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A PRELIMINARY REPORT OF STUDY ON SOYBEAN RUST

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ABSTRACT:- Soybean rust caused by *Phakopsora pachyrhizi* Syd. was found in several soybean growing areas during the rainy season of 1971, with damage and losses in yield ranging from 10 - 30% in local varieties and complete loss of yield in some imported varieties. No resistant variety was found among 57 varieties and hybrids tested at Mae Cho, Chiang Mai, but two hybrids, 64-104 and 0-38 were tolerant. Of 7 fungicides and fungicide mixtures tested, only Plantvax and Plantvax plus Benlate reduced defoliation significantly, but Benlate had no appreciable effect when used alone. No fungicide increased yields. Use of fungicides in farmers' fields will not be recommended until further tests have been made.

INTRODUCTION

Soybean rust caused by *Phakopsora pachyrhizi* Syd., is now a very important disease of soybean (*Glycine max* Merrill). It can cause serious defoliation, and yield losses may amount to 15 to 40% in individual cases (Kitani and Inoue, 1960; Kurata, 1960). The disease has been reported in the Philippines, Indonesia, China, Japan, Sarawak, Cambodia (Khmer Republic), Thailand, Taiwan and Malaysia (Baker, 1914; Boedijn, 1960; Cummins, 1950; Hiratsuka and Yoshinaga, 1935; Johnson, 1960; Litzenberger *et al.*, 1962; Puckdeedindan, 1966; Sawada, 1931; Thompson and Johnston, 1953; Wei and Hwang, 1939). Experiments with spraying for rust control have been reported from Taiwan and Japan (Hung and Liu, 1961; Kitani *et al.*, 1960). In Thailand the disease has not been extensively studied and no control measures have been established.

This paper reports preliminary studies of the occurrence, etiology, losses due to rust, resistant varieties, and spraying experiments with various fungicides.

MATERIALS AND METHODS

Several areas in the soybean growing regions of North, Northeast and Central provinces were selected for observations on the time of occurrence, and for estimation of the damage due to soybean rust.

Soybean varieties were tested for rust resistance at the Mae Cho Agricultural Experiment Station, Chiang Mai. The disease developed by natural infection without artificial inoculation.

The fungicides listed in Table 1 were tested at the Huai Si Thon Demonstration Farm, Kalasin. There were 6 replications of each fungicide and the water control, 8-row plots in 3.5x5.0 m. The 54 plots were arranged in a randomized complete block. Seeds of soybean variety S.J. 1 were planted in 22 July 1971. Two months later the first sprays were applied using the rates given in Table 1, and two additional sprays at the same rates were applied at 10-day intervals thereafter. Observations on defoliation and disease ratings were made 5 days before and 5 days after the last application. The four middle rows of each plot were harvested for seed yields. Seeds were dried to 8.5% moisture content before weighing.

RESULTS

Soybean rust was found in Chiang Mai, Sukhothai, Kalasin, Sakon Nakhon, Nakhon Phanom, Chai Nat and Suphan Buri provinces. It was present throughout the growing season (July to November) at all locations, but most prevalent in September and October when rains are most frequent. The disease lesions are found on the stems, leaves and petioles. The leaves and stem gradually change from green to yellow and then are shed, leaving only the bare stalk remaining. Damage and losses in yield may amount to 10 to 30% for the S.J.1 and S.J. 2, varieties. Total losses of yield were observed on some imported varieties at Mae Cho, Chiang Mai.

TABLE 1. Fungicides tested against soybean rust

Fungicide		Rate of application g/20 liters or ml/20 liters
PIOMY	<i>Streptomyces pimentogenus</i>	20 g
DU-TER W.P. EXTRA	triphenyl tinhydroxide	40 g
DACONIL W.P.	tetrachloroisophthalonitrile	38 g
MANZATE D	manganese ethylenebisdithiocarbamate	40 g
TECTO 40 FLOWABLE	Thiabendazole	22.5 ml
BENLATE 50 W.P.	Benomyl	11 g
PLANTVAX 75 W.P.	Oxathiin	22 g
BENLATE + PLANTVAX	Benomyl + Oxathiin	11 + 22 g
Control	Natural plain water	100 liters/rai*

* 1 rai = 1600 m²

A Total of 5 local varieties including S.J. 1 and S.J.2, 42 introduced varieties, and 10 hybrids were tested for resistance at the Mae Cho Agricultural Experiment Station. No resistant varieties were found but the hybrid varieties 64-104 and 0-38 apparently had some tolerance. S.J. 2 was also apparently more tolerant than S.J. 1. This experiment will be repeated during the rainy season of 1972.

In the spray experiment at Kalasin, it was observed that only a small number of the lower leaves were infected with rust pustules on the under side at the time of the first spraying, but the disease developed rapidly before the second spraying. Defoliation was observed in all treatments at the time of the third spraying. As shown in Table 2, defoliation was reduced by Plantvax alone or by Plantvax and Benlate.

Average seed yields for each treatment are given in Table 2 as kilograms per rai (1600 m²). There was no significant difference between treatments.

DISCUSSION

Application of the fungicides at the application rates used has no effect on yield, though Plantvax, Plantvax and Benlate, Manzate and Tecto decreased defoliation. The fact that Benlate had no effect when used suggests that only

the Plantvax in the Benlate-Plantvax was effective. The rapid increase in the disease after the first spray suggests that more frequent spraying, possibly at 3 to 5 day intervals instead of 10 days, might be more efficient. This will be tried in 1972. But based on the results of the present experiment, the author would not recommend the use of protectant fungicides in farmers' fields.

TABLE 2. Leaf defoliation and average seed yield after spraying with various fungicides

Fungicide	Leaf defoliation	Yield kg/rai* (8.5 % moisture)
BENLATE + PLANTVAX	Light	352
PLANTVAX	"	355
MANZATE	Moderate	358
TECTO	"	374
DU-TER	Heavy	380
BENLATE	"	350
DACONIL	"	330
PIOMY	"	341
Control	"	313

*1 rai = 1600 m²

By analysis of variance the data was found non significance.

C.V. 10.5%

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