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Short Communication

Heterosis in *rabi* sorghum (*Sorghum bicolor* (L.) Moench)

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An experiment involving nine elite lines of *rabi* sorghum selected from different *rabi* growing regions of the country along with a released variety as check (CSV-14R) and 18 hybrids obtained by crossing the 9 elite lines at random was laid out in a randomised block design with two replications during *rabi* 1998-99 at Centre on Rabi Sorghum (NRCS), Solapur. A single plot had two rows of 4 meter length. The inter and intra row spacing was 45 x 15cm. All the recommended package of practices for cultivation of *rabi* sorghum were followed. Observations on characters viz, days to 50% flowering, days to maturity, 1000 grain weight and grain yield per plant were recorded on 10 randomly selected plants in each plot. The F_1 hybrid heterosis was estimated over better parent (heterobeltosis) [1] and over the check (useful heterosis) and the test of significance was carried out. The analysis of variance revealed significant differences among parents and F_1 hybrids for all the characters. The estimates of heterosis are presented in Table 1.

The degree of heterosis, however, differed for various characters. The heterobeltosis and useful heterosis for days to 50% flowering ranged from –11.53 to –1.41 and –13.15 to –2.63, respectively. All the crosses showed heterosis in the desired direction over better parent and the check variety (CSV-14R). This indicates clearly that hybrids flowered earlier than the better parent and check variety, These results are in agreement with the previous reports [2, 3]. The heterosis over better parent and the check variety for days to maturity ranged from –5.83 to 1.68 and –8.33 to 0.83, respectively. Thirteen hybrids showed heterosis in desired direction over better parent whereas all the crosses except one (104 B X RSLG-262) showed

Table 1. Percent heterosis in *rabi* sorghum over better parent (H2) and over check CSV-1 (H3)

Sl.No.	Crosses	Days to 50% flowering		Days to maturity		1000 grain weight		Grain yield per plant	
		H2	H3	H2	H3	H2	H3	H2	H3
1	SPV-1375 x RSLG-262	–6.57	–6.57*	–2.54	–4.16	12.12	5.71	72.22**	34.78*
2.	SPV-1375 x NIC-9751	–9.21**	–9.21**	–4.23*	–5.83	–8.33	–5.71	80-55**	41.60*
3.	104B x NIC-19749	–7.69*	–5.26	–1.68	–2.50	35.48**	17.14*	29.03	–13.04
4.	104B x RSLG-262	–7.69*	–5.26	0.68	0.83	16.12	2.85	64.70**	21.73
5.	RSLG-262 x M35-1	–3.89	–2.63	–2.54	–4.16	0.0	0.0	102.94**	50.00**
6.	RSLG-262 x Sel-3	–4.22	–10.52**	0.87	–5.83	19.35*	5.71	91.17**	41.30*
7.	SPV-1155 x RSLG-262	–7.69*	–5.26	–2.50	–2.50	22.22*	25.71**	42.55	45.65**
8.	SPV-1155 x Sel-3	–6.41	–3.94	–5.83**	–5.83	16.86	20.00*	63.82*	67.39**
9.	SPV-1155 x NIC-19751	–11.53**	–9.21	–5.83**	–5.83	5.55	8.57	51.06*	54.34**
10.	NIC-19751 x M35-1	–3.89	–2.63	–2.54	4.16	5.55	8.57	109.09**	50.00**
11.	NIC-19751 x RSLG-262	–1.41	–7.89**	–2.63	–7.51	2.77	5.71	64.70"	21.73
12.	NIC-19751 x Sel-3	–5.71	–13.15**	–0.91	–8.33**	–13.88	–11.42	93.93**	39.13*
13.	NIC-19751 x NIC-1 9749	–1.42	–9.21	0.0	–7.51**	22.22*	25.71**	69.69**	21.73
14.	CSM-78 x Sel-3	–2.66	–3.94	0.0	–2.50	0.0	8.57	26.08	26.08
15.	M35-1 x RSLG-262	–6.49	–5.26	0.84	–2.50	5 71	5.71	17.64	13.04
16.	NIC-19749 x M35-1	–9.09**	–7.89**	–4.23*	–5.83	–8.57	–11.42	80.64**	21.73
17.	NIC-19749 x RSLG-262	–5.63	–11.84	–2.63	–7.51**	19-35*	2.85	61-76*	19.56
18.	NIC-19749 x NIC-1 9751	–5.71	–13.15**	–0.91	–6.66*	2.70	2.85	12.12	–19.56
	C.D. at 5%	2.38	2.38	1.82	1.82	3.96	3.96	5.41	5.41

*,** Significant at 5% and 1 %, respectively.

heterosis in desired direction over the check. The hybrids which flowered earlier need not necessarily be early in maturity.

For 1000 grain weight heterosis ranged from –13.88 to 35.48 and –11.42 to 25.71 over better parent and the check variety (CSV-14R), respectively. Significant heterosis over better parent was observed in 5 hybrids whereas 4 hybrids exhibited significant heterosis over the check (CSV-1 4R) for 1000 grain weight. Positive heterosis for 1000 grain weight in *rabi* sorghum has been reported earlier [2, 4, 5]. The heterobeltosis and useful heterosis for grain yield per plant ranged from 12.1 to 102.9% and –19.56 to 67.3%, respectively over better and check varieties. Significant heterosis over better parent and the check variety (CSV-14R) were observed for 14 and 9 hybrids, respectively. The results are in confirmity with earlier findings [3,4,6,7].

In the present study the hybrids viz. SPV-1375 x RSLG-262, SPV-1375 x NIC-19751, 104B x RSLG-262, RSLG-262 x Sel-3, SPV-1155 x RSLG-262, SPV-1155 x NIC-19751, NIC-19751 x Sel-3, NIC-19751 x RSLG-262, NIC-19751 x NIC19749, NIC-19749 x M35-1 and NIC19749 x RSLG-262 which showed heterosis in desired direction for days to 50% flowering over better parent and the check variety (CSV-14R) also showed significant heterosis for grain yield per plant. These desirable cross combinations could be used to produce biparental progenies to get superior segregants, which may be handled through pedigree method of breeding. The heterosis over better parent for grain yield to the extent of 102.9% offers a good scope for heterosis breeding in *rabi* sorghum employing cytoplasmic genetic male sterility system. Thus, the present study reveals that there is ample scope for exploitation of hybrid vigour for commercial production as well as for isolation of purelines among the progenies of heterotic crosses.

References

1. **Fonseca S. and Patterson F. L.** 1968. Hybrid vigour in seven-parent diallel cross in common wheat (*T. aestivum* L.). Crop Sci., **2**: 85-88.
2. **Rao N. G. P.** 1970. Genetic analysis of some exotic x Indian crosses in sorghum. I Heterosis and b interaction with seasons. Indian J. Genet., **30**: 347-351.
3. **Ghorade R. B., Gite B. D., Sakhare S. A. and Archana Thorat.** 1997. Analysis of heterosis and heterobeltosis for commercial exploitation of sorghum (*Sorghum bicolour* (L) Moench) hybrids. J. Soils and Crops., **7**: 185-189.
4. **Chinna B. S. and Phul P. S.** 1989. Heterosis and combining ability studies in grain sorghum under irrigated and moisture stress environment. Crop Improvement, **15**: 157-155.
5. **Kanaka S. K. and Goud J. V.** 1981. Inheritance of quantitative characters in sorghum. Mysore J. Agric. Sci., **12**: 36-39.
6. **Indi S. K. and Goud J. V.** 1981. Gene effects in sorghum. Indian J. Genet., **4**: 25-29.
7. **Gite B. D., Khorgade P. W., Ghorade R. S. and Sakhare B. A.** 1997. Hybrid vigour for grain yield and its component characters in sorghum. J. Soils and Crops, **7**: 23-26.