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Original Research Article

Effect of Seed Dressing and Foliar Apllication of Fungicides on Pod Blight Complex of Soybean

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Keywords

Soybean, Pod blight complex, fungicides

A B S T R A C T

An experiment was carried out to study the efficacy of seed dresser and foliar spray fungicides against Pod blight complex of soybean. Results revealed that the highest seed germination (95.17%), minimum disease index (11.88%), least per cent pod infection (16.42 %) and maximum grain yield (2248 kg/ha) registerd in treatment T4- seed treatment with carboxin + thiram @ 2g/kg + foliar spray with thiophanate methyl @ 0.1% at 55 and 75 DAS followed by treatment T5- seed treatment with with carbendazim + mancozeb (combi product) @ 2g/kg seed + foliar spray with thiophanate methyl @ 0.1% at 55 and 75 DAS and treatment T7-Spray with thiophanate methyl @ 0.1% at 55 and 75 DAS.

Introduction

Soybean (*Glycine max* (L) Merrill.) belonging to family Papilionaceae, possess a very high nutritional value. It contains about 20 per cent oil and 40 per cent high quality protein. The quality of soybean produce is affected by the biotic factors. Among the several diseases pod blight disease has become more common. Pod blight disease of soybean is caused by the fungus *Colletotrichum truncatum*, *Diaporthe phaseolorum* f. sp. *sojae* and *C. gleosporides* complex is considered to be the most significant yield–depressing pathogen in the world (Sinclair and Hartman, 1999). In India, pod blight (anthracnose) is considered the most severe soybean disease and observed in endemic ways (Chavan and Gupta, 2005). A yield loss of 100% was reported in India (Sinclair 1989). The disease has attained significant economic importance during recent years due to shift in sowing date of soybean, because of delayed onset of monsoon and because it reduces the quality of harvested seed. Presently cultivated variety is highly susceptible for this disease.

If infected seeds are planted, emergence may be low due to seed rot or seedling blight. Pod blihght is seed-borne and seed-transmitted disease which might cause systemic infection (Neergard, 1979). Seed treatment with antagonists or fungicides protects the seed from infection by seed and soil borne pathogens (Ramos and Ribeiro, 1993). Foliar fungicides are also used to

control numerous endemic diseases of soybean. Henceforth, keeping the above points in view, the present invetsigaton was carried to study the influence of seed dresser and the effect of foliar spray of fungicides applied at different period on pod blight severity and soybean grain yield.

Materials and Methods

A field experiment was conducted in randomized block design with three replication in 2.25 x 4 m^2 plots during 2016-17 at field of Regional Research Center, Amravati. Treated soybean seed (JS 335) was sown with spacing of 45 x 5 cm as per the treatments. The crop was raised successfully following all other recommended package of practices. Observations on seed germination and plant stand recorded on 8 and 30 days after sowing (DAS) respectively. Per cent disease index was calculated by using uniform method given by Anonymous (2014).

Disease scoring was done using 0-9 scale **(**0-No lesions/spots/discolouration, 1-1% area covered with lesions/spots/ discolouration, 3-1.1–10 % area covered with lesions/spots/ discolouration, 5-10.1 – 25 % area covered with lesions/spots/discolouration, 7-25.1 – 50 % area covered with lesions/spots /discolouration, 9-More than 50% area covered with lesions/spots/discolouration). Per cent pod infection was calculated by using the formula given below-

% pod infection = No. of infected pods/Total no. of pods observed x 100.

Upon crop maturity the crop was harvetsd treatment wise separetly, yield and yield attributes were recorded and all the data were subjected to statistical analysis.

Results and Discussion

The data on seed germination influenced by the seed treatment are presented in Table 1. Maximum per cent seed germination (95.17%) was recorded in treatament T4- ST with carboxin + thiram @ 2g/kg seed which is at par with treatments T1, T2 and T3. Least germination (84.53 %) was found in control treatment (Table 1). Same trend was observed in respect of plant stand observations. These results in accordance with the findings of Anitha *et al.*, (2015) reported that seed treatamnt with carboxin + thiram @ 0.2%, *Trichoderma harzianum* @ 0.6% and carbendazim + mancozeb @ 0.2% significantly increased the seed germination of soybean over control.

During crop growth period, *Colletotrichum* blight symptoms observed in field in the array of 11.88 to 30.33 % (Table 1). Least per cent disease (11.88 %) recorded in treatment T4- ST with carboxin + thiram @ 2g/kg seed + foliar spray with thiophanate methyl @ 0.1% at 55 and 75 DAS which is at par with treatment T5- ST with carbendazim + mancozeb @ 2g/kg seed + foliar spray with thiophanate methyl @ 0.1% at 55 and 75 DAS (13.82%). Maximum per cent infection index of blight observed in control treatmet i.e. T-9 (30.33%). Per cent pod infection pod registerd in the range of 16.42 to 33.37 in respective treatments. Minimum % pod infection noticed in treatment T4- T1 + foliar spray with thiophanate methyl @ 0.1% at 55 and 75 DAS *i.e.* 16.42% followed by treatment T5- T2 + foliar spray with thiophanate methyl @ 0.1% at 55 and 75 DAS, treatment T6- T3 + foliar spray with thiophanate methyl @ 0.1% at 55 and 75 DAS and treatment T7- foliar spray with thiophanate methyl @ 0.1% at 55 and 75 DAS registerd 18.09, 19.88, 20.95% pod infection respectively.

Table.1 Effect of various treatments on germination and disease index of soybean

SN	Treatment	% Germination	Plant stand/1 sq. m (30 DAS)	% Disease index	% pod infection
T1	ST with Carboxin + Thiram @ 2g/kg seed	94.65 (76.86)*	18.13	18.06 (25.10)*	22.26 (28.09)*
T2	ST with Carbendazim + mancozeb @ 2g/kg seed	92.97 (75.05)	17.60	19.06 (25.84)	24.47 (29.61)
T3	ST with *Trichoderma* @ 5g/kg seed	89.49 (71.16)	16.53	22.52 (28.31)	27.93 (31.90)
T4	T1 + foliar spray with thiophanate methyl @ 0.1% at 55 and 75 DAS	95.17 (77.65)	18.87	11.88 (20.13)	16.42 (23.82)
T5	T2 + foliar spray with thiophanate methyl @ 0.1% at 55 and 75 DAS	92.77 (74.43)	17.87	13.82 (2180)	18.09 (25.12)
T6	T3 + foliar spray with thiophanate methyl @ 0.1% at 55 and 75 DAS	90.89 (72.47)	16.80	14.56 (22.43)	19.88 (26.47)
T7	Foliar spray with thiophanate methyl @ 0.1% at 55 and 75 DAS	86.42 (68.70)	15.93	16.17 (23.67)	20.95 (27.10)
T8	Foliar spray with *Trichoderma* @ 5g/litre at 55 and 75 DAS	85.30 (67.60)	15.80	20.67 (27.02)	25.84 (30.49)
T9	Control	84.53 (67.08)	15.73	30.33 (33.41)	33.37 (35.28)
	SE ± (m)	1.96	0.71	0.96	1.44
	CD (P=0.05)	5.83	2.13	2.88	4.29

*figures in parentheses are arc sine transformed value

Table.2 Effect of various treatments on grain yield of soybean

SN	Treatment	100 seed weight (g)	Seed Yield (kg/ha)	ICBR
T1	ST with Carboxin + Thiram @ 2g/kg seed	10.14	1956	1:11.4
T2	ST with Carbendazim + mancozeb @ 2g/kg seed	9.50	1922	1:9.6
T3	ST with Trichoderma @ 5g/kg seed	9.32	1830	1:9.3
T4	T1 + foliar spray with thiophanate methyl @ 0.1% at 55 and 75 DAS	13.02	2248	1:3.3
T5	T2 + foliar spray with thiophanate methyl @ 0.1% at 55 and 75 DAS	12.30	2196	1:2.9
T6	T3 + foliar spray with thiophanate methyl @ 0.1% at 55 and 75 DAS	10.92	2056	1:1.9
T7	Foliar spray with thiophanate methyl @ 0.1% at 55 and 75 DAS	10.34	2011	1:1.8
T8	Foliar spray with *Trichoderma* @ 5g/litre at 55 and 75 DAS	9.12	1859	1:2.8
T9	Control	8.82	1730	
	SE ± (m)	0.53	105.0	
	CD (P=0.05)	1.58	312.0	

The given treatments significantly affected the 100 seed weight and grain yield as compared with control treatment (Table 2). Treatments T4 and T5 regisrered higher 100 seed weight i.e. 13.02 and 12.30 g respectively compare to other treatments. The highest grain yield (2248 kg/ha) was recorded in the treatment T4- T1 + foliar spray with thiophanate methyl @ 0.1% at 55 and 75 DAS followed by treatment T5- T2 + foliar spray with thiophanate methyl @ 0.1% at 55 and 75 DAS (2196 kg/ha) and treatment T7-foliar spray with thiophanate methyl @ 0.1% at 55 and 75 DAS (2011 kg/ha). Least yield recorded in control treatment T9 i.e. 1730 kg/ha. In the present study, it was revealed that seed treatment with carboxin + thiram @ 2g/kg, carbendazim + mancozeb @ 2g/kg seed (93.0%) and *Trichoderma* @ 5g/kg seed plus foliar application of thiophanate methyl @ 0.1% at 55 and 75 DAS resulted in increase in seed germination, least disease index, minimum per cent pod infection and increased 100 seed weight which have contributed for higher seed yield as compared to control and other treatments. Gawade *et al.*, (2009) and Anitha *et al.*, (2015) also reported similar effect in soybean crop against anthracnose and purple seed stain disease of soybean. Application of fungicides in controlling anthracnose disease and increasing the yields were reported earlier Shukla and Singh, 1993 and Bestor *et al.*, (2014).

Calculated the economics of treatments on the basis of expenditure and yield obtained and data revealed that highest ICBR recorded in treatment T1- ST with Carboxin + Thiram @ 2g/kg seed (1:11.4) followed by treatment T2- ST with Carbendazim + Mancozeb @ 2g/kg seed (1:9.6) and T3- ST with *Trichoderma* @ 5g/kg seed (1:9.3). Seed treatment and foliar application of fungicides evaluated under field conditions against pod blight of soybean were found most effective in reducing the disease as well as increasing the seed yield over unsprayed control.

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