



Inheritance of resistance to bacterial leaf blight in native germplasm of rice (*Oryza sativa* L.)

S. K. Nair¹, S. S. Baghel and R. K. Sahu

Department of Plant Breeding and Genetics, Indira Gandhi Agricultural University, Raipur 492 012

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Bacterial leaf blight of rice (*Oryza sativa* L.) caused by *Xanthomonas oryzae* pv. *oryzae* is one of the disastrous diseases in the rice growing regions of the world. It has been reported to occur in epidemic form in several parts of the World and in India. Depending upon the severity and stage of its occurrence, the losses in grain yield have been estimated to range from 6 to 60 per cent under natural condition [1]. Since chemical control is found to be ineffective, incorporation of resistant genes and its use is the best approach to control the disease.

Seven indigenous rice accessions from Madhya Pradesh germplasm having resistance and moderate resistance to isolate 6 of *Xanthomonas oryzae* pv. *oryzae* were Bhejari II (B 565 II), Kalkatiha, Kranchi, Assam Chudi (A:384), Deshi Chudi (D:1138), Surmatia and Assam Chudi (A:402). The work of studying mode of inheritance in these accessions were carried out at the Department of Plant Breeding and Genetics, IGAU, Raipur during *kharif* 1996. Out of these seven accessions, six accessions were crossed to a known susceptible variety MW 10 whereas remaining Bhejari II was crossed with another well known susceptible variety TN 1.

The F₁s and F₂s were raised under optimum management condition with fertility level 150:80:30 kg NPK per ha. at 25 cm × 20 cm plant spacing. Isolate 6 of *Xanthomonas oryzae* pv. *oryzae* [2] was used for inoculation in genetical studies. Its pure culture was maintained on Potato Sucrose Agar medium and for inoculation, seventy-two hours bacterial growth slant culture was suspended in sterile distilled water to 1.5 OD level. The test plants were inoculated in the field at the maximum tillering stage (55-60 days after planting) by clip inoculation method. Disease score was recorded 21 days after inoculation following the Standard Evaluation System of IRRI (1988). For genetical analysis

the frequencies Highly Resistant, Moderately Resistant & Resistant categories were treated as Resistant (R) and Moderately Susceptible, Susceptible & Highly Susceptible pooled together as Susceptible (S).

All the seven accessions except Bhejari II (B 565 II) were observed to have ≤ 3 disease score in the field, Bhejari II had a disease score of 1. The disease reaction of these crosses in F₁ and F₂ generations were analyzed and are presented in Table 1.

Table 1. Bacterial leaf blight reaction in F₁ and F₂ of crosses of rice

Cross	Reaction of F ₁	Reaction of F ₂			R:S	χ ² value
		Total plants	Resist. (R)*	Suscep. (S)*		
TN 1/Bhejari II	S	516	208	308	7:9	2.481
MW 10/Kalkatiha	R	549	417	132	3:1	0.267
MW 10/Kranchi	R	414	246	168	9:7	1.690
MW 10/Assam Chudi (A:384)	R	495	357	138	3:1	2.187
MW 10/Deshi Chudi (D:1138)	S	462	210	252	7:9	0.545
MW 10/Surmatia	S	460	116	344	1:3	0.011
MW 10/Assam Chudi (A:402)	R	485	260	225	9:7	1.375

*Disease score for BLB under SES of IRRI 1988

Score	%age of infected leaf area	Reaction
0	0	Highly Resistant (HR)
1	1-5	Resistant (R)
3	6-12	Moderately Resistant (MR)
5	13-25	Moderately Susceptible (MS)
7	26-50	Susceptible (S)
9	> 50	Highly Susceptible (HS)

¹Present address: S. G. College of Agriculture and Research Station, I.G.A.U., Kumhrawand, Jagdalpur 494 005

The F_1 progenies of the crosses of TN 1 with Bhejari II and that of MW 10 with Deshi Chudi (D:1138) were susceptible, indicating that the susceptibility is dominant over resistant. The F_2 generation ratio indicates that the resistance against isolate 6 of *Xanthomonas oryzae* pv. *oryzae* was governed by two independent recessive genes in Bhejari II and Deshi Chudi (D:1138). Similar digenic independent nature of resistance against bacterial leaf blight pathogen has been reported in rice [3].

The F_1 s of MW 10 with Kalkatiha and Assam Chudi (A:384) were resistant, indicating the dominant nature of resistance. The F_2 ratio suggests that resistance in these accessions was governed by single dominant gene. These findings confirm earlier report of monogenic dominant nature resistance against *Xanthomonas oryzae* pv. *oryzae* [4].

The F_1 of MW 10 \times Surmatia was susceptible, indicating the recessive nature of resistance and F_2 ratio reveals that resistance is governed by single recessive gene. Similar monogenic recessive nature of resistance against *Xanthomonas oryzae* pv. *oryzae* was also reported earlier in rice [4, 5].

The F_1 s of MW 10 with Kranchi and Assam Chudi (A:402) were resistant indicating the dominant nature of resistance and the F_2 generation ratio indicated that two complementary dominant genes governed resistance in Kranchi and Assam Chudi (A:402). Similar

type of resistance against bacterial leaf blight was earlier reported in rice [6].

The above results clearly indicate that, under the present study, resistance is observed to be monogenic dominant, monogenic recessive, digenic dominant and digenic recessive. The resistance controlled by major genes observed in the present study is desirable for their utilization in breeding programmes since their incorporation is relatively simple.

References

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