15. VARIETAL DIFFERENCE IN *HELMINTHOSPORIUM* LEAF SPOT AND SOME PROBLEMS OF CONTROL MEASURE IN THAILAND

Prakob Kanjanasoon* and Tawee Sitthichai**

Introduction

Helminthosporium leaf spot disease of rice was not observed to be a serious and widespead disease in Thailand until 1965; the incidence of the disease was observed after the outbreak of Yellow Orange Leaf Virus diseased, and gradually increased toward maturing stage, causing tremendous damage to rice plants. In 1966, approximately 660,000 hectares of rice field in different parts of the country were infected with Yellow Orange Leaf virus. Symptoms were more conspicuous at tillering stage, At later stages of plant growth, all the virus infected plants appeared more susceptible to the *Helminthosporium* disease: most of them were badly infected.

However, before occurrence of the virus disease, *Helminthosporium* leaf spot disease was also observed in limited areas in the Northeast and South of the Country. In one extreme case, a place at the East where the soil is a nonfortile Roi Ed clay loam-fine sandy loam, the disease was commonly found in seedbeds and often killed the plants.

The control of *Helminthosporium* leaf spot disease at transplanting stage is not well established in Thailand. In seedbeds, however, attempts are being made to select resistant varieties and effective fungicides.

Varietal Resistance and Chemical Control Tests

The bests were conducted at seedling stage in a rice farmer's field in the Eastern part of the country where the disease was commonly found in seed bed as mentioned elsewhere. The following methods have been adopted for a severe test of brown spot resistance and chemical control in Thailand.

Upland seed beds were used in the tests. Besides the ideas that a dry upland plot will bring more severe brown spot development, the seed bed has other advantages: more uniform stands of seedlings, easier to handle the dry seeds and more convenient tc work. No fertilizer was used during the tests.

Time of testing. For the convenience of water supply, tests were made in August, wheather was regular rainfall and most of the fields were planted.

1. Resistance Test.

Method of planting. Test rows were 50 cm. About 5 gm. of seeds were used in a row in order to have dense stand. Rows were about 10 cm. apart. Karb-Dum, the most susceptible native variety, was used as a susceptible check between each test row. Three rows of susceptible variety were planted on each side of the plot and 6 rows at both ends. 282 foriegn varieties and 62 local varieties were used in the test.

* Chief, Rice Pathologist, Rice Protection Research Centre, Rice Department, Ministry of Agriculture, Bangkok, Thailand.

** Rice Pathologist, Rice Protection Research Centre, Rice Department, Ministry of Agriculture, Bangkok Thailand.

2. Chemical Control.

Only Karb-Dum, the most susceptible variety, as mentioned above, was used. For testing, 10 gms of seed was planted in each rows. Rows were 10 cm. long and 10 cm. apart. At 15 th day after planting, the test chemicals were first applied, with 4 additional applications at 5 day intervals. The chemical compounds and antibiotics sulfenate and their dosages are given below according to the recommendation of the respective chemical companies:

(1) Antibiotics

Blasticidin-S-M 0.2 and 0.3%	
active ingredient: blasticidin-S-benzilamine	20. %
mercury	1.7%
inert ingredient	93.3%
Uni-Blasticidin W.P. 0.2, 0.3%	
active ingredient: blasticidin-S-benzilamine sulfenate	2.0%
inert ingredient	98.0%

(2) Copper compounds

Blitox 0.25 and 0.35%	40.0%
active ingredient: copper sulfate	40.0%
inert ingredient	60.0%
Cupravit forte 0.3 and 0.35%	
active ingredient: copper oxychloride	50.0%
inert ingredient	50.0%
Cuprosan P 0.25 and 0.35%	
active ingredient: zineb	50.0%
copper	12.0%
inert ingredient	38.0%

(3) Captan

Captan 50 W.P. 0.25 and 0.3%	
active ingredient: N-trichloromethyl mercapte-4-cyclochexene	
61, 2-dicarboximide	50.0%
inert ingredient	50.0%

(4) Mercury compounds

Verdasan 0.2 and 0.3%	
active ingredient: organo merurial salt	2.5%
inert ingredient	97.5%
Ceresan 0.25 and 0.3%	
active ingredient: ethyl urea	2.5%
mercury	2.5%
inert ingredient	9.50%
Agrosan 5 W. 0.25 and 0.3%	
active ingredient: mercurial salt	.0%
inert ingredient	95.0%

(5) Zinc

Antracol 0.2 and 0.3%	
active ingredient: zinc thiocarbamate	70.0%
inert ingredient	20.0%
Tonacol 0.2 and 0.3%	
active ingredient: zinc ethylene bisdithiocarbamate	65.0%

(6) Manganese

Dithane M-45 0.2 and 0.3%

active ingredient: ethlene bisdithiocarbamate 62.0%

To 100 cc. of each concentration was added I drop of Tween 20. The resulting suspension was sprayed on the plants in a 1 square metre plot. When seedling of all tests were 35-40 days old, the observations were made. Results of Varietal Resistance and Chemical Control Tests are given below.

Table 1. Disease reaction to 344 rice varieties

Number ef var. tested	Reaction				
	VR	R	MS	S	VS
344	—	5	54	69	216

Table 2. Effective chemicals controlled the disease.

Chemical	Concentration gm1/00cc.	Percent of plant showed various groups of disease reaction				
		Group 1	Group 2	Group 3	Group 4	Group 5
Agrosan 5 W	0.25	78.67	21.33	—	—	—
Ceresan	0.30	78.00	22.00	—	—	—
Verdasae	0.30	64.33	35.67	—	—	—
Blasticidin S-M	0.30	25.67	65.33	8	1	—

Note: Group 1=VR (Very resistant) Very small brown specks of pin point size were produced on the leaves.

Group 2=R (Resistant) Few small brown spots, larger than those in group 1, were produced on a leaf.

Group 3=MS (Moderately Susceptible) The size of spots were similar to group 2, but more numerous on a leaf.

Group 4=S (Susceptible) Typical brown spot lesions, with brown margins, were large and numerous on a leaf. Sometimes grey centres were observed. When the disease was advanced, the leaves turned yellow.

Group 5=VS (Very susceptible) The lesions were like group 4, but larger, and often killed the leaves.

Disease classifications adopted from:

Bedi, K.S., and H.S. Gill. 1961. Relativ reaction of different varieties of rice to the brown leaf-spot disease in the Panjab. Indian Phytopathology 14 (1): 42-47.

From table 1, it is seen that 5 varieties (or 1.44%) of the 344 varieties are resistant and that 62.25% fall into the very susceptible group. The 5 resistant varieties are:

(i) Taichung Native 1. (Taiwan)
(ii) Muey Nawng 62 M. (Thailand)
(iii) Leuang Yai 34. 〃
(iv) Leuang Thong 82 〃
(v) Crossed of PJP 54×IRH 8 BKN 56-7-106

In table 2, Agrosan at a concentration of 0.25% and Ceresen and Verdasan at a cocentration of 0.30% gave very good control, over 64.33% of the plants showed a disease reaction in group 1, the rest were in group 2, and non was in group 3-5. The other chemicals tested which are not indicated in table 2, were less effective: over 75% of plants in most treatments showed disease reactions in group 3 and 4.

Fertilizer Trial to Minimize the Loss

It was observed at harvest period in 1965, that most of the rice plants previously infected with Yellow Orange Leaf Virus at early stage of plant growth became infected with the brown spot disease at flowering stage, causing darkening of the grain and reduced the yield to some extent.

The test here, therefore, conducted in order to find out whether the application of enough nitrogenous and phosphate compound to the field previously infected with Yellow Orange Leaf Virus, will minimize the loss caused by the brown spot disease at later stage of plant growth. To do this, a rice farmer's field infected with the virus disease were used. All test field to be applied with fertilizer were first applied with 31.25 Kg/ha. ammophos (16: 20:0) about 40 days after transplanting. Last application was done 7 days before primodial initiation began. Three rates of fertilizer application used in the test are: 31.25, 125.00 and 250.00 Kg/ha. Two fields were used for checks: one received neither no fertilizer nor insecticide, the other one received no fertilizer but was protected with insecticide. All other test fields were protected with insecticide in order to prevent insect infestations. First insecticide application, and 2 additional were made at 15 day intervals. Results of the test are given in Table 3.

Table 3. The effect of treatment on the incident of brown spot diseased seed.

Treatment			Diseaed seed	av. wt. of 200 seeds (gm.)	
Plot No	Insecticide	kg/ha. ammophos		Healthy	Diseased
1	No	0	40.50	4.40	3.50
2	Yes	0	40.09	4.55	4.00
3	Yes	31.25	37.49	4.57	3.52
4	Yes	125.00	24.50	4.40	3.45
5	Yes	250.00	19.88	4.60	3.10

From table 3, it can be seen clearly that the more fertilizer applied to the field, the lower incidence of brwon spot diseased seed. Plot no 5 received 250 Kg/ha., of ammophos, and the percentage of diseased seed was about 20, compared with 40 for the unfertilized plots no 1 and 2. The results indicate that application of nitrogenous and phosphate fertilizer to the virus infected plants helped reduce subsequent brown spot infection. It is also obvious that the difference in weight of 200 seeds among 5 treatments of the healthy seeds is small, but the average weight of all healthy seeds is about 17 percent higher than that of the diseased seeds.

Summary

Results from the tests on Varietal Resistance indicated that 5 varieties of the 344 varieties were resistant to brown spot disease, and Chemical Control clearly showed that 3 mercurial compounds gave very good control to the disease. A test on Ferilizer Trial to Minimize the Loss was also conducted in a field previously infected with Yellow Orange Leaf Virus, suggested that application of nitrogenous and phosphate fertilizer to the virus infected plant helped reduce subsequent brown spot infection.

References for Paper 15

1. Bedi, K.S., and H.S. Gill. 1961. Relative reaction of different varieties of rice to the brown leaf-spot disease in the Panjab. Indian Phytopathology 14 (1): 42-47.

2. Ou, S.H. 1961. Rice blast disease and breeding for its resistance in Thailand with notes on other rice diseases. Final Report to FAO 43 pp. (Mimeographed).
3. Sittichai, Tawee, 1965. A study on Varietal Reaction to Brown Spot. Final Report to Rice Department, 13 pp. (Mimeographed).
4. Takahashi, J. and others, 1967. Increasing The Yields of Photo-Sensitive Varieties by Modifying Their Cultural Practices. IRC. News letter, Vol. XVI, No. 2, 40-44 pp.