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SHORT NOTES

EFFECT OF SHEATH BLIGHT DISEASE ON THE YIELDS OF THREE RICE VARIETIES

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RINGKASAN

Penyakit padi hawar kelopak boleh menyebabkan kesusutan hasil sebanyak 30% bagi jenis padi IR 1487 yang mudah diserang penyakit ini. Kesusutan hasil sebanyak 1–4% bagi jenis padi yang tahan diserang (IR 20) dan sederhana tahan diserang (Mahsuri) didapati tidak bererti dibandingkan dengan petak "control".

INTRODUCTION

The sheath blight disease of rice is caused by *Rhizoctonia solani* Kuhn which is an imperfect stage of the fungus *Thanatephorus cucumeris* (Frank) Donk (OU, *et al*, 1973). The disease was reported and described in Peninsular Malaysia as early as 1958 (JOHNSTON, 1958) and has been described as widespread and severe in several rice growing regions in Peninsular Malaysia (CHIN, 1973). It infects rice plants (leaf blades, leaf sheaths and culms) at different stages of growth but the damage is more prominent at prebooting stage. The disease infection could increase with high nitrogen application and there is a fear that with the widespread cultivation of high nitrogen responsive varieties and wide usage of nitrogenous fertilizers, the disease could become a serious problem and the damage to rice plant could be considerable. Recently the disease has severely affected heavily fertilized rice fields in the Kubu Gajah area in Kepong and the Tanjong Karang areas in the State of Selangor.

Yield reduction of 20–25% has been reported in Japan and in the Philippines and damage has been reported to be severe in some seasons (OU, 1972). In Malaysia, however, the disease has been noted to be severe but yield loss assessment has not been carried out so far. Therefore the present study was conducted to assess yield losses for three rice varieties of different reaction to the disease under artificially inoculated conditions.

MATERIALS AND METHODS

Seedlings of rice variety IR 1487, a variety susceptible to sheath blight disease were raised in the nursery for 25 days, and fertilized with 0.5 Kg of ammophos fertilizer per seedling bed of 15 x 1m. The seedlings were transplanted into the test plots at the rate of two seedlings per point and at the spacing of 25 x 25cm. These transplanted seedlings were fertilized with a total of 90 KgN/ha, 45 KgP_2O_5/ha and 34 KgK_2O/ha in the forms of urea, double superphoshate and muriate of potash respectively.

The experiment was conducted in a split plot design where the main treatments were (a) control plots (uninoculated) and (b) inoculated plots. The subtreatments consisted of three rice varieties IR 20 (resistant), Mahsuri (intermediate) and IR 1487 (susceptible). Each sub-plot

measured 5m square. The inoculated plots were treated with the sheath blight straw-inoculum at the rate of three inoculum straws per hill and prevented from floating out by a piece of rubber band. The control plots were similarly treated with sterilised straws.

Using the disease scales prepared by the International Rice Research Institute (IRRI 1975), disease scoring was done at the ripening stage at the rate of ten hills per plot.

RESULTS

The average disease scores obtained in the study confirmed that these three varieties showed distinct differential reactions to sheath blight disease *(Table 1)* . IR 20 was resistant to sheath blight (average score 2.7), Mahsuri was intermediate in reaction (average score 3.7) and IR 1487 was susceptible (average score 7.9).

TABLE 1. DISEASE REACTIONS OF THREE RICE VARIETIES AGAINST SHEATH BLIGHT DISEASE OF RICE

Replicate / Variety	Disease Score R_1	R_2	R_3	Mean			Varietal Reaction
IR 20	2.6	3.2	2.2	2.7	*	**	Resistant
Mahsuri	3.2	3.8	4.0	3.7			Intermediate
IR 1487	8.0	8.0	7.8	7.9	**		Susceptible

Mean	=	4.7556	
SE/obs	=	0.3887	
CV x	=	8.17%	
SE (mean difference)	=	=	0.3171
LSD 5% (between varieties)		=	0.8823
LSD 1% (between varieties)		=	1.4600

* = Significant at 5% level

** = Significant at 1% level

The total grain yields recorded for the inoculated and the uninoculated plots *(Table 2)* showed that there was a highly significant yield reduction between the two treatments which depended on the susceptibility ratings of the rice varieties *(Table 3)* There was no significant yield reduction between resistant and intermediate varieties (IR 20 and Mahsuri) whereas yield reduction was highly significant for susceptible variety (IR 1487) *(Table 2)*. The yield reduction for IR 20 and Mahsuri were 1.3% and 4.4% respectively which were not significantly different from each other. However for a susceptible variety (IR 1487) the yield reduction was 30% which was very significantly higher than the resistant and intermediate varieties *(Table 4)*.

TABLE 2. GRAIN YIELDS* OF THREE RICE VARIETIES AS AFFECTED BY THE SHEATH BLIGHT DISEASE OF RICE

Variety	IR 20		Mahsuri		IR 1487	
Replicate	C	I	C	I	C	I
R1	5300	5300	6000	5600	5600	4000
R2	5250	5100	6000	5800	5300	3200
R3	5400	5350	6000	5800	5400	4520
Mean	5316.7	5250.0	6000.0	5733.3	5433.3	3816.7
Test of significance	NS		NS		**	

C = Control plots (uninoculated)
I = Inoculated plots
* = In grams
NS = Not significant at 5% level
** = Significant at 1% level

TABLE 3. ANALYSIS OF VARIANCE ON THE DATA IN TABLE 2

Source	df	SS	MS	F-test
Replicate	2	215,833.3333	107,916.6667	1.6550 NS
Variety	2	4,630,833.3333	2,315,416.6667	35.5080 **
Error I	4	260,833.3334		
Sub-total	8	5,107,500.0000		
Treatment	1	1,901,250.0000	1,901,250.0000	46.5612 **
Treat. x Var.	2	2,132,500.0000	1,066,250.0000	26.1122 **
Error II	6	245,000.0000		
Total	17	9,386,250.0000		

Overall mean = 5258.3333
SE/obs (Error I) = 255.3592
CV x (I) = 4.86%
SE/obs (Error II) = 202.0726
CV x (II) = 3.84%
SE (mean difference) = 164.99

Between Inoculated & Control for a given variety:-

LSD 5% = 404.23
LSD 1% = 612.11
** = Significant at 1% level

TABLE 4. % YIELD LOSSES OF THREE RICE VARIETIES CAUSED BY THE SHEATH BLIGHT DISEASE OF RICE

Variety \ Replicate	R_1	R_2	R_3	% Mean	$Sin^{-1}\sqrt{P}$	
IR 20	0	2.85	0.93	1.26	5.0844	NS
Mahsuri	6.67	3.33	3.33	4.44	11.9986	**
IR 1487	28.57	39.62	21.30	29.83	32.9350	**

Mean	=	16.6727
SE/obs	=	4.5512
CV x	=	27.30%
SE (mean difference)	=	3.7160
LSD 5%	=	10.3305) with reference to $Sin^{-1}\sqrt{P}$
LSD 1%	=	17.0936)

NS = Not significant at 5% level

** = Significant at 1% level

NB = Analysis is based on $Sin^{-1}\sqrt{P}$

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SUMMARY

Sheath blight disease of rice could cause a very significant yield loss of 30% for a susceptible variety IR 1487. For a resistant variety (IR 20) and an intermediate variety (Mahsuri), the yield losses of 1–4% were not significant.

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