

Resistance of rice entries to sheath blight and sheath rot diseases in West Bengal

S. SAHA*, U.K. ROY CHOUDHURY** AND A. BISWAS**

Rice Research Station, Bankura 722 101, India*; Rice Research Station, Chinsurah 712 102, India**

During the *Kharif* (wet) season of 2000, 149 entries of NSN-1 were evaluated for their reaction to sheath blight and sheath rot diseases under artificial inoculated condition at Bankura and Chinsurah. None of the test entries recorded resistant reaction to sheath blight disease either at Bankura or at Chinsurah. However, eleven and seventeen entries showed moderate resistance to this disease at Bankura and Chinsurah respectively. In case of sheath rot one entry at Bankura and six entries at Chinsurah showed resistance; however, as many as twenty one and fifty six entries reacted as moderate resistance to the disease respectively, at Bankura and Chinsurah locations.

Key words : Sheath blight, sheath rot, resistance, rice entries

INTRODUCTION

Sheath blight (ShB) caused by *Rhizoctonia solani* and Sheath rot (ShR) caused by *Sarocladium oryzae* were first recorded as minor diseases of rice in West Bengal (Roy, 1949; Amin *et al.*, 1974). Later both the diseases were referred as major ones in West Bengal (Sharma and Mukherjee, 1978; Biswas, 2000 a, b). This may be due to wide spread cultivation of high yielding but highly susceptible semi-dwarf varieties. The high tillering capacity of these cultivars and indiscriminate use of high doses of nitrogenous fertilizers also predisposed them towards these diseases. This is entailing substantial economic loss in yield of rice (Amin *et al.*, 1974; Mohan and Subramanian, 1977; Chakravarty and Biswas, 1978; Kannaiyan and Prasad, 1978; Rajan, 1987; Purakayastha *et al.*, 1983a,b; Rajan 1987). Most effective and economic method to avoid losses due to these two diseases is by growing resistant varieties. The present paper reports on screening of rice entries of National Screening Nursery (NSN-1) against Sheath blight and Sheath rot diseases.

MATERIALS AND METHODS

During 2000 *Kharif* (wet) season under the All India Co-ordinated Rice Improvement Programme (AICRIP), 149 rice entries of

National Screening Nursery were screened at RRS, Bankura (representing Red and Laterite Zone) and RRS, Chinsurah (representing New Alluvial Zone) for resistance to Sheath blight Sheath rot diseases under artificial inoculated condition. Each test entry was planted in two 2m rows spaced in 20 cm × 15 cm and the plot was fertilized with 120 kg N, 50 kg P and 30 kg K/ha. Recommended agronomic practices were followed at both locations. For Sheath blight, during maximum (active) tillering stage, randomly selected ten hills (except the border ones) per entry were inoculated with 10 days old highly virulent isolate of *Rhizoctonia solani* by the "straw-bit" method. The pathogen was isolated from the infected leaf sheaths of the susceptible high yielding variety "Swarna". For Sheath rot, "grain inoculation" method was followed, in which a single grain of rice (IR 20), previously autoclaved and inoculated with *Sarocladium oryzae* for ten days was placed inside the leaf sheath enclosing the panicle. Ten replicates were maintained.

Disease reaction was recorded on 10 and 40 days after inoculation in case of Sheath blight whereas Sheath rot was noted 15 days after inoculation. Entries were scored according to the Standard Evaluation System (SES) for rice (0-9 scale) of IRRI, 1996. Susceptible checks for ShB and ShR were Swarna and TN-1 respectively.

Table 1. Reaction of NSN-I varieties of different ecosystems and duration to sheath blight disease under artificial inoculated condition at Bankura and Chinsurah, West Bengal during *Kharif* (wet) season, 2000

			Reaction of Entries in SLS (0-9) at											
			BANKURA						CHINSURAH					
Rice Ecosystems	Duration (days)	Total entries (no)	0	1	3 ^a	5 ^b	7	9 ^c	0	1	3	5	7	9
Rainfed upland	Very early (<90)	18	0	0	0	1	11	6	0	0	0	0	10	8
Irrigated	Early (90-110)	33	0	0	0	2	14	17	0	0	0	0	27	6
Irrigated	Mid-early (115-125)	37	0	0	0	2	18	17	0	0	0	0	18	19
	Medium (130-140)	42	0	0	0	4	22	16	0	0	0	7	22	13
Rainfed lowland	SHW ^d	Late Long (140-160)	04	0	0	0	2	2	0	0	0	1	3	0
	SDW ^e	Late Long (<150)	09	0	0	0	2	4	3	0	0	0	4	5
	DW ^f	Late Long (<150)	06	0	0	0	0	1	5	0	0	0	5	1
Total		149	0	0	0	11	72	66	0	0	0	17	86	46
L.S.I.		7.7							7.4					

^a Reactions 0-3 Resistant (R)^b Reaction 5 Moderately resistant (MR)^c Reaction 9 Susceptible (S)^d SHW Shallow water (up to 30 cm water depth)^e SDW Semi-deep water (30-50 cm water depth)^f DW Deep water (above 50 cm water depth)**Table 2.** Reaction of NSN-I entries of different ecosystems and duration to Sheath rot disease under artificial inoculated condition at Bankura and Chinsurah, West Bengal during *Kharif* (wet) season, 2000

			Reaction of Entries in SLS (0-9) at											
			BANKURA						CHINSURAH					
Rice Ecosystems	Duration (days)	Total entries (no)	0	1	3 ^a	5 ^b	7	9 ^c	0	1	3	5	7	9
Rainfed upland	Very early (<90)	18	0	0	0	2	9	6	0	0	0	1	6	11
Irrigated	Early (90-110)	33	0	0	1	6	11	17	0	0	2	20	9	2
Irrigated	Mid-early (115-125)	37	0	0	0	7	14	17	0	0	1	22	7	7
	Medium (130-140)	42	0	0	0	4	17	16	0	0	2	6	17	17
Rainfed lowland	SHW ^d	Late Long (140-160)	04	0	0	0	2	2	0	0	0	2	2	0
	SDW ^e	Late Long (<150)	09	0	0	0	2	2	3	0	0	0	4	3
	DW ^f	Late Long (<150)	06	0	0	0	4	5	0	0	1	1	4	0
Total		149	0	0	1	21	59	66	0	0	6	56	48	39
L.S.I.		7.6						6.6						

^a Reactions 0-3 Resistant (R)^b Reaction 5 Moderately resistant (MR)^c Reaction 9 Susceptible (S)^d SHW Shallow water (up to 30 cm water depth)^e SDW Semi-deep water (30-50 cm water depth)^f DW Deep water (above 50 cm water depth)

RESULTS AND DISCUSSION

None of the test entries was found to be resistant (R) to ShB at both the locations: eleven (11) and seventeen (17) entries were moderately resistant (MR) at Bankura and Chinsurah respectively. At Bankura, the MR entries were IET 16809 (Rainfed upland/Irrigated-very early), IET 16360, IET 16707 (Rainfed upland/Irrigated-early), IET 15609, IET 16561, IET 15609 (Irrigated-mid early), IET 15576, IET 15579, IET 15581 and IET 16786 (Irrigated-medium), IET 16209, IET 16237, (Rainfed lowland, Semi-deep water, Long duration). At Chinsurah, the MR entries were IET 16307, IET 16307, IET 16610, IET 16611, IET 16613, IET 16615, IET 16850 and IET 16853 (Irrigated medium duration), IET 16965 (Rainfed Lowland, Shallow water, Long duration); IET 16472, IET 16473, IET 16477 and IET 16481 (Rainfed Lowland, Semi-deep water, Long duration); IET 16845, IET 16846, IET 16846, IET 16847, IET 16848 and IET 16849 (Rainfed Lowland, Deep water, Long duration). Location Severity Index (L.S.I) was also high at both the locations (7.7 at Bankura and 7.4 at Chinsurah). However, no similarity has been shown by any of the test entries regarding their resistance to Sheath blight disease at different eco-systems of both the locations.

Regarding Sheath rot, one entry IET 16065 of Rainfed upland/ Irrigated ecosystem and early duration showed resistance at Bankura; whereas six entries viz., IET 16364, IET 16726 (Rainfed upland/Irrigated ecosystem and early duration); IET 16144 (Irrigated mid-early); IET 16851, IET 16853 (Irrigated medium); IET 16849 (Rainfed lowland-deep water, long duration) at Chinsurah. Twenty one entries viz., IET 16806, IET 16835 (Upland/Irrigated, very early); IET 15163, IET 15924, IET 15928, IET 16057, IET 16345, IET 16347 (Upland/Irrigated, early); IET 16281, IET 16519, IET 16525, IET 16526, IET 16532, IET 16535, IET 16542 (Irrigated mid-early); IET 16075, IET 16307, IET 16615, IET 16798 (Irrigated early); IET 16237, IET 16488 (Rainfed lowland, semi-deep water, long duration) reacted as moderately resistant to Sheath rot at Bankura while a large number of entries (56) viz. IET 16835 (Upland/Irrigated, Very early); IET 15163, IET 15164, IET 15339, IET 15610, IET 15923, IET 15924, IET 15928, IET 15933, IET 15937, IET 15948, IET 15949, IET 15963, IET 16057, IET 16059, IET 16064, IET 16065, IET 16345, IET 16347, IET 16362, IET 16707, IET 16724

(Upland/Irrigated early); IET 15495, IET 16249, IET 16251, IET 16260, IET 16261, IET 16262, IET 16263, IET 16264, IET 16265, IET 16266, IET 16270, IET 16274, IET 16282, IET 16284, IET 16519, IET 16525, IET 16526, IET 16532, IET 16535, IET 16536, IET 16542, (irrigated mid-early); IET 16839, IET 16841, IET 16850, IET 16852 (irrigated medium); IET 16445, IET 16965 (Rainfed lowland, shallow water, long duration); IET 16472, IET 16473, IET 16481, IET 16488 (Rainfed lowland, semi-deep water, long duration); IET 16846 (Rainfed lowland, deep water, long duration) showed moderate resistance to sheath rot at Chinsurah. The Location Severity Index (L.S.I.) was also high at both the locations (7.6 at Bankura and 6.6 at Chinsurah).

Only four entries namely IET 16065, IET 16345, IET 16535, IET 16542 showed low scores (<5.0) against sheath rot at both the locations. The R/MR entries may be utilized for further breeding programmes.

REFERENCES

- Amin, K.S.; Sharma B.D. and Das, C.R. (1974). Occurrence in India of Sheath rot of rice caused by *Acrocyndrium oryzae*. *Pl. Dis. Repr.* **58** (4): 358 - 360.
- Biswas, A. (2000a). Resistance of rice entries to Sheath blight disease in West Bengal, India. *Environ and Ecol.* **18**: 516 - 517.
- Biswas, A. (2000b). Changing trends of rice diseases in West Bengal. *Indian J. Mycopathol. Res.* **38**: 33 - 36.
- Chakravorty, D.K. and Biswas, S. (1978). Estimation of yield loss in rice affected by Sheath rot. *Pl. Dis. Repr.* **62**: 226 - 227.
- Kannaiyan, S. and Prasad, N.N. (1978). Seed borne nature of Sheath blight pathogen, *Rhizoctonia solani* in rice. *IRRV.* **3**: 10.
- Mohan, R. and Subramanian, C.L. (1977). Influence of nitrogen nutrition and Sheath rot disease on sugar content of two paddy varieties. *Curr. Sci.* **46**: 753 - 755.
- Purakayastha, R.P.; Ghosal, A. and Biswas, S. (1983a). Momilactone synthesis associated with differential resistance of tall and semidwarf rice cultivars to Sheath rot disease. *Ind. Phytopath.* **36**: 322 - 327.
- Purakayastha, R.P.; Ghosal, A. and Biswas, S. (1983b). production of momilactone associated with resistance of rice cultivars to Sheath rot disease. *Curr. Sci.* **52** (3): 131 - 132.
- Rajan, C.P.D. (1987). Estimation of yield loss due to Sheath blight of rice. *Ind. Phytopath.* **40**: 174 - 177.
- Roy, T.L. (1949). Fungi of Bengal. *Bull. Bot. Soc. Bengal.* **3**: 135 - 175.
- Sharma, B.D. and Mukherjee, S.K. (1978). Natural occurrence of *Corticium sasakii* on four hosts. *Sci. Cult.* **44**: 43 - 44.