.11	1.28	1.28	1.28

TABLE 2. Number of fungal species tolerant to different Concentrations (µg/ ml) of Ceresan in the Rhizosphere(R) and Soil (S) of Groundnut- SB-11

S.No	Fungal species	Control		100		500		1000		1500	
		R	S	R	S	R	S	R	S	R	S
1.	*Absida corymbifera*	-	2	-	-	-	-	-	-	-	-
2.	*Actinomucor elegans*	1	-	-	-	-	-	-	-	-	-
3.	*Choanophora* Sp	1	-	-	-	-	-	-	-	-	-
4.	*Mucor circinelloides*	2	1	2	-	-	-	-	-	-	-
5.	*Rhizopus stolonifer*	4	2	2	-	-	-	-	-	-	-
6.	*Penicillium brefeldianum*	3	2	-	-	-	-	-	-	-	-
7.	*Aspergillus aculeatus*	3	2	-	2	-	-	-	-	-	-
8.	*A.carbonarus*	6	4	2	1	1	1	1	1	1	1
9.	*A.flavus*	4	2	4	-	-	-	-	-	-	-
10.	*A. fumigatus*	-	-	2	2	-	-	-	-	-	-
11.	*A. niger*	2	6	3	2	-	-	-	-	-	-
12.	*A. sclerotiorum*	-	3	-	-	-	-	-	-	-	-
13.	*A. terreus*	-	3	-	-	-	-	-	-	-	-
14.	*Aureobasidium pullulans*	3	1	-	-	-	-	-	-	-	-
15.	*Cladosporium oxysporum*	-	1	-	-	-	-	-	-	-	-
16.	*Fusarium oxysporum*	5	4	2	2	-	-	-	-	-	-
17.	*F. semitectum*	-	4	-	-	-	-	-	-	-	-
18.	*Penicillium funiculosum*	5	4	4	1	-	-	-	-	-	-
19.	*P.varians*	2	1	-	-	-	-	-	-	-	-
20.	*Rhizoctonia bataticola*	-	2	-	-	-	-	-	-	-	-
21.	*Trichoderma viride*	1	1	-	-	-	-	-	-	-	-

TABLE 3: Number of fungal colonies (10^3/ g oven dry soil) tolerant to different concentrations (µg/ml) of Difolatan in the rhizosphere and soil of groundnut-SB-11

	Control	10	30	50	80
Rhizosphere (R)	11.61	0.72	0.29	0.14	0.14.
Soil (S)	3.15	0.45	0.11	0.11	0.11
R/S	3.60	1.61	2.57	1.28	1.28

In Difolatan final tolerant limit of fungal population in the rhizosphere and soil was 80µg /ml. There was negative correlation between the fungal population and fungicidal concentrations in the plate (rhizosphere r = -0.62 ; soil , r = -0.65) . More reduction was seen at 10 µg /ml , whereas at 30,50,80 µg /ml population more or less same .Rhizosphere effect was more at 30 µg /ml , when compared to other concentration.Qualitatively 18 fungal species were reported , only *Aspergillus carbonarius* (R & S) showed its tolerance up to 80 µg /ml . 10µg /ml tolerance was shown by : *Mucor circinelloides* (R), *Rhizopus stolonifer* (R), *A. niger (R) , Trchoderma viride* (R) , while 30 10µg /ml tolerance was shown by *Aspergillus fumigatus* (R) , *Fusarium oxysporum* (S) . Eleven micro fungi did not tolerate 10µg /ml of the fungicide including a potential pathogen *Rhizoctonia bataticola* (Table- 4).

TABLE 4. Number of fungal species tolerant to different Concentrations (µg/ ml) of Difolatan in the Rhizosphere(R) and Soil (S) of Groundnut- SB-11

S.No	Fungal species	Control	10	30	50	80

		R	S	R	S	R	S	R	S	R	S
1	*Absida corymbifera*	-	2	-	-	-	-	-	-	-	-
2	*Mucor circinelloides*	2	1	1	-	-	-	-	-	-	-
3	*Rhizopus stolonifer*	4	2	1	-	-	-	-	-	-	-
4	*Penicillium brefeldianum*	3	2	-	-	-	-	-	-	-	-
5	*Aspergillus aculeatus*	3	2	-	-	-	-	-	-	-	-
6	*A. carbonarius*	6	4	1	1	1	1	1	1	1	1
7	*A. flavus*	4	2	-	-	-	-	-	-	-	-
8	*A. fumigatus*	-	-	-	1	1	-	-	-	-	-
9	*A. niger*	2	6	1	-	-	-	-	-	-	-
10	*A. sclerotiorum*	-	3	-	-	-	-	-	-	-	-
11	*Aureobasidium pullulans*	3	1	-	-	-	-	-	-	-	-
12	*Cladosporium oxysporum*	-	1	-	-	-	-	-	-	-	-
13	*Fusarium oxysporum*	5	4	-	-	-	1	-	-	-	-
14	*F. semitectum*	-	4	-	-	-	-	-	-	-	-
15	*Penicillium funiculosum*	5	4	-	-	-	-	-	-	-	-
16	*P.varians*	2	1	-	-	-	-	-	-	-	-
17	*Rhizoctonia bataticola*	-	2	-	-	-	-	-	-	-	-
18	*Trichoderma viride*	1	1	2	-	-	-	-	-	-	-

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