
Screening new-semi-deep water rice cultivars for reaction to bacterial leaf blight disease

A.K. MOHANTY, P.N. SETHI* AND A.K. SAHU

Department of Plant Pathology, College of Agriculture, Orissa University of Agriculture and Technology, Bhubaneswar-751003

Sixty elite breeding cultivars of new-deep water rice cultivars were tested against their reaction towards bacterial leaf blight (BLB) disease during 1994 wet season. Out of the 60 elite breeding cultivars, four were reported as highly resistant to BLB caused by *Xanthomonas oryzae*. Twelve and thirty five cultivars were moderately resistant and moderately susceptible respectively whereas eight cultivars were found susceptible to BLB.

Key words : Deep water rice, *Xanthomonas oryzae*, bacterial leaf blight, resistant cultivars

INTRODUCTION

Out of 39.1 million hectares of wet season rice of India, 6.9% is under deep water condition which mostly concentrates in eastern India covering the states of Assam, West Bengal, Bihar, Uttar Pradesh and Orissa. About 3% of the rice area in Orissa (1.1 lakh hectares) is under semi-deep water rice, mostly confined to the coastal districts of Puri, Kendrapada, Bhadrak and Balasore. With an average productivity of about 1.0-1.5 tons per hectare, the annual production from deep and semi-deep water areas amounts to only 1.96 million tons and represents approximately 8% of rice production. Of the various constraints of production, disease particularly BLB and sheath-rot play important role resulting in significant loss in yield. In the absence of successful methods of control of these diseases under the situations they are being grown, cultivation of resistant tolerant cultivars is the only alternative to prevent losses in grain yield. The present paper reports the reaction of elite breeding cultivars to BLB.

MATERIALS AND METHODS

During 1994 wet season, sixty elite breeding cultivars semi-deep water rice from Directorate of Rice Research, Rajendranagar, Hyderabad, were evaluated for their reaction towards BLB at Central Research Station of Orissa University of Agriculture and Technology, Bhubaneswar. During wet season of 1994 the breeding lines were planted in

* Hindusthan Fertilizer Corporation Ltd., Bhubaneswar 751001

five rows, 2 m long at 15 cm x 20 cm. Fertilizers level was kept at 180 N, 100 P and 50 K kg/ha, the sources being urea, single super phosphate and muriate of potash. Symptoms appeared at the panicle emergence stage. The outbreak of the disease was moderate under natural infestation condition. Scoring was done at 15 days interval from panicle emergence taking 10 hills from each microplot of one sq. m. The percentage of panicles infected was calculated for each field. Disease intensity was also recorded in 1-9 scale according to standard evaluation system. In the screening nursery the percentage of leaf infection and disease intensity due to BLB was recorded at 45 DAT under natural infestation conditions. The data have been presented in Tables 1 and 2.

RESULTS

The outbreak of BLB during 1994 caused by *Xanthomonas oryzae* (Uyeda and Ishiyama) Dows was moderate under natural infection condition. In the screening nursery the percentage of leaf infection and disease intensity due to BLB varied from 7.46-24.34% and

Table 1. Incidence of BLB in different DWR varieties

Cultivars	Percentage of leaf infected	Average intensity	Disease reaction	Disease scale (0-9)
1	2	3	4	5
NDR 4064	14.51	4.6	MS	5
NDR 4073	20.41	5.0	MS	5
NDR 4080	7.46	3.0	MR	3
NDR 4082	12.43	3.8	MS	5
NDR 4107	17.87	3.8	MS	5
NDR 4122	16.25	5.0	MS	5
NDR 4178	17.97	6.6	S	8
NDR 4184	20.00	2.2	MR	3
NDR 4185	24.26	2.6	MR	3
NDR 40003	14.91	5.8	S	8
NDR 40017	15.49	5.0	MS	5
NDR 40018	24.34	7.6	HS	9
NDR 40023	24.21	5.0	MS	5
NDR 40049	18.72	3.4	MS	5
NDR 40072	17.14	1.0	HR	1
NDR 40074	18.69	2.2	MR	3
NDR 40075	11.71	1.0	HR	1
NDR 40078	10.59	1.0	HR	1
NDR 40080	8.50	1.0	HR	1
NDR 40101	12.25	2.2	MR	3
CN 846-75-10	15.78	5.4	S	8
CN 848-15-3	19.19	3.8	MS	5
CN 1035-59	16.26	5.4	S	8
CN 1035-60	18.10	5.0	MS	5
CN 1035-61	22.03	4.2	MS	5
CN 1035-62	15.01	5.0	MS	5
CN 1036-52	11.25	3.4	MS	5
CN 843-10-15	14.71	3.8	MS	5

Table 1. Continued.

1	2	3	4	5
PLA 162	17.00	2.6	MR	3
PLA 8572	16.00	3.4	MS	5
PLA 10865	13.86	3.8	MS	5
OR 1128-10	18.37	4.6	MS	5
OR 1171-3-2	19.30	5.4	S	8
OR 1171-12	19.94	4.8	MS	5
OR 1196-8	23.77	5.8	S	8
OR 1316-1	17.19	5.4	S	5
OR 1332-4	20.22	5.0	MS	8
OR 1332-9	14.37	3.4	MS	5
OR 1359-RGA-DR-1	16.72	2.2	MR	3
OR 1359-RGA-DR-23	16.55	2.6	MR	3
OR 1359-RGA-DR-27	11.98	4.2	MS	5
CSR (D) 7-0-4	14.00	4.2	MS	5
CSR (D) 7-0-3-3	15.97	4.2	MS	5
CSRC (D) 13-12-3-1	18.22	5.0	MS	5
CSRC (D) 304-15-20	17.28	3.8	MS	5
Sabita	14.84	2.2	MR	3
Utkalprava	14.34	3.0	MR	3
Kanchan	15.05	4.2	MS	5
OR 888-4-30	14.71	3.8	MS	5
OR 8903-158	17.05	4.2	MS	5
OR 912-10-190	15.90	3.0	MR	3
OR 1206-25-1	17.44	3.8	MS	5
OR 1206-26-2	13.28	3.8	MS	5
OR 1212-30-1	10.47	5.0	MS	5
OR 1206-29-2	17.04	3.6	MS	5
Mahalaxmi	16.14	5.8	S	8
Manika	18.49	3.2	MS	5
OR 1206-7-1	12.97	4.2	MS	5
OR 1155-2	11.23	3.0	MR	3
OR 1207-1-1	14.50	3.8	MS	5

1.0-7.5, respectively (Table 1). Basing on disease intensity, four cultivars viz. NDR 40078, NDR 40075, NDR 40080 and NDR 40072 were categorised as highly resistant having 1 or less than 1 disease intensity in 1-9 scale (Anonymous 1980). Out of sixty cultivars twelve and thirty five cultivars were moderately resistant and moderately susceptible respectively to BLB (Table 2). Eight cultivars viz. NDR 4178, NDR 40003, CN 846-75-10, CN 1035-59, OR 1171-3-2, OR 1196-8, OR 1316-1 and Mahalaxi were categorised as susceptible to BLB having the disease intensity of more than 5. One cultivar viz. NDR 40018 showed highly susceptible reaction to BLB (Table 2).

DISCUSSION

Studies on reaction of rice cultivars against BLB were conducted by several workers in India as well as in other countries (Karki 1989; Adhikari and Mew, 1989; Sunder *et al.*,

Table 2. Reaction of DWR varieties to BLB

Grade	Category	Cultivars
1	HR (4)	NDR 40078, NDR 40075, NDR 40080, NDR 40072
3	MR (12)	NDR 4080, NDR 4184, NDR 4185, NDR 40074, NDR 40101, PLA 162, OR 1359-RGA-DR-1, OR 1359-RGA-DR-23, Sabita, Utkal Prava, OR 912-10-190, OR 1195-2
5	MS (35)	NDR 4064, NDR 4073, NDR 4082, NDR 4107, NDR 4122, NDR 40017, NDR 40023, CN 848-15-3, CN 1035-60, CN 1035-61, CN 1035-62, CN 1036-52, CN 843-10-16, PLA 8572, PLA 10865, OR 1128-10, OR 1171-12, OR 1332-4, OR 1332-9, CSRC (D) 7-2-3-3, CSRC 13-12-2-1, OR 1359-RGA, DR-27, CSRC(1) 7-0-4, OR 890-3-158, OR 1206-25-1, OR 1206-26-2, OR 1212-32-1, OR 1206-29-e, Manika, OR 1206-7-1, OR 1207-1-1
7	S (8)	NDR 4178, NDR 40003, CN 846-75-10, CN 1035-59, OR 1171-3-2, OR 1196-8, OR 1316-1, Mahalaxmi
9	IIS (1)	NDR 40018

1991, Rana and Pophaly, 1994). Screening IET rice varieties, Rana and Pophaly (1994) reported eight cultivars (*viz.* R 650-1820, Ratna, IR 33059-26-2-2, Nagarjuna Phalguna, R 845-89-43, IR 54, R 649-1715 and RP 1924) out of fifty eight cultivars and Sunder *et al.* (1991) reported only six cultivars (*viz.* IR 16/2Parmel, CB II/Ratna, CR 114, CR 115, CR 98-7216, IET 4141) out of thirty cultivars as resistant to BLB. In Nepal working on the same line, Karki (1989) reported 9.5% (61 out of 644) cultivars as resistant to BLB. According to him, Janki, Laxmi and KAU 1727 showed high field resistance to both blast and BLB pathogens. Adhikari and Mew (1989) also reported Laxmi as moderately resistant to BLB.

The wild rices are reported to be highly resistant to BLB (Rongbai, 1994). The wild rices, *viz.* *O. officinalis*, *O. barthii*, *O. latifolia*, *O. minuta*, *O. nivara*, *O. sativa*, showed high degree of resistance to BLB, which may be used in wide hybridization to transfer resistance to cultivated rice (Ahmed *et al.*, 1991). Resistance to blast and BLB are not as strong in japonica rice varieties as in indica varieties. Indica varieties are widely used for BLB resistant parents (Xiaoming *et al.*, 1989). The problems of diseases can be overcome in semi-deep water situations or deep water situations using tolerant/resistant cultivars.

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