

## INHERITANCE OF RESISTANCE TO FOUR PATHOTYPES OF BACTERIAL BLIGHT IN RICE CULTIVAR B. J. I

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Genetics of resistance in the variety B. J. I was studied against four Philippines pathotypes. A single recessive gene controlled the resistance against the pathotypes PXO 61, PXO 86, and PXO 79. The gene also provided moderate level of resistance to pathotype PXO 71.

Bacterial blight of rice (*Xanthomonas campestris* pv *oryzae*, Ishiyama, Dye) is widely distributed, and from the economic point of view is one of the most disastrous disease that affect the crop. In the past, several epidemics have been experienced in India and abroad. Since chemicals are not very effective against the disease, the development of resistant varieties becomes an important approach. The progress in this respect however would depend upon the knowledge of various sources of resistance and the mode of inheritance of the genes for resistance. An Indian cultivar Bhog Jira I (B. J. I) had proved to possess broad spectrum resistance for bacterial blight against many virulent races of the world (Buddenhagen and Reddy, 1972). The present communication reports the genetics of bacterial blight resistance to four Philippines pathotypes in B. J. I.

### MATERIALS AND METHODS

Crosses involving B. J. I, T (N) I and IRI 545-339 were made to study the mode of inheritance and allelic relationships of genes governing resistance. The four Philippines pathotypes PXO 61, PXO 86, PXO 79 and PXO 71 (Mew *et al.*, 1982) were used in the present study. The bacteria were multiplied on Wakimoto medium (Wakimoto, 1954). Bacterial suspension was adjusted to about  $10^9$  cells per ml. At the maximum tillering stage, tillers of each plant were divided into four by binding them with different coloured vinyl ties (one colour for each pathotype). The parents, F<sub>1</sub> plants and F<sub>2</sub> populations were inoculated at the maximum tillering stage (50 days after seeding) by the method as suggested by Kauffman *et al.*, (1973). Disease assessment was done 14 days after inoculation following the Standard Evaluation

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Table 1 Classification of  $F_1$  and  $F_2$  plants for bacterial blight resistance from the cross of T (N) 1 x B. J. 1 to four pathotypes

Pathotype	Reaction of $F_1$ plants	Reaction of $F_2$ progenies		$\chi^2$ , 1:3	P value
		Resistant [no.]	Susceptible [no.]		
PXO 61	Susceptible	344	136	2.59	0.1-0.25
PXO 86	Susceptible	344	136	2.59	0.1-0.25
PXO 79	Susceptible	344	136	2.59	0.1-0.25
PXO 71	Susceptible	0	480		

Table 2 Classification of  $F_2$  population for bacterial blight resistance from the cross of T (N) 1 x B. J. 1 to pathotype PXO 71

$F_2$ population		$\chi^2$ , 1:3	P value
Moderately susceptible [no.]	Susceptible [no.]		
336	144	3.73	0.05-0.10

System (IRRI 1980). The study was conducted at the International Rice Research Institute, Philippines.

## RESULTS AND DISCUSSION

The disease reactions of parents  $F_1$  and  $F_2$  populations of crosses presented in table 1 indicated, 1 resistant : 3 susceptible ratio. This suggested clearly that the resistance of B. J. 1 to races PXO 61, PXO 86, and PXO 79 were controlled by a pair of recessive genes. The reaction of B. J. 1 to PXO 71 was of moderate susceptible nature. When  $F_2$  population was classified in the moderate susceptible (MS) and susceptible (S), the ratio

of 1 MS : 3 S which suggested the moderate level of resistance in B. J. 1 is due to a single recessive gene (Table 2). The joint segregation to four pathotypes (PXO 61, PXO 86, PXO 79 and PXO 71) 1 RRRMS : 3 SSSS suggested that a single pair of recessive gene conditioned resistance to PXO 61, PXO 86, and PXO 79 and the moderate resistance to pathotype PXO 71.

The  $F_1$  and  $F_2$  progenies of IR 1545-339 x B. J. 1 did not segregate for any of the races (Table 3), thus indicating the resistance gene in B. J. 1 is allelic to *xa5*.

Table 3 Reaction of  $F_1$  and  $F_2$  progenies for bacterial blight resistance in the cross IR1 545-339 x B. J. I to the four pathotypes

Pathotype	$F_1$	$F_2$	
		Resistant {no}	Susceptible {no}
PXO 61	Resistant	460	0
PXO 86	Resistant	460	0
PXO 79	Resistant	460	0
PXO 71	Resistant	460	0

A single recessive gene in cultivar B. J. I. has also been reported by Murty and Khush (1972) and Hsu *et al.*, (1976). But conclusions drawn by several other workers on the mode of inheritance of genes for resistance in B. J. I are contradictory. Jayaraj *et al.*, (1972) reported digenic inhibitory ratio. Jayaraj *et al.*, (1972) and Moses *et al.*, (1974) reported trigenic and tetragenic inhibitory ratio with different

isolates. Singh and Nanda (1975) found monogenic dominant gene. Polygenic inheritance was also noticed in B. J. I (Mishra *et al.*, 1971, Tembhornikar and Padmanabhan 1981). The genetics of B. J. I observed through present study is simple and the resistance can very easily be incorporated in the desired breeding lines to combat the bacterial blight menace.

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