

Assessment of bacterial leaf blight severity in rice caused by *Xanthomonas oryzae* pv. *oryzae* in Godavari zone of Andhra Pradesh

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ABSTRACT

Bacterial leaf blight (BLB) of rice caused by *Xanthomonas oryzae* pv. *oryzae* is one of the most important diseases in Godavari zone of Andhra Pradesh, India with a potential to cause significant yield loss. A roving survey was conducted during *kharif* 2024 to assess the bacterial leaf blight severity in predominant rice growing areas covering five districts of Godavari zone of Andhra Pradesh during panicle initiation stage to heading stage of crop growth. Bacterial leaf blight severity in the surveyed locations ranged from 48.32 to 76.24 Percent Disease Index (PDI). Comparatively more BLB severity was recorded in West Godavari district followed by Kakinada, East Godavari, Eluru and Konaseema districts. Variation in BLB severity in the surveyed locations was found associated with the rice varieties cultivated. All the cultivars from the surveyed locations were found susceptible to bacterial leaf blight of rice.

Keywords: Andhra Pradesh, Bacterial leaf blight, BLB, Godavari zone, *Oryza sativa*, PDI, Rice, Survey

Rice (*Oryza sativa*) is the principle staple food for nearly 2.7 billion people worldwide, cultivated across the tropical, subtropical and temperate countries of the world. It is the second most essential cereal food crop in our country belonging to the *Poaceae* family and sub-family *Oryzoideae* (Ezuka and Kaku, 2000). In Asia, nearly 90 percent of the world's rice is produced and is often referred to as world's "Rice Bowl". In India, rice is cultivated in an area of 47.6 M ha with 137.82 MT of production and 2713 Kgha⁻¹ of productivity. In Andhra Pradesh, area under rice cultivation is approximately 2.15 M ha with 7.94 Mt of production (Directorate of Economics & Statistics, 2023-24). In India paddy production and productivity is greatly hampered by various biotic and abiotic factors which causes yield losses upto 20-30%. An estimated 15–30% of rice output is lost due to diseases inflicted during crop production, which accounts to a loss of 33 billion USD (approx.) annually (Nayak *et al.*, 2021). Among the diseases, bacterial leaf blight (BLB) caused by *Xanthomonas oryzae* pv. *oryzae* (Xoo) is a serious problem and threat to rice production in both tropical and temperate rice growing regions due to its high epidemic potential (Mew *et al.*, 1987). Yield loss due

to bacterial blight can be as much as 70% when susceptible varieties are grown and upto 100% in severe conditions (Walters *et al.*, 2013). In tropical Asia, losses due to BLB may vary from 2 to 74 % depending on certain factors *viz.*, locality, weather conditions, stage of the crop and cultivars. (Chaudhary *et al.*, 2012). Keeping in view the destructive nature of the BLB pathogen, a roving survey was carried out in *Kharif* 2024 to assess the severity of bacterial leaf blight in Godavari zone of Andhra Pradesh.

MATERIAL AND METHODS

A roving survey was conducted in Godavari zone of Andhra Pradesh during October to November months (*kharif*, 2024) coinciding with the Panicle Initiation stage to heading stage of rice crop growth to assess severity of bacterial leaf blight of rice (BLB) caused by *Xanthomonas oryzae* pv. *oryzae*. Survey was undertaken in major rice growing locations of 5 districts *viz.*, Kakinada, Konaseema, East Godavari, Eluru and West Godavari districts of Andhra Pradesh. Twenty locations were surveyed in the study, covering two villages from each mandal and two mandals from each district. Information on date of survey, predominant rice variety in the location,

BLB severity and GPS location were collected during the survey.

Scale for assessing bacterial leaf blight severity (IRRI, 2013)

Score	Affected lesion area
1	1-5%
3	6-12%
5	13-25%
7	26-50%
9	51-100%

Bacterial leaf blight severity scores (1-9 scale of Standard Evaluation system, IRRI, 2013) were recorded from 10 random plants (hills) of a particular location and BLB severity in terms of per cent disease index (PDI) was calculated using the below formula

$$\text{PDI} = \frac{\text{Sum of all disease ratings}}{\text{Total no. of disease ratings} \times \text{Max. disease ratings}} \times 100$$

RESULTS AND DISCUSSION

During the roving survey in twenty location of Godavari zone of Andhra Pradesh, information on predominant rice cultivars in the surveyed village, stage of the crop, bacterial leaf blight severity and geographical location was collected and presented in Table1. Among the districts surveyed, comparatively higher bacterial leaf blight percent disease index was recorded in West Godavari district (68.60) followed by Kakinada (59.22), East Godavari (55.30), Eluru (54.87) and Konaseema districts (53.96).

Bacterial leaf blight severity in the surveyed locations ranged from 48.32 PDI (Elakolanu village, E.G.Dist.) to 76.24 PDI (Chinnamvaripalem village of West Godavari district). Among the twenty locations surveyed, bacterial leaf blight severity of more than 60.00 PDI was recorded among all the locations (4 no's) from West Godavari district and from one location in Kakinada district, (Boyanapudi village of Samalkota mandal). In the present study, higher BLB severity recorded in West Godavari district of Andhra Pradesh could be attributed to monocropping and intensive cultivation of paddy, a pattern consistent with earlier findings where continuous rice cultivation and high inoculum pressure to elevated BLB incidence (Mew *et al.*, 1993; Kauffman *et al.*, 1973).

The variation in Bacterial Leaf Blight (BLB) severity across surveyed districts was found to be closely associated with the varieties cultivated and their known susceptibility levels. From the surveyed locations, all the cultivars, RGL 2537, BPT 5204, MTU 7029, MTU 1010, NP-9558 and NP 558 were found to be susceptible to BLB. MTU 1318 was the predominant variety cultivated in the Godavari zone of Andhra Pradesh, the cultivar which showed varied response to BLB during the survey, mean disease severity of 54.87 PDI was recorded in Eluru district against 68.60 PDI in West Godavari district from similar number of MTU 1318 growing locations as shown in the fig 1. During the study, differences in susceptibility level were observed for a particular

Fig 1. Prevalence of BLB severity across twenty villages of Godavari zone of Andhra Pradesh



Table 1: Assessment of Bacterial Leaf Blight of rice caused by *Xanthomonas oryzae* pv. *oryzae* in five districts of Godavari zone of Andhra Pradesh during Kharif, 2024

S.NO.	District	Date of Visit	Village	Mandal	Varieties grown in the area	CROP STAGE	GPS Co-ordinates	PDI	Mean PDI
1.	EAST GODAVARI	17-10-2024	Elakolanu	Rangampeta	RGL-2537 NP-9558 MTU-1318	Panicle initiation stage	17.09744 N	48.32	55.30
							81.93203 E		
			Gandepalli	Gandepalli	RGL-2537 NP-558 MTU-1318	Panicle initiation stage	17.13320N 81.96319E	56.13	
							Murari		
			Vadisaleru	Rangampeta	NP-558 MTU-1318 PLA-1100	Heading stage		17.08373N 81.94975E	
2.	KONASSEMA	21-10-2024	Rajupalem	Mummidivaram	MTU-7029 NP-9558 MTU-1318	Panicle initiation stage	16.65111N 82.10792E	57.21	53.96
							Krapa		
			Mummidivaram	Mummidivaram	MTU-7029 JMP-1275 MTU-1153	Panicle initiation stage		16.64365N 82.09954E	
							Magam	Ainavilli	

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S.NO.	District	Date of Visit	Village	Mandal	Varieties grown in the area	CROP STAGE	GPS Co-ordinates	PDI	Mean PDI
3.	WEST GODAVARI	18-10-2024	Nadipudi	Penugonda	MTU-1061	Panicle initiation stage	16.65130N	68.81	68.60
					MTU-1318		81.83193E		
			Chinnamvaripalem	Penugonda	MTU-1064	Panicle initiation stage	16.66147N	76.24	
					MTU-1156		81.75858E		
			Kodamanchili	Achanta	MTU-1318	Panicle initiation stage	16.60310N	63.11	
					MTU-1064		81.78643E		
4.	ELURU	26-10-2024	Pedamallam	Achanta	MTU-1318	Booting stage	16.62821N	66.25	54.87
					MTU-1064		81.83706E		
			Gogulapaddu	Pedapadu	MTU-1318	Panicle initiation stage	16.68119N	56.23	
					MTU-1010		81.04947E		
			Bhogapuram	Pedavegi	MTU-1318	Panicle initiation stage	16.70158N	51.13	
					PLA-1100		81.03457E		
5.	KAKINADA	25-10-2024	Vatluru	Pedapadu	MTU-1318	Panicle initiation stage	16.68119N	56.82	59.22
					PLA-1100		81.04612E		
			Koppaka	Pedavegi	MTU-1061	Panicle initiation stage	16.74771N	55.31	
					MTU-1010		81.03457E		
			Kapavaram	Samalkota	NP-558	Panicle initiation stage	17.01119N	55.73	
					MTU-1318		82.12440E		
		25-10-2024	Tatiparthi	Gollaprolu	BPT-5204	Heading stage	17.17954N	58.16	59.22
					NP-9558		82.37382E		
			Gollaprolu	Gollaprolu	NP-9558	Panicle initiation stage	17.14318E	59.32	
					BPT-5204		82.12440N		

variety at different locations. The observations during the study can corroborated by the finding of Lubis *et al.* 2020, Adhikari *et al.*, 1995; Nino-Liu *et al.* 2006. who earlier suggested differences in pathogen strains, cultivation practices, and variety susceptibility as contributory factors dictating disease expression and severity.

CONCLUSION

The survey revealed that bacterial leaf blight (BLB) is prevalent across all major rice-growing regions of Godavari zone of Andhra Pradesh with disease severity (PDI) ranging from 48.32 to 76.24. All the cultivars from the surveyed locations viz., MTU-1318, RGL 2537, MTU 7029, BPT 5204, NP-9558, NP-558 etc. were found susceptible to bacterial leaf blight of rice. Predominant rice cultivar of the zone, MTU 1318 showed varied response to BLB in Eluru and West Godavari districts from similar number of observations.

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