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COMPARATIVE EFFECTIVENESS OF FIVE FUNGICIDES AGAINST SOYBEAN RUST

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Soybean rust (*Phakopsora pachyrhizi* Syd.), is a very prevalent disease in the Philippines and a constant menace to the crop. The disease is common during the dry season but is also sometimes observed during the wet season. The symptoms are reddish-brown, pinhead-sized blisters or pustules on the lower surface of the leaves (Quebral and Benigno 1975). Severe infection results in defoliation, death of the plants and complete crop loss.

This study was conducted to determine the efficacy of locally available fungicides in controlling soybean rust.

Materials and methods

Two field trials, one in the wet season (June-Sept. 1974) and the other in the dry season (Nov. 1974-Feb. 1975), were conducted. A split-plot design with four replications was used. The area was divided into 48 sub-plots. The sub-plots, measuring 2 m in width and 4 m in length were separated from each other by a 1 m alley guard row. T.K. # 5 and Clark 63 varieties of soybean were used in the experiment. The plants were artificially inoculated with rust by spraying with a spore suspension prepared from rust-infected soybean leaves. A knapsack sprayer was used to apply fungicide treatments at weekly intervals, five spray applications during the wet and four during the dry season. Cultural practices were followed as needed.

Results and discussion

Results of the first trial show that Dithane M-45 was the most effective in controlling soybean rust. Plants sprayed with this fungicide had a lower degree of infection and gave a significant increase in yield (Table 1). HOE 6052 caused phytotoxicity.

Further trials showed that plants treated with fungicides had a disease rating lower than the control.

A comparison of the two trials shows that more needs to be known about factors affecting yield loss, as well as the environmental factors that maximized the effectivity of chemical applications.

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Table 1. Effect of fungicides on rust and yield of soybeans

Variety	Treatment & rate per 100 gal		Rust Index*		Yield (kg/ha)	
			(Wet)	(Dry)	(Wet)	(Dry)
	HOE 6052 50W	0.6 lb	6.00**	4.31	465.50	635.00
	HOE 1374	0.45 liter	5.75	5.36	610.25	523.75
	Benlate	1.0 lb	5.75	4.61	724.75	683.25
T.K. # 5	Plantvax 75 W	0.4 lb	6.00	5.23	492.50	660.50
	Dithane M-45	2.0 lb	3.87	4.32	1138.25	650.25
	Unsprayed Check		6.00	5.53	698.00	570.25
	HOE 6052	0.6 lb	4.47	3.80	1723.25	628.25
	HOE 1374	0.45 liter	5.66	4.18	1699.50	722.75
	Benlate	1.0 lb	3.75	3.88	1793.75	758.50
Clark 63	Plantvax 75 W	0.4 lb	3.75	3.60	1727.50	816.25
	Dithane M-45	2.0 lb	2.74	3.40	1997.50	764.75
	Unsprayed Check		4.77	5.57	1608.75	752.50

* Rust Index: no rust pustules; 1 = less than 10% of leaf area infected; 2 = 10-25% of leaf area infected; 3 = 26-50% of leaf area infected; 4 = 51-75% of leaf area infected; 5 = 76-90% of leaf area infected; 6 = 91-100% of leaf area infected.

** Average of 4 replicates.

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[*Phakopsora pachyrhizi*]

CHEMICAL CONTROL OF SOYBEAN RUST . 4

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SUMMARY

The germination percentages of urediospores were 14, 14, 0.3, 0, 16, 2.7, 3.7, 1, 0.7 on 1% water agar contained 2,000ppm active ingredient (a.i.) 2-Chloroethyltrimethylammonium chloride (CCC), 100ppm 2,4-Dichlorophenoxyacetic acid (2,4-D), 12ppm 3-Indoleacetic acid (IAA), 55ppm α -Naphthalene acetic acid (NAA), 20 ppm a.i. 1-(butylcarbamoyl)-2-benzimidazole carbamic acid, methyl ester (Benlate), 15 ppm Sankyo Bordeaux, 500 ppm a.i. 2,3-Dihydro-5-carboxanilide-6-methyl-1,4-oxathiin-4,4-dioxide (DCMOD, Plantvax 75W), 4 ppm a.i. Dithane M-45, 20 ppm a.i. O-Methyl benzoid acid amilide (MBAA, BAS 3050F), respectively. The germ tubes were distorted with Benlate above 4 ppm a.i..

The resultant data of foliage application indicated that all growth regulators increased the weight of one thousand seeds from infected soybeans except that of 1500 ppm a.i. CCC. Spray of either 1 ppm NAA or 100 ppm a.i. CCC were particularly effective in this respect. One ppm 2,4-D significantly decreased defoliation of infected plants with high degree of infection and produced the nearly equal number of flowers to healthy plants, however, the yield was less since less effective percentage of mature pods was obtained. Efficacy of growth regulators reached maximum on third day after application, then gradually decreased. Chemical injury was

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observed in the soybean plants treated with 1,500ppm a.i. CCC, 100ppm NAA, 10ppm 2,4-D or 1,000 ppm a.i. MBAA.

All the fungicides tested, i.e. Benlate, Sankyo Bordeaux, Plantvax 75W, Dithane M-45, MBAA, not only decreased the disease incidence and defoliation but also increased 1,000 seeds weight which was higher than that of control. The least disease incidence was obtained by applying either Dithane M-45 or Benlate. Foliage spray with Benlate caused the same percentage of defoliation as that of healthy plants. With regard to the yield, 100 ppm a.i. Benlate and 200-fold or 400-fold dilution of Dithane M-45 were recommended for control of soybean rust. Sankyo Bordeaux was nearly as effective as the abovementioned fungicides, but it contained phenylmercuric acetate which was not permitted to use for the foliage application on this island.