



Virulence Profile of *Xanthomonas Oryzae* pv. *Oryzae* Strains from Bihar

Arvind Kumar*, Swati, Ajay Kumar, Puja Kumari and Brajesh Patel

Agricultural Research Institute, Patna-800020

Dept. of Plant Pathology & Rice Pathologist, Biotechnology, T.M. Bhagalpur University, Bhagalpur.

Plant Protection, KVK, Barh, Patna.

*Corresponding author: arvind.headplpath@gmail.com

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Abstract

Bacterial Leaf Blight (BLB) of rice caused by *Xanthomonas oryzae* pv. *oryzae* is a serious threat to rice production in India. Field trials were conducted at ARI, Patna during 2013 and 2014, to study the virulence profile of prevalent strain of the BLB pathogen, *Xanthomonas oryzae* pv. *oryzae* (*Xoo*) using rice differentials (IRBB NILs) possessing different bacterial blight resistant genes and their combinations. The reaction pattern on the differentials indicated the existence of moderately virulent strains of bacterial blight pathogen in this location.

Keywords: *Xanthomonas oryzae* pv. *oryzae*, rice, IRBB lines.

Introduction

Bacterial leaf blight (BLB) of rice caused by *Xanthomonas oryzae* pv. *oryzae* (Ishiyama, Swings *et al*) is one of the most serious production constraints of rice, world wide. The disease can cause an average of 20-30% yield loss (Ou, 1985). In the tropics, depending on the severity of infection, the loss may be as high as 60-70% (Ou, 1985). Srivastava and Kapoor (1982) reported 6-37% yield loss against 1-9 infection grades in India. BLB has spread to many non-traditional areas in India, in addition to recurring incidence in the traditional areas under irrigated and rainfed shallow lands. The pathogen is highly variable in nature and continuous monitoring of the pathogen virulence profile is very important for breeding durable BLB resistant rice varieties. In the present experiment, we studied the virulence profile of the local *Xoo* strains on a set of rice differentials possessing different bacterial blight resistance genes and their combinations.

Methodology

Assessment of the virulence spectrum of *Xanthomonas oryzae* pv. *oryzae* was carried out at the Agricultural Research Institute, Patna (PTN) location during the rice crop season 2013 and 14 under field condition. The trial consisted of twenty two Near Isogenic Lines (NILs/ IRBB lines) with different bacterial blight resistance genes and their combinations and different checks. The seed material for the trial was received from the ICAR-IIRR, Hyderabad. The plants at the maximum tillering stage were clip inoculated with the bacterial leaf blight pathogen (Kaufman *et al.*, 1973). The pathogen was isolated in modified Wakimoto's agar medium from infected leaves collected from naturally infected rice fields. The pathogen was multiplied on same medium and the inoculum was

prepared by scrapping the bacteria from culture plates and bacterial suspension was made. This bacterial suspension was used for clip inoculation.

Results and Discussion

The rice differentials used in this trial consisted of twenty two Near Isogenic Lines, possessing different BLB resistant genes singly or in various combinations of four BLB resistant genes, viz., *Xa4*, *xa5*, *xa13* and *Xa21* in the background of rice cultivar IR24. The differentials like DV 85 Ajaya (IEI 8585) and TN1 were also included in the trial.

The reaction of different differentials to the native isolate of *Xoo* is presented in Table 1. The data revealed that the native *Xoo* isolate was not highly virulent as it did not show typical susceptible reaction in any of the NILs. The overall location severity index (LSI) during 2013 and 2014 was 3.8 and 3.7, respectively. There were no differential reactions among the different differentials. More number of *Xoo* isolates will be collected and studied in our future work to know the composition of different *Xoo* races in different rice growing regions of Bihar.

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References

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Table 1: Reaction of rice differentials to *Xanthomonas oryzae* pv. *oryzae* in rice crop season 2013 and 2014

Differentials	Gene combination	Disease reaction	
		2013	2014
IRBB-1	<i>Xa1</i>	5	7
IRBB-3	<i>Xa3</i>	4	5
IRBB-4	<i>Xa4</i>	3	5
IRBB-5	<i>xa5</i>	5	1
IRBB-7	<i>Xa7</i>	4	3
IRBB-8	<i>xa8</i>	4	5
IRBB-10	<i>Xa10</i>	4	7
IRBB-11	<i>Xa11</i>	4	1
IRBB-13	<i>xa13</i>	5	3
IRBB-14	<i>Xa14</i>	2	3
IRBB-21	<i>Xa21</i>	3	5
IRBB-50	<i>Xa4+ xa5</i>	4	1
IRBB-51	<i>Xa4+ xa13</i>	3	3
IRBB-52	<i>Xa4+ Xa21</i>	2	1
IRBB-53	<i>xa5+ Xa13</i>	4	3
IRBB-54	<i>xa5+ Xa21</i>	4	5
IRBB-55	<i>xa13+ Xa21</i>	5	3
IRBB-56	<i>Xa4+ xa5+ xa13</i>	4	5
IRBB-57	<i>Xa4+ xa5+ Xa21</i>	2	5
IRBB-58	<i>Xa4+ xa13+ Xa21</i>	3	3
IRBB-59	<i>xa5+ xa13+ Xa21</i>	3	3
IRBB-60	<i>Xa4+ xa5+ xa13+ Xa21</i>	4	3
DV-85		4	3
Ajaya		3	1
T N1		6	9
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LSI		3.8	3.7
Minimum Score		2	1
Maximum Score		6	9
#entries>5		1	3
Disease reaction: Less virulent			