SHORT COMMUNICATION

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Screening of improved rice genotypes and their hybrids against rice blast (*Pyricularia oryzae*) under foot hills of North Western Himalayas

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ABSTRACT

Nine diverse rice genotypes viz. HPR1164, HPR2047, China 988, VL91-1754, VL93-3613, VL93-6052, IR578793-08, VL Dhan221 and JD8 which were crossed in a diallel mating design and screened in a uniform blast nursery. Among the parents, China 988 was susceptible, IR57893-08 was resistant while VL Dhan 221 was highly resistant and remaining six genotypes were moderately resistant to leaf blast. Out of thirty six hybrids, six were highly resistant and remaining ones were moderately resistant to leaf blast and neck blast. Cross combinations HPR2047 x VL93-6052, HPR2047 x IR57893-08, China 988 x VlDhan221, China 988 x JD8 and VLDhan221 x JD 8 exhibited resistance against neck blast in F_1 and F_2 generations.

Key words: *rice, blast, resistance, hybrids, segregating generations*

Rice blast disease causes heavy damages to rice crop almost every year and causes huge financial loss. The environmental conditions of north western Himalayas of the mid hills of Himachal Pradesh, particularly Palampur region are quite favorable for the blast disease of rice caused by *Pyricularia oryzae* resulting in the high disease and low productivity (Anonymous, 1988). Hence, the present study was under taken to evaluate high yielding rice genotypes and their F_1 and F_2 for resistance against blast.

Nine diverse genotypes of rice *viz*., HPR1164, HPR2047, China 988, VL91-1754, VL93-3613, VL93-6052, IR578793-08, VLDhan221 and JD8 were crossed in diallel mating design (excluding reciprocals) at Palampur, Himachal Pradesh. Among the parents, one was susceptible, six were moderately resistant, one was resistant and one was highly resistant to leaf blast. Parents, hybrids and their F_2 s along with one suitable check (China 988) were screened for their resistance to the rice blast in a uniform blast nursery. Seeds of the nine parents, 36 hybrids and their segregating generation were sown in a uniform blast nursery having five rows each with 20x15cm along with two rows of the susceptible check (China 988) after every row of the test material which included F_1's and F_2's. Two longitudinal rows of the susceptible check were sown in order to trap the fungal spores and create high disease pressure on the evaluating material. Urea at the rate of 90Kg ha^{-1} was applied in three equal splits. The date of sowing was adjusted to synchronies the vegetative stage of the plant with the favorable period for maximum natural disease occurrence. The terminal leaf blast severity was recorded following a 0-9 scale of the standard evaluation system (Tabien *et al.,* 1995).

In both the years, weather conditions were highly favorable for the disease development resulting in 100 per cent disease pressure in the susceptible check. Out of the nine parents tested for leaf blast, six exhibited moderate resistant (HPR1164, HPR2047, VL91-1754, VL93-3613, VL93-6052 and VLDhan221) one resistant (IR57893-08), one highly resistant (JD8) and one susceptible (China 988). Out of 36 hybrids (F_1's) tested, four exhibited (HPR2047 x VL93-6052, HPR2047 x IR57893-78, China 988 x VlLDhan221 and VlDhan221 x JD8) highly resistant reaction against leaf blast and the rest were found to be moderately resistant (Table1). In addition to the leaf blast resistance, the above mentioned cross combinations also possessed

Table 1. Reaction of rice genotype to leaf blast and neck blast under field conditions

Parents/Hybrids	SES Score		Reaction	
	Leaf blast	Neck blast	Leaf blast	Neck blast
Parents				
HPR 1164	2	4	MR	MR
HPR 2047	3	3	MR	MR
China 988	9	9	S	S
VL91-1754	3	0	MR	MR
VL93-3613	3	2	MR	HR
VL93-6052	4	3	MR	MR
IR57893-08	1	0	R	HR
VLDhan 221	2	1	MR	R
JD-8	0	1	HR	MR
Hybrids (F1S)				
HPR 1164/HPR 2047	3	2	MR	HR
HPR 1164/China 988	4	0	MR	HR
HPR 1164/VL91-1754	5	2	MR	MR
HPR 1164/VL93-3613	6	0	MR	HR
HPR 1164/VL93-6052	3	5	MR	MR
HPR 1164/IR57893-08	4	2	MR	MR
HPR 1164/VLDhan221	4	0	MR	HR
HPR 1164/JD-8	3	6	MR	MR
HPR 2047/China 988	2	4	MR	MR
HPR 2047/VL91-1754	4	6	MR	MR
HPR 2047/VL93-3613	3	1	MR	R
HPR 2047/VL93-6052	1	0	R	HR
HPR 2047/IR57893-08	0	0	HR	HR
HPR 2047/VLDhan 221	5	2	MR	MR
HPR 2047/JD-8	2	4	MR	MR
China 988/VL91-1754	5	0	MR	HR
China 988/VL93-3613	3	2	MR	MR
China 988/VL93-6052	3	0	MR	HR
China 988/IR57893-08	3	0	MR	HR
China 988/VLDhan 221	0	0	HR	HR
China 988/JD-8	0	0	HR	R
VL91-1754/VL93-3613	2	1	MR	HR
VL91-1754/VL93-6052	2	0	MR	R
VL91-1754/IR57893-08	3	1	MR	HR
VL91-1754/VLDhan221	3	0	MR	MR
VL91-1754/JD-8	3	7	MR	MR
VL93-3613/VL93-6052	3	4	MR	MR
VL93-3613/IR57893-08	3	6	MR	MR
VL93-3613/VLDhan 221	3	8	MR	MR
VL93-3613/JD-8	3	0	MR	HR
VL93-6052/IR57893-08	3	4	MR	MR
VL93-6052/VLDhan 221	5	2	MR	MR
VL93-6052/JD-8	6	4	MR	MR
IR57893-08/VLDhan 221	3	1	MR	R
IR57893-08/JD-8	4	0	MR	MR
VLDhan221/JD-8	0	0	HR	MR
F2S				
HPR 1164/HPR 2047	1	0	R	HR
HPR 1164/China 988	1	0	R	HR
HPR 1164/VL91-1754	1	0	R	HR
HPR 1164/VL93-3613	1	2	R	MR
HPR 1164/VL93-6052	2	1	MR	R
HPR 1164/IR57893-08	5	2	MR	MR
HPR 1164/VLDhan221	2	1	MR	R
HPR 1164/JD-8	2	1	MR	R
HPR 2047/China 988	2	0	MR	HR
HPR 2047/VL91-1754	2	0	MR	HR
HPR 2047/VL93-3613	1	0	R	HR
HPR 2047/VL93-6052	2	1	MR	R
HPR 2047/IR57893-08	2	1	MR	R
HPR 2047/VLDhan 221	3	2	MR	MR
HPR 2047/JD-8	1	0	R	HR
China 988/VL91-1754	2	0	MR	HR
China 988/VL93-3613	1	1	R	R
China 988/VL93-6052	3	1	MR	R
China 988/IR57893-08	3	1	MR	R
China 988/VLDhan221	2	1	MR	R
China 988/JD-8	1	0	R	HR
VL91-1754/VL93-3613	2	3	MR	MR
VL91-1754/VL93-6052	2	4	MR	MR
VL91-1754/IR57893-08	3	2	MR	MR
VL91-1754/VLDhan221	2	0	MR	HR
VL91-1754/JD-8	1	0	R	HR
VL93-3613/VL93-6052	2	1	MR	R
VL93-3613/IR57893-08	2	1	MR	R
VL93-3613/VLDhan221	1	1	R	R
VL93-3613/JD-8	1	1	R	R
VL93-6052/HPR 1164	1	2	R	MR
VL93-6052/VLDhan221	2	5	MR	MR
VL93-6052/JD-8	1	3	R	MR
IR57893-08/VLDhan 221	1	0	R	HR
IR57893-08/JD-8	1	0	R	HR
VLDhan 221/JD-8	2	1	MR	R

MR-Moderately resistant (2, 3, 4, 5, 6, 1-5%), HR- Highly resistant (0, 0%) R-Resistant (1, <1%) S - Susceptible (9, 26-50%)

resistance to the neck blast. Among the 36 F_2'S, the cross combinations that exhibited resistant reaction against leaf blast were HPR1164 x HPR2047, HPR1164 x China 988, HPR1164 x VL91-1754, HPR1164 x VL93-3613, HPR2047 x JD8, China988 x VL93-3613, China988 x JD8, VL91-1754 x JD8, VL93-3613 x JD8, VL93-6052 x IR57893-08, VL93-6052 x JD8, IR57893-08 x VLDhan221 and HPR2047 x VL93-3613. Twenty one cross combinations showed moderately resistant reaction against neck blast. Thirteen cross combinations were highly resistant against neck blast, 15 resistant and 8 moderately resistant. Five cross combinations HPR-2047 x VL93-6052, HPR-2047 x IR57893-08, China-988 x VLDhan-221, China 988 x JD-8 and VLDhan-221 x JD-8 showed resistant against leaf and neck blast in both the generations i.e. F_1 and F_2 under field conditions. The population size of F_2 was hundred plants. However, the parents for these hybrids gave susceptible and moderately resistant to resistant reactions against rice blast disease. The higher resistance to leaf blast and neck blast in the hybrids may be due to complementary interactions among the genes of the parents. Thus, the hybrids with high resistance to leaf blast and neck blast can be developed by complementation of resistant genes of the parents in hybrids. These results are in agreement with the findings of Tabien *et al.* (1995), Chauhan *et al.* (2000), Nagaraju *et al.* (2001) and Hedge *et al.*(2001). These results indicated that the cross combination such as HPR-2047xVL93-6052 can be explored in breeding programmes because of its high degree of resistance to leaf blast and neck blast.

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