INFLUENCE OF FUNGICIDES ON DAMPING - OFF DISEASE AND SEED YIELD OF SOYBEAN

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Abstract

The effect of seed dressing fungicides on soybean seedling disease and yield was studied in a naturally infested field as well as in artificially in fested soil in pots . The results of the two successive seasons (1989 and 1990) showed that Homai 80 , Vitavax / Captan and Quinolate 15 CTS or Quinolate pro increased percentage of survivals . Soybean seed yield was also increased in the seed dressing treatments over untreated one.

INTRODUCTION

Soybean (Glycine max L.) is an important legume crop. A large number of pathogens was reported to attack soybean seeds , seedlings and roots (Sinclair 1979, Mosa 1982, Sinclair 1982 and Hassanein 1985). Eighteen fungal isolates from diseased soybean roots, hypocotyls , stem base or seeds were reported by Mahrous and Ibrahim. (1984), while El - Gantiry (1985) identified forty two fungi associated with soybean seeds internally or externally. The isolated fungi however, varied in their frequency and pathogenicity . Genera of *Fusarium , Rhizoctonia, Verticillium, Macrophomina , Chaetomium, Sclerotinia , Trichothecium , Phialophora and Drechslera* were reported.

Soybean seeds and seedlings diseases can be very damaging when environmental conditions are favourable leading to poor germinations, more post emergernce damping - off and less surviving plants and subsequently increasing yield loss.

Use of fungicides is considered the most feasible method in controlling seed rets and seedling diseases (Horn *et al.* 1975, Ellis *et al.* 1984).

The purpose of this study is to test some seed dressing fungicides , in pots and field trials, to control seedling disease of soybean and their influence on seed yield.

MATERIALS AND METHODS

Effect of seed dressing fungicides on soybean seedling disease.

1. Pot experiment

Cultures of *Rhizoctonia solani, Fusarium solani* and *Macrophomina phaseolina* were grown in barley sand medium for 7 days at 20 + 2^{o} C. The fungal inoculum was added to the pots at the rate of 5 % of soil weight . The soil was previously sterilized with formalin solution (5 %). The pots were watered for 7 successive days before planting . Soybean seeds (Crawford cultivar) were treated with the following fungicides : Homai 80 (60 % Thiophanate methyl + 20 % thiram); Quinolate 15 CTS (15 % copper oxyquinolate + 7.5 % Carbendazim), Quinolate pro (10 % Carbendazim , 16 . 6 % anthraquinone + 10 % Oxin copper, Vitavax / Capatan (37. 5 % Carboxin + 37.5 % Captan), Rovral (50 % iprodione) and Benlate (methyl 1 - butyl - carbamyl 1-2 - benzindizol - carbamte) all at the rate of 3 g ./ 1 kg seed and 2 g / 1 kg seed for Benlate. Ten seeds were sown per pot (20 cm in diameter) . There were five replications for each treatment. Pre-and post- emergence daming - off were recorded 25 and 45 days after sowing for each treatment as follows :

$$\frac{\text{Number of infected plants}}{\text{Total plant numbers}} \times 100$$

II. Field experiments

The experiments were carried out in naturally infested soil at Zarzora

Agriculture Research Staion " Behera Governorate " during 1989 and 1990 growing seasons. The plot chosen was rotavated and harrowed to perepare a fine seed bed . Soybean seeds (Crawford cultivar) were treated with the above fungicides at the same rates. Treated and untreated seeds were sown in the middle of June 1989 and 1990 , in 3 m long rows, four rows for each treatment. All treatmets were replicated four times and were arranged in a completely randomized block design . Pre - and post - emergence damping - off as well as survival plants were recorded 25, 45 and 90 days after sowing . Seed yield (kg / plot) and 100 seed weight were also recorded.

RESULTS AND DISCUSSION

Seed dressing fungicides gave a noticeable protecetion against seedling disease of soybean (Table 1). Moreover, the protection was marked in the seeds treated with Homai 80. Vitavax / Cpatan , Quinolate Pro or Quinolate 15 CTS at the rate of 3 g /kg seeds , respectively . However, benlate or rovral offered the least protection against the disease . The effect of the fungicides on the fungi varied . *Macrophomina phaseolina* was more affected than *Fusarium solani* or *Rhizoctonia solani* thus showing the least percentage of pre - and post - damping - off .

Results of the field experimets are presented in Table 2 . In 1989 growing season, seed treatment decreased pre-and post - emergence damping - off compared with untreated seeds. Fungicides differed in their effect , Homai 80, Vitavax/ Captan and Quinolate 15 CTS at the rate of 3 g / kg seed were the best fungicides, as seedling emergence was increased where survival plants were 88.6 % , 85.7 % and 85.0 % , respectively. Rovral increased plant stand to 72.5 % . On the other hand, Benlate at the rate of 2 or 3 g / kg seed was the least effective fungiclde.

Results obtained during 1990 growing season were almost the same as in 1989 season .Minor differences, however , were observed. Quinolate Pro was more effective in controlling seeding disease in 1990 than in 1989. However, in case of Benlate , the effect was reduced in 1990 than in 1989.

The high nutritional value of soybean seeds form a suitable media to be colonized by numerous pathogens . Seed rots and seedling diseases occurred when the climatic conditions favour growth and development of the pathogenic fungi . Primary infection by the pathogenic fungi usually take place through the root meristems. This phase of the disease seems more amenable to fungicidal control (ISPP 1980 and El

Table 1. Effect of seed dressing fungicides on pre - and post - emegence damping - off on soybean Crawford cultivar (pot experiment).

Fungicides	Dose g / kg seed	*Rhizoctonia solani*		*Fusarium solani*		*Macrophomina phaseloina*	
		% Seedling damping - off					
		Pre	Post	Pre	Post	Pre	Post
Benlate	2	25.1	6.5	21.6	5.2	19.9	4.8
Belate	3	26.3	6.3	23.9	6.1	19.0	3.9
Quinolate Pro	3	18.5	4.9	18.0	3.8	15.1	3.0
Quinolate 15 CTS	3	19.7	5.0	18.9	4.1	16.2	3.4
Homai - 80	3	15.3	3.8	17.1	3.9	14.8	3.1
Vitavax\Captan	3	16.8	4.0	17.8	3.7	14.0	2.9
Rovral	3	20.2	4.6	20.6	4.1	18.2	3.8
Control	-	27.3	6.9	27.3	6.9	27.3	6.9
L. S. D. 5 %		2.6	0.4	2.8	0.5	1.9	0.4

Table 2 . Influence of soybean seeds treated with some fungicides on pre - and post - emergence damping - off and survival plants in 1989 and 1990.

Fungicides	Dose g / kg seed	1989			1990		
		Pre -	Post -	Survival Plants %	Pre -	Post -	Survival Plants %
		% damping - off			% damping - off		
Benlate	2	27.5	12.5	60.5	28.4	14.1	57.5
Benlate	3	27.3	10.1	62.6	25.6	11.2	63.2
Quinolate							
Pro	3	17.5	3.2	79.3	13.9	3.1	83.0
Quinolate							
15 CTS	3	12.3	2.6	85.1	15.0	3.2	81.8
Homai - 80	3	8.8	2.6	88.6	9.3	3.0	87.7
Vitavax/Captan	3	11.5	2.8	85.7	12.1	3.0	84.9
Rovral	3	21.8	5.7	72.5	23.3	5.9	70.8
Control	-	29.3	17.7	53.0	30.0	15.6	54.4
L. S. D. 5 %		12.39	3.9	10.8	13.9	4.0	9.9

Table 3 . Effect of seed dressing fungicides on soybean seed yield and 100 seeds weight in 1989 and 1990 season.

Fungicides	Dose g / kg seed	1989		1990	
		Seed Yield (Kg/ plot)	100-seeds weight (g)	Seed Yield (Kg/ plot)	100-seeds weight (g)
Benlate	2	1.89	13.6	1.47	14.3
Benlate	3	1.87	14.6	1.80	14.8
Quinolate Pro	3	2.39	15.5	2.54	14.0
Quinolate15 CTS	3	2.71	14.9	2.89	15.3
Homai - 80	3	3.09	15.0	3.01	15.6
Vitavax\Captan	3	3.00	13.9	2.79	14.2
Rovral	3	2.00	14.9	2.13	15.3
Control	-	1.58	14.9	1.63	15.1
L. S. D. 5 %		0.29	N. S.	0.23	N.S.

Mosallamy *et. al.* 1988). Therefore , use of seed dressing fungicides has been found beneficial mainly in controlling the seed rots and seedling diseases (Jacobsen *et. al.* 1982).

The obtained results (Pots and fields) showed that seed dressing treatmets decreased seedling emergence damping - off than un case of untreated seeds. Moreover, Homi 80 ; Vitavax / Captan and Quinolate Pro or 15 CTS (3 g / kg seed) led to a significant reduction in seedling disleases. Futher evidence came from Ellis *et al.* (1979) Almedia (1981) and El-Gantiry *et al.* (1989). They found that pre and post - emergence damping - off was controlled when soybean seeds were treated with Vitavax / Thiram (3.3g / kg), Captan (0.2 and 2.0 g/kg and Quinolate V4X (3g/ kg seed), respectively.

On the other hand, Benlate ranked as the least effective fungicide . This observation was also reported by Backman *et. al.* (1975) and Williams and Abateni. (1975). This finding of degradation by products of Benlate in control soybean seedling diseases may be explained by the following : Some systemic fungicides (benlate) had a selective nature against specific pathogen (s) (Edgington *et. al.* 1980). A certain systemic fungicide can alter the antagonistic properties of saprophytes which normally maintain some natural control over inoculum density and potential for diesease occurrence. Backman *et. al.,* (1975) found that using Benlate in the field imopsed a toxic effect upon *Trichoderma* , a common fungus antagonistic in soil. Resistance of some plant pathogenic fungi to Benlate was indicated by Georgopulos (1977) and Fouad (1990).

Soybean seed yield was increased as a result of seed dressing fungicides. This increase was mainly due to the increase in numbers of the survival plants at harvest. Similarly, fungicides have been found useful in many situations in obtaining singinficantly higher yield though the control of soybean diseases (Sinclair 1979).

In conclusion, use of seed dressing fungicides offered adequate protection against soybean seedling diseases. Yield loss was also reduced. In future work, search for fungicides with long residual action, and safe to humans and environment is badly needed.

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تأثير بعض المبيدات الفطرية علي مقاومة مرض موت البادرات وكمية المحصول في فول الصويا

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درس تأثير بعض المطهرات الفطريه علي مقاومة مرض موت البادرات وكذا كمية المحصول لنباتات فول الصويا في تجارب حقلية خلال موسمي ١٩٨٩ ، ١٩٩٠ بمحطة بحوث ايتاي البارود، وكذا تجارب في الصوبه . ووجد أن معاملة البذرة بالمطهرات الفطرية تزيد نسبه انبات البادرات بوجه عام . وكانت المبيدات ماي - ٨٠ وفيتافاكس كابتان وكنيوليتا برو وكينوليت 15 CTS بتركيز ٣ جم مبيد / كيلو جرام بذرة هي افضلهم بالترتيب التنازلي.

وجد أيضا أن وزن المحصول / للقطعة كان أكبر في حالة البذور المعاملة بالمبيدات الفطرية عن غير المعاملة . في نفس الوقت لم يكن هناك فرق معنوي بين المعاملات بالنسبه لوزن ١٠٠ بذرة.