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REACTION OF F_1 HYBRIDS TO RICE BLAST *(Pyricularia oryzae Cavara)* RESISTANCE

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ABSTRACT

The reaction of six F_1 hybrids for leaf and neck blast (*Pyricularia oryzae* Cavara) involving TKM 9, CO 29, IR 36 and IR 50 was studied. The F_1 hybrids showed grades towards susceptibility for leaf blast, indicating the dominance of susceptibility over resistance. In the case of TKM 9/IR 50 and its reciprocal, the high heterotic vigour towards resistance indicated the possibility to exploit them to obtain desirable blast resistant segregants.

KEY WORDS: Rice, Disease resistance, Blast.

Blast disease caused by *Pyricularia oryzae* cavara occurs in all rice growing areas of the world. It is the most important disease of the rice plant and causes serious, sometimes total yield loss. In Tamil Nadu, after the introduction of high yielding dwarf genotypes like TKM 9 and IR 50 and large scale cultivation of these varieties under varied environments, the blast disease appeared in server form. Their cultivation in the Navarai season (December-January to March-April) was severely handicapped because of its high susceptibility to blast. Mohan *et al.* (1984) reported that highest blast incidence was recorded in the mid December, followed by that planted in early January. A study was undertaken at Rice Research Station, Tirurkuppam, Tamil Nadu during Navarai 1983-84 on the reaction of the hybrids to blast.

MATERIALS AND METHODS

TKM 9, a cosmopolitan high yielding, semi-dwarf genotype was taken as the base parent and crossed with CO 29 (resistant), IR 36 (moderately resistant) and IR 50 (highly susceptible). Reciprocal crossess were also made using TKM 9 as male parent. The F_1 hybrids and their parents were raised in randomised black design replicated five times.

The experimental materials were tested for blast reaction by Uniform Blast Nursery (UBN) technique as suggested by Ou (1965).

The infected plants were observed for leaf blast symptoms on the tenth day. Observations were recorded

on five plants and in each plant, ten tillers were graded at the rate of three leaves per tiller for each replication. The disease intensity was rated as per Standard Evaluation System for rice (IRRI, 1980).

The mean and standard error for disease intensity were calculated. The differences between the F_1s and parents were assessed by means and the reaction was also studied as a heterotic reaction of F_1 hybrids over parents.

RESUTS AND DISCUSSION

The leaf blast incidence score of the parents ranged from 2.6 ± 0.27 in CO 29 to 6.6 ± 0.56 in IR 50 and that of the hybrids from 3.4 ± o.83 in IR 50/TKM 9 to 5.4 ± 1.09 in TKM 9/CO 29 (Table). From the grades, it is seen that IR 50 falls under susceptible grade. CO 29 is found to be highly tolerant. IR 36 appears to have weak resistance as compared to CO 29. IRRI (1985) also indicated that IR 36 possessed incomplete blast resistance. TKM 9 is moderately susceptible. Similar trend is also seen for neck blast incidence.

The F_1 hybrids show grades towards susceptibility for leaf blast indicating the dominance of susceptibility over resistance. Maruyama et al. (1983) reported that resistance was incompletely dominant in the F_1, when a cross was made between Japanese Upland rice cultivar RNM 4 (blast resistant) with the susceptible lowland cultivar. However, Mathur and Srivastava (1981) observed that the F_1 plants showed resistant reaction indicating the dominance of resistance.

Significant and negative relative heterosis for resistance to leaf blast incidence was observed in two cross combinations *viz.*, IR 50/TKM 9 (-40.35 per cent) and its reciprocal (-19.3 per cent). The heterosis over better parent was negative and significant only for the cross IR 50/TKM 9 (-29.17 per cent). All the three parameters of heterosis were highly significant and positive for susceptibility in the cross TKM 9/CO 29, whereas its reciprocal did not show any significance. The reciprocal difference observed in the above cross may be due to plasmon effect or maternal effect.

The mean of the parents for neck blast incidence score ranged from 1.24 ± 0.54 in CO 29 to 5.23 ± 0.48 in IR 50. The mean for this trait in hybrid ranged from 0.32 ± 0.15 in IR 50/TKM 9 to 2.5 ± 1.43 in TKM 9/CO 29 (Table).

The cross TKM 9/CO 29 and its reciprocal showed susceptible reaction for both leaf and neck blast incidences. Gowda and Gowda (1982) reported that there was a close relationship between susceptibility to leaf blast and neck blast. Ahn and Rubiano (1984) also expressed a similar view that the level of leaf blast infection is highly and positively correlated with the severity of panicle infection, indicating that cultivars gnerally susceptibile to a population of certain races are susceptible to both leaf and panicle infection.

The heterosis worked out on the basis of disease grades for leaf and neck blast incidence indicates that in the case of hybrid TKM 9/IR 50 and its reciprocal, it was negatively significant. Since both the parents are susceptible, the high heterotic vigour towards resistance for the above combinations in both straight and reciprocal indicated that these two parents appear to possess complementary genes for resistance though they are susceptible individually which is to be confirmed by F_2 and test cross analysis.

Table. Mean performance (SES scale) and expression of heterosis (per cent) for blast incidence

S. No.	Cross	Mean ± SE of F_1 hybrid	Mean ± SE of Female parent	Mean ± SE of Male parent	Heterosis di	Heterosis dii$^{\$}$	Heterosis diii.$^{\$}$
I Leaf blast							
1.	TKM 9/CO 29	5.40±1.09	4.80±0.43	2.60±0.27	45.95**	107.69**	107.69**
2	CO 29/TKM 9	4.20±0.75	2.60±0.27	4.80±0.43	13.51	@	@
3.	TKM 9/IR 36	4.40±0.57	4.80±0.43	3.60±0.40	4.76	@	@
4.	IR 36/TKM 9	3.80±0.80	3.60±0.40	4.80±0.43	-9.52	@	@
5.	TKM 9/IR 50	4.60±0.60	4.80±0.43	6.60±0.56	-19.30**	-4.17	76.92**
6.	IR 50/TKM 9	3.40æ0.80	6.60æ0.56	4.80æ0.43	-40.35**	-29.17**	30.77
II Neck blast							
1.	TKM 9/CO 29	2.50±1.43	3.20±0.67	1.24±0.54	10.61	@	@
2.	CO 29/TKM 9	2.46±1.13	1.24±0.54	3.28±0.67	8.84	@	@
3.	TKM 9/IR 36	2.27±0.69	3.28±0.67	1.47±0.27	-4.42	@	@
4.	IR 35 TKM 9	2.10±0.98	1.47±0.27	3.28±0.67	-11.57	@	@
5.	TKM 9/IR 50	1.34±0.52	3.28±0.67	5.23±0.48	-68.50**	-59.14**	8.06
6.	IR 50/TKM 9	0,32±0.15	5.23±0.48	3.28±0.67	-92.47**	-90.24**	-74.19**

* Significant at 5% level; ** Significant at 1% level

@ Ignored since heterosis on mid parental value was not significant

$ Numerically lower grade was taken as better and best parents (towards resistance to blast)

SES scale - Standard Evaluation System for rice.

di - Relative heterosis; dii - Heterobeltiosis; diii - Standard heterosis

Since these two varieties are high yielders with other disirable traits like earliness and fertilizer responsiveness, it may be possible to combine resistance with high yield and desirable attributes of the two parents. Hence it will be worthwhile to exploit the hybrid combination TKM 9/IR 50 and its reciprocal to obtain progenies with blast resistance, high yield and other desirable attributes of the above two parents.

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DIMENSIONAL ANALYSIS AN APPROPRIATE METHOD FOR HEAD LOSS DETERMINATION IN FOOT-VALVES

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ABSTRACT

For computing the pressure loss while designing a pump or while selecting a pump, an equation taking into account the area of dome surface, section eross section area, acceleration due to gravity, velocity flow at the foot valve, diameter the suction pipe and strainer opening area was developed.

KEYWORDS : Foot valve, Head loss, Dimensional analysis.

Of the many components of a pump set, foot-valve is an important one. Probably owing to its very nature of being sub-merged under the liquid

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