TOLERANCE OF BALYTON BY RHIZOSPHERE MYCOFLORA OF *CAPSICUM ANNUUM* LINN. (CHILLI)

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Abstract: The problem in the present investigation was undertaken to study the tolerance of fungicide (Balyton) by the rhizosphere mycoflora of *Capsicum annuum* L. Tolerance of Balyton by the rhizosphre microflora of chilli was studied by serial soil dilution plate count technique. Altogether 16 fungal species were recorded from rhizosphre and soil. Out of 16 fungal species, 14 were from the rhizosphere (R) where as 11 were from soil (S). Most of the fungal species tolerated Balyton from rhizosphre and soil. *Aspergillus niger* and *Fusarium oxysporum* tolerated Balyton at higher concentration.As the fungicidal concentration increases in the plates, the fungal population decreases.

Keywords - Fungicide, tolerance,rhizosphere, soil, fungi

INTRODUCTION:

Capsicum annuum Linn. is an important cash crop in India and is grown for its pungent fruits, which are used both green and ripe (dried) to impart pungency to the food. Green *Capsicum annuum* Linn is rich in vitamin A and vitamin C, minerals and protein. Nadkarni (1927) has reported many medicinal value of chilli. Tayal (2009) reported that the application of fungicide in agricultural soil decreases the total number of soil fungi. Many pesticides (fungicides) compounds are directly introduced into agricultural land for combating soil borne diseases and pests. These chemicals reach the soil and thus influence the microbial balance of the soil. (Subha Rao 1977, Wainwright 1979, Bollen 1979).

Tolerance of plant pathogenic fungi to various pesticides is well known as this possesses a serious problem in chemical control of plant diseases. The interesting examples of the resistance to agricultural pesticides have been reviewed by Dekkar (1976) and Georgopoulos (1976, 1977). The following are some of the examples of plant pathogenic fungi showing tolerance against some pesticidal compounds. Although the role of every fungal species or strains belonging to different way is fully appreciated, reports on the effects of pesticidal compounds on the individual fungal species in rhizosp here and soil, however, have been very few (Gangawane and Deshpande, 1978 a). Tolerance of fungicides by pathogenic fungi is reported by some workers (Anderson, 1978; Greaves, 1979; Saler and Gangawane, 1980; Saler and Gangawane 1981, Saler, R.S. and Gangawane, 1994, and Saler et al., 2008). Aktar et al. (2009) gave a detailed account of effect of contamination of air, soil and non-target organism by different pesticides. According to the workers the economic impact of pesticides in non-target species (including humans) has been estimated at approximately 18 billion annually in developing countries. Most of the fungi are sensitive to fungicides and are readily killed. Their tolerance depends upon the initial chemical concentration and the nature of fungicide used.

Chen and Edwards (2001) had studied the effect of three broad-spectrum fungicides benomyl, captan and chlorothalonil, applied at recommended field application rates on soil microbial activity and biomass, nitrogen dynamics, organic matter decomposition and plant growth compared to the relative transient effects of benomyl and chlorothalonil, the captan had a greater and longer-lasting overall influence on soil microbial activity and nitrogen dynamics. Tayal (2009) reported that by application of fungicide micronite in agricultural soil decreases the total number of soil fungi. Saler et al. (2008) studied biodiversity and rhizosphere microfungi of groundnut with special reference to fungicide Blitox-50 and Topsin-M. Altogether 36 micro fungi were recorded on those 27 occurred in rhizosphere and 19 occurred on the soil of Blitox-50, while Topsin-M, 35 Micro fungi recorded 25 were from rhizosphere 15 from the soil. Fungi like *Rhizopus stolonifer, Penicillium brefeldianum, Penicillium funiculousum, Penicillium varians, Aspergillus niger, Aspergillus flavus, Cephalosporium sclerotiorum* and sterile black mycelium. were tolerate up to 1500 µg/ml of Blitox-50 concentrated on the other hand, at 1500 µg/ml concentration of Topsin-M, the tolerable fungi were *Mucor circinelloides, Rhizopus stolonifer, Aspergillus carbonarius, Aspergillus niger, Fusarium semitectum* and *Hormiscium brefeldianum.* The problem in the present investigation was undertaken to study the tolerance of Balyton by the Rhizosphere mycoflora of this important crop.

MATERIALS AND METHODS :

Tolerance of Rhizosphere Fungi to Fungicide:

Collection of soil sample: Seeds of the chill (*Capsicum annuum* Linn.) were sown in the 6 x 6 experimental plots in the Botanical Garden, K.T.H.M. College Nashik. Plots were irrigated with tap water to maintain sufficient moisture. Then they were observed for the germination after 15 days. Plants were collected to study the tolerance of fungicide by rhizosphere micro fungi.

Food Poisoning Soil Dilution (FPSD) technique: Tolerance of microfungi was studied by modifying food poisoning soil dilution (FPSD) technique (Saler and Gangawane, 1980). The media employed were equal volume (10+10 ml) of 2x medium (served as food) and 2x concentration of fungicide (served as poison) along with 1 ml of spore suspension from a dilution flask (served as soil dilution). Thus the medium had the final concentration 100, 200, 500, 1000, 1500 µg/ml of fungicides. Media with single strength without fungicidal compound served as control. Control concentration was considered as 0 µg/ml. 'R' abbreviation used as rhizosphere mycoflora and 'S' used as soil mycoflora. R/S referred as

Rhizosphere effect. Plates in triplicates were incubated at room temperature 26+_30^{0}C and observation for the number and type of fungal species on the poisoned plate. The identification of fungal organism was done by referring various monographs, research papers and other literature such as a manual of soil fungi (Gilman, 1956), Fungi of Agricultural soils (Domsch and Gams 1972), The genus Aspergillus(Raper and Fennell 1965),Kendrick (1971), etc. All the cultures, semi permanent slides, materials were properly labeled, numbered and deposited in Mycological Herbarium.

RESULTS AND DISCUSSIONS :

Quantitative results: At 1500 µg/ml, only 0.5 and 0.5 thousand population survived as against 3.50 and 2.75 at '0' µg/ml (control)Balyton in the rhizophere and soil respectively. Rhizosphere effect was lowered as concentration increases. There was a significant decrease in the population as concentration increases. Final tolerance limit of fungal population was 1500 µg/ml. Recorded (Table no: 2 and Fig. No. 1)

Qualitative results: A total of 16 fungal species was recorded during this experiment. Out of these, 12 were from the rhizosphere and 8 in soil on poisoned plates. At 0 µg/ml 14 species were recorded in rhizosphere and 11 species were in the soil. (Table No: 1)

The species that tolerated 1000 and 1500 µg/ml Balyton was *Aspergillus niger* (R and S) and *Fusarium oxysporium* (R and S); 500 µg/ml Balyton was tolerated by *Aspergillus niger* ® *Fusarium moniliforme* ® *Fusarium oxysporum* ® *Rhizopus stolonifer* (S) and *Trichoderma viride* (R and S); the species tolerated 200 µg/ml Balyton were*Alternaria alternata (S) Aspergillus carbonarius* ® *Aspergillus niger* (S) *Fusarium moniliforme* (S) *Fusarium oxysporum* (S) *Helminthosporium tetramera* ® *Rhizopus stolonifer* (R) and *Trichoderma viride* (R and S); and the species to lerated to 100 µg/ml Balyton in were *Aspergillus carbonarius* ® *Aspergillus niger* (R and S), *Fusarium melanochorum* ® *Fusarium moniliforme* ® *Fusarium oxysporum* (R) *Helminthosporium tetramera (S) Mucor plumbeus* ® *Penicillium varians* (R and S) *Penicillium verrucosum*(R) *Rhizoctonia bataticola* ® *Rhizopus stolonifer* (R) and *Trichoderma viride* (R and S).

The species eliminated from poisoned plates were *Aspergillus fumigatus, Alternaria solani, Aspergillus flavus*, *Fusarium melanchorum*, *Mucor plumbeus, Penicillium verrucosum and Rhizoctonia bataticola.* The abovementioned conclusion on the results obtained during these studies indicates that is show existence of rhizosphere effect. It was also confirmed that survival of a number of fungal population was dependent on the different growth periods of the plant.

Table No-: 1 Number of fungal colonies tolerated toBalyton(µg/ml) for rhizosphere and soil of *Capsicum annuum*Linn (Chilli)

Sr. no	Fungal species	Control		100		200		500		1000		1500	
		R	S	R	S	R	S	R	S	R	S	R	S
1	*Alternaria alternata*	-	1	-	-	-	1	-	-	-	-	-	-
2	*Aspergillus fumigatus*	1	1	-	-	-	-	-	-	-	-	-	-
3	*Alternaria solani*	2	-	-	-	-	-	-	-	-	-	-	-
4	*Aspergillus carbonarius*	1	1	2	-	2	-	-	-	-	-	-	-
5	*Aspergillus flavus*	2	1	-	-	-	-	-	-	-	-	-	-
6	*Aspergillus niger*	8	2	9	6	2	5	1	1	4	2	1	1
7	*Fusarium melanochorum*	1	-	2	-	-	-	-	-	-	-	-	-
8	*Fusarium moniliforme*	4	2	1	-	-	1	1	-	-	-	-	-
9	*Fusarium oxysporum*	4	3	2	-	2	2	1	-	3	1	`1	1
10	*Helminthosporium tetramera*	-	-	-	1	1	-	-	-	-	-	-	-
11	*Mucor plumbeus*	3	2	3	-	-	-	-	-	-	-	-	-
12	*Penicillium varians*	1	3	2	2	-	-	-	-	-	-	-	-
13	*Penicillium verrucosum*	1	2	1	-	-	-	-	-	-	-	-	-
14	*Rhizoctonia bataticola*	1	-	1	-	-	-	-	-	-	-	-	-
15	*Rhizopus stolonifer*	2	-	1	-	2	-	-	1	-	-	-	-
16	*Trichodermaviride*	10	8	9	2	3	4	3	1	-	-	-	-

Table No-: 2 Number of fungal colonies (10^3/gm over dry soil) tolerated to different concentration (µg/ml)of Balyton in the rhizosphere (R) and soil (S) of *Capsicum annuum* Linn. (Chilli)

Balyton(µg/ml)												
Concentration	0		100		200		500		1000		1500	
	R	S	R	S	R	S	R	S	R	S	R	S
Rhizosphere(R) and Soil (S)	3.50	2.75	2.75	1.00	2.50	1.25	1.00	0.75	0.5	0.5	0.5	0.5
R/S	1.27		2.75		2.00		1.33		1.00		1.00	

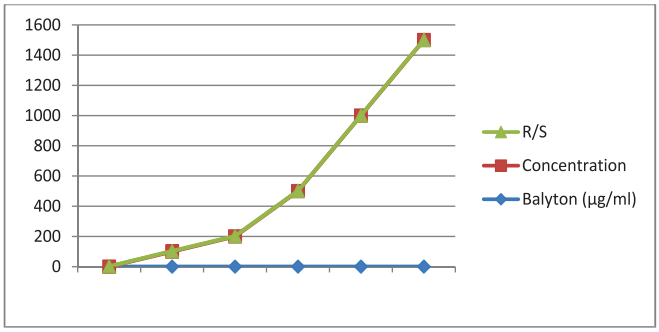

Fig.No.1 -Relationship between concentrations of Balyton in the poisoned plates of fungal population fromthe Rhizosphere and Soil of *Capsicum annuum* Linn

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