Short Communication

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Hybrid Vigour in Basmati Rice

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In some crop plants hybrid display more vigour than either parent (e.g corn). Increased yield is generally associated with the hybrid vigour. In genetical sense hybrid vigour of heterosis refers to increase or decrease of F_1 value over the mean of parent value (Matzinger *et al* 1962). From breeders point of view the increase of F_1 value over the better parent (heterobeltiosis) is more important (Fonseca and Patterson 1968). The phenomenon of heterosis in rice was first reported by jones (1926). Since then rice breeders have shown increasing interest in heterosis (Rangaswamy and Natarajamoorthy 1988; Gravois and McNew 1993; Ali and Khan 1995; Pandey *et al* 1995; Reddy and Nerkar 1995; Mallik *et al* 1998), this was a surprise when Chinese scientists reported hybrid varieties in China (Anon 1980).

Since heterosis studies in Basmati rice are meagre, the present preliminary study was planned to see the heterotic effects in Basmati rice. For the purpose three commercially grown varieties viz. Basmati-370, Basmati-Pak, Super-Basmati and three dwarf mutants (DM) namely, DM 107-4, DM-25, DM 25-18-88 derived from Basmati-370 following gamma irradiation were crossed. The resulting six F_1s (Table 1) along with the parent were grown under comparable environmental conditions. At maturity, data was recorded on yield and yield components.

The heterosis of F_1 hybrids with respect to mid parent and better parent for productive tillers per plant, panicle length, primary branches per panicle, total spikelets per panicle, sterile spikelets per panicle, panicle density and paddy yield per plant were noted (Table 1). The degree of heterosis varied greatly for different characters and different cross combinations.

Deviation from mid parent. In case of productive tillers per plant (Ali and Khan 1995; Pandey *et al* 1995; Rangaswamy and Natarajamoorthy 1988; Reddy and Nerkar 1995) and total spikelets per panicle (Ali and Khan 1995; Malik *et al* 1998) all the crosses showed positive heterosis over mid parent except one in each case i.e. cross Nos. 1 and 5 respectively. While panicle length (Ali and Khan 1995; Pandey *et al* 1995) and primary branches per panicle (Malik *et al* 1998) revealed positive heterosis in all the cross combinations. Out of six crosses, four crosses i.e., 1,3,4, and 5 for sterile spikelets per panicle (Rangaswamy and Natarajamoorthy 1988) four crosses i.e., 1,2,3, and 6 for panicle density (Ali and Khan 1995) and all crosses in case of yield per plant (Ali and Khan 1995; Pandey *et al* 1995; Reddy Nerkar 1995) showed positive heterosis suggesting dominance due to positive genes.

Deviation from better parent. Three crosses i.e., 2,3 and 4 for productive tillers per parent (Ali and Khan 1995; Rangaswamy and Natarajamoorthy 1998), three crosses i.e., 3,4 and 5, for panicle length (Rangaswamy and Natarajamoorthy 1988), two

Table 1

Heterosis (upper row) and heterobeltiosis (lower row) for yield and yield related characters in some rice hybrids.

Crosses	Heterosis and heterobeltiosis (%) in given crosses						
	Productive tillers per plant	Panicle length	Primary branches per panicle	Total spikelets per panicle	Sterile spikelets per panicle	Panicle density	Paddy yield per plant
1.Basmati-385XDM-107-4	-22.14	4.51	16.78	35.10	44.51	31.16	20.50
	-31.42	-3.00	-3.97	9.41	7.86	12.80	12.35
2.Basmati-385xDM-25	20.41	3.15	1.20	22.40	-25.67	19.58	41.54
	20.07	-6.52	-11.47	7.03	-49.86	14.80	31.76
3.DM-25xBasmati-Pak	37.99	3.98	3.47	7.34	17.45	3.00	33.74
	34.64	3.28	2.76	-6.38	2.39	-10.84	29.78
4.Super BasmatixBasmati-Pak	41.93	5.88	0.95	2.58	34.35	-2.93	63.12
	39.76	5.55	-2.12	-12.45	0.00	-17.29	55.83
5.DM-25xDM-25-18-88	2.24	4.97	9.40	-2.87	14.58	-7.21	10.93
	-2.56	1.88	5.06	-7.82	-4.69	-9.33	-0.09
6.DM-25-18-88xBasmati-385	0.62	5.53	3.39	18.41	-15.38	12.12	20.07
	-3.92	-1.68	-6.22	8.57	-35.43	10.20	15.86

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crosses i.e., 3 and 5, for primary branches per panicle, three crosses i.e., 1,2 and 6 for total spikelets per panicle (Ali and Khan 1995; Rangaswamy and Nataraja moorthy 1988); two crosses i.e., 1 and 3 for sterile spikelets per panicle (Rangaswamy and Natarajamoorthy 1988); three crosses i.e 1,2 and 6 for panicle density (Ali and Khan 1995) and all crosses in case of yield per plant(Ali and Khan 1995; Pandey *et al* 1995; and Reddy Nerkar 1995) except one (cross No. 5) exhibited positive heterosis over the better parent indicating over dominance due to positive genes. The remaining cross combinations showed negative heterosis due to negative dominant genes.

This study suggests that genetic control of particular character depends upon particular cross combination.

***Key words*:** Heterosis, Basmati rice, Dominance.

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