researchNOTE | International Journal of Plant Sciences, Vol. 6 Issue 1 (January, 2011) : 223-225

Heterosis in two line rice hybrids for quality characteristics

L. MAHALINGAM AND N. NATRAJAN

Received : July, 2010; Accepted : September, 2010

Mahalingam, L. and Natrajan, N. (2011). Heterosis in two line rice hybrids for quality characteristics. *Internat. J. Plant Sci.*, **6** (1): 223-225.

Key words : Heterosis, Rice, Hybrids

Hybrid technology has successfully been used to increase the yield. Many high yielding rice hybrids have been developed in India, but in most cases quality is not to desirable extent and therefore, lacked acceptability by consumers and millers. The increasing demand of quality rices in the local and international markets has paid attention on quality breeding improving rice quality has now become prime objective of most of breeding programme. The quality characteristics of rice include the total head rice recovery, kernel length, kernel breadth, cooking, eating quality and aroma.

In rice heterosis for grain yield and its components have been reported by various workers but little information is available on quality characters. Therefore, it is essential to develop quality rice hybrids by using TGMS lines and aromatic restorers that will be expected to aromatic if aroma is governed by dominant gene as reported by Bijral and Gupta (1998). In view of above considerations, the present study has planned to develop basmati rice hybrids as well as non-aromatic over with better quality and to estimate the heterosis for various quality characters and yield.

Four aromatic varieties *viz.,* ADT 41, Pusa Basmati 1, Basmati 370 and Taroari Basmati and the three TGMS lines (TS 29, TS 6, and GD 98013) were crossed to generate 12 F_1 hybrid with normal fertility. These F_1 along with parents and Pusa Basmati 1 as the standard control were evaluated at Agricultural College and Research Institute, Madurai in randomized block design with three replications. Each entry was planted in a single row of 3m length with a spacing of 20x15 cm at one seedling per hill. The recommended agronomic practices were adopted to raise a good crop. Observations on various quality characters *viz.,* head rice recovery, kernel length, kernel breadth, L/B ratio, linear elongation ratio, amylose content, gel consistency, alkali digestion and volume expansion ratio were recorded from a composite seed sample of ten randomly selected plants from each replication and grain yield was taken from randomly selected plants. The head rice recovery were computed as per method of Ghosh *et al.* (1971). Kernel elongation was measured from cooked kernels with the help of graph paper and aroma was detected from leaves as well as ripened kernels by using method of Nagaraju *et al*. (1991). For kernel length and kernel breadth traits ten polished kernel with tips intact from each replication of the bulk samples of each genotypes were measured by vernier caliper. Average of length and breadth were taken in millimeters and L/B ratio was calculated. The volume expansion ratio was computed as per Juliano *et al*. (1965). Gelatinization temperature was estimated by the extent of alkali spreading and clearing of milled rice soaked in 1.7 % KOH for 23 hours. The gel consistency was done as per the method of Cagampang *et al*. (1973). The range of standard heterosis were estimated as per cent increase or decrease of F_1 values over standard check. The data on standard heterosis for various quality character and yield per cent of 12 hybrids are presented in Table 1 and Fig. 1.

The hybrids exhibited significant positive as well as negative standard heterosis for head rice recovery. The hybrids TS 29 x ADT 41, TS 29 x Pusa Basmati 1 and TS 6 x ADT 41 showed significant positive standard heterosis for head rice recovery. None of the hybrids showed positive significant heterosis for kernel length trait. The hybrid TS 6 x TB showed negative significant heterosis for kernel breadth and the rest of the hybrids showed significant positive heterosis for kernel breadth. Significant negative heterosis was observed for L/B ratio in all the hybrids except two hybrids *viz.,* TS 29 x ADT 41 and TS 6 x Taroari Basmati. The hybrid GD 98013 x ADT 41 showed positive significant heterosis for amylose content. These results are in accordance with the findings of Yolanda and Das (1995). Aroma was not expressed in leaves of hybrids showed a recessive gene which would be expected to segregate in F2 seed with one fourth of

Correspondence to:
L. MAHALINGAM, Hybrid Rice Evaluation Centre, T.N.A.U., GUDALPUR (T.N.) INDIA

Authors' affiliations:
N. NATARAJAN, Hybrid Rice Evaluation Centre, T.N.A.U., GUDALPUR (T.N.) INDIA

Table 1 : Estimates of standard heterosis for different traits

Hybrids	HRR	KL	KB	LBR	KLAC	LER	VER	ASV	AC	GC
TS 29 x ADT 41	17.77*	5.71	6.45*	-5.75	5.52*	-0.50	0.97	-7.14*	0.83	-3.71*
TS 29 x Pusa Basmati 1	9.69*	7.14	12.90*	-5.09	4.73*	-2.50	2.78*	0.00	-2.08	-1.02
TS 29 x Basmati 370	-0.64	-11.43	22.58*	-29.20*	19.63*	-10.50*	39*	-28.57*	-7.90*	-9.99*
TS 29 x Taroari Basmati	-9.16*	-2.85	22.58*	-20.80*	-17.12*	-15.00*	-34.77*	-45.71*	-8.11	-46.17*
TS 6 x ADT 41	21.16*	-1.43	9.68*	-10.18*	6.09*	-5.00*	-6.40*	-17.86*	-2.91	-29.73*
TS 6 x Pusa Basmati 1	-24.39*	-13.57*	58.06*	-45.35*	17.19*	-4.50*	-4.87*	-21.43*	-1.04	-28.23*
TS 6 x Basmati 370	-3.74*	-7.86	3.23	-10.84*	-14.97*	-8.00*	-18.36*	17.86*	-7.07*	-30.32*
TS 6 x Taroari Basmati	0.33	-11.43	-12.90*	1.77	-25.21*	15.50*	-32.96*	-57.14*	-5.20*	47.67*
GD 98013 x ADT 41	-4.16*	-0.71	35.48*	-26.55*	-1.15	-0.50	-6.54*	0.00	4.37*	-21.95*
GD 98013 x Pusa Basmati 1	1.75	2.86	12.90*	-8.85*	1.93	-1.00	-3.62*	0.00	-1.25	-15.97*
GD 98013 x Basmati 370	-19.96*	-22.14*	29.03*	-39.82*	-28.51*	-18.50*	8.92*	-17.14*	0.62	-34.21*
GD 98013 x Taroari Basmati	-4.03*	-15.99*	22.58*	-30.53*	29.66*	-17.50*	34.08*	-50.00*	2.91	-48.27*

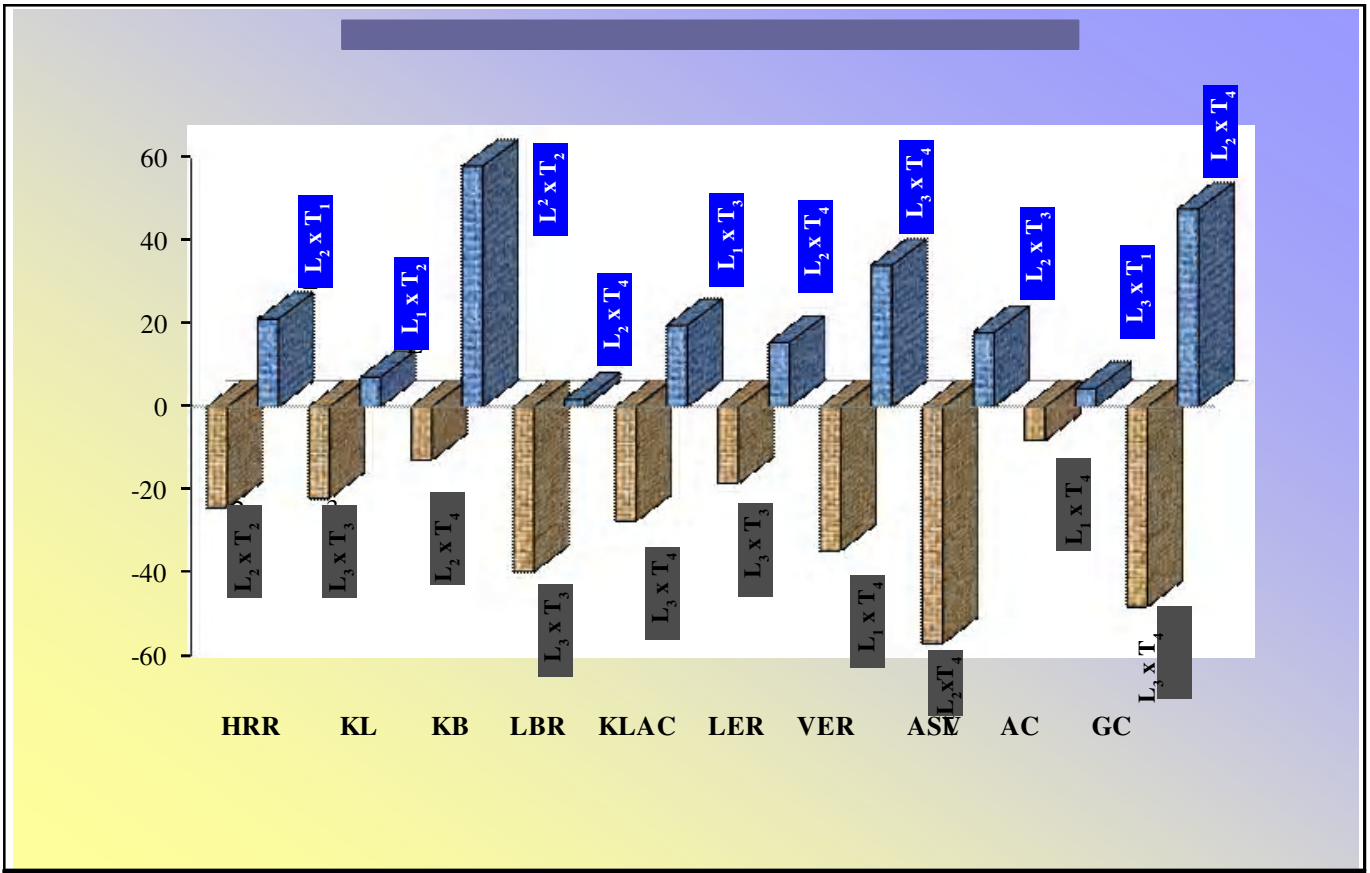

Fig. 1 : Range of standard heterosis for grain quality characters

aromatic grains. For gel consistency hybrids showed significant positive as well as significant negative standard heterosis. The hybrid TS 6 x B370 showed positive significant standard heterosis and rest of the all hybrids showed significant negative heterosis. Two hybrids *viz.*, TS 29 x Pusa Basmati and TS 29 x Basmati 370 showed positive significant standard heterosis for alkali spreading value. Overall two hybrids TS 29 x ADT 41 and TS 29 x Pusa Basmati 1 were found to be superior and could be utilized commercially for exploitation of heterosis.

REFERENCES

Bijral, S.S and Gupta, B.B. (1998). Inheritance of aroma in saanwal basmati. *Indian J.Genet.,* **58** : 117-119.

Cagampang, G.B., Perez, C.M. and Juliano, B.O. (1973). A gel consistency test for eating quality of rice. *J. Sci. Food agric.*, **24**:1589-1594.

Ghosh, A.K, Nanda, B.B., Govindaswamy, S. and Nayak, B.B. (1971). Influence of on the physio-chemical characteristics of rice. *Oryza*, **8**:87

Juliano, B.O., Onate, L.U. and Mundu, A.M. (1965). Relation of starch composition, protein content and gelatinization temperature to cooking and eating qualities of milled rice. *Food Technol.,* **19** : 116-121.

Little R.R., HIlder G.B and Dawson E.H. 1958. Differential effect of dilute alkali on 25 varieties of milled rice. Cereal chem., **35**:111-126.

Nagaraju, M., Mohanty, K.K., Choudhary, D. and Gangadharan, C. (1991). A simple technique of detect scent in rice. *Oryza* **28**:109-110.

Yolanda, J.L. and Das, L.D.V. (1995). Heterosis in grain quality characteristics of rice crosses. *Madras Agric.J.*, **82**:565-566.

****
*****