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HETEROSIS IN VARIETAL CROSSES OF SUNFLOWER

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Twenty cross combinations in sunflower were studied for heterotic potential in seed yield and its important yield components in Sunflower. Seven crosses exhibited significant heterosis over the respective better parents for seed yield/ capitulum. Among them the maximum degree of herterosis was realised in the combination EC 85820 x BSH 1. The utility of promising hybrids in sunflower breeding has been discussed.

Heterosis in inter varietal crosses of sunflower (*Helianthus annuus* (L.) for seed yield and its components has been reported by Putt (1966) and Gupta and Khanna (1982). The present investigation was undertaken to study the heterosis in chosen cross combinations involving genetically diverse parents.

MATERIALS AND METHODS

The experiment involved nine parents viz. five females (EC 85820, SUF 1, EC 116211, EC 82362 and EC101494, and four males (suf 2, Morden, EC 68414 and BSH 1) selected for their genetic diversity. The parent BSH 1 used in this study is a single cross hybrid of sunflower developed at Bangalore. Crosses were effected between seed and pollen parents by hand pollination and seeds from 20 hybrids along with their parents were raised in a randomised block design with three replications at TamilNadu Agricultural University, Coimbatore during Kharif 1982. Observations were recorded on plant height, diameter of Capitulum. seeds/Capitulum and seed yield/capitulum in randomly selected

TABLE 1 Analysis of variance for yield components in Sunflower

Source of variation	Df	Means quares			
		Plant height	Diameter of Capitulum	Seeds/Capitulum	Seed yield / Capitulum
Replication	2	759.30**	2.03	36964.38	26.29
Female	4	863.18**	9.28**	208439.25**	751.90**
Male	3	1198.70**	6.34*	253323 66**	752.12**
Female x Male	12	576.63**	5.371**	201015.91**	445.47**
Error	56	48.77**	1.644	18732.55	25.16

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

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TABLE 2 Mean performance and expression of heterosis over better parent (Heterobelliosis in sunflower

Parents/Cross	Plant height (cm)		Diameter of capitulum		Seeds/capitulum		Seed yield / Capitulum	
	Mean	% over better parent	Mean	% over better parent	Mean	% over better parent	Mean	% over better parent
1	2	3	4	5	6	7	8	9
EC 85820	141.0	—	10.1	—	343	—	15.4	—
SUF 1	146.7	—	13.1	—	676	—	22.3	—
EC 116211	120.4	—	8.7	—	312	—	9.5	—
EC 82362	177.7	—	14.8	—	647	—	20.2	—
EC 101494	173.7	—	13.4	—	682	—	24 1	—
SUF 2	71.5	—	7.3	—	252	—	7.4	—
BSH 1	145.8	—	9.2	—	505	—	20.2	—
Morden	111.0	—	9.8	—	389	—	12.0	—
EC 68414	153.3	—	12.6	—	606	—	20,7	—
EC 85820 x SUF 2	141.4	0.2	9.9	—1.6	374	9.02	11.6	—24.6
,, x BSH 1	140.4	—3.6	10.9	7.9	1252	147.72**	49.9	147.0*
,, x Morden	113.7	—19.3**	9.4	—6.2	201	—48.33	5,8	—62.3**
,, x EC68414	143.7	—6.2	10.3	1.5	546	—9.95	23.1	11.7
SUF 1 x SUF 2	115.7	—21.1**	10.1	—24.0**	454	—32.82	18.73	—16.2
,, x BSH 1	140.7	—4.1	11 3	—14.7	943	39.43*	42.4	89.5*
,, x Morden	125.2	—14.6**	9.7	—26.7**	699	3.40	35.6	59.4*
,, x EC 68414	131.3	—14.3**	10.2	—22.9**	590	—12.76	34.0	52.3*
EC 116211 x SUF 2	151.1	25.5**	10.1	16.4	300	—3.6	10.2	7.7
,, x BSH 1	153.8	5 4	8.1	—12.2	386	—23.6	11.2	—44.4*
,, x Morden	140.9	17.0**	9.7	—0.3	458	17.5	15.6	29.4
,, x EC68414	138.4	—9.7*	10.6	—15.8	451	—25.5	20.3	—1.5
EC 82362 x SUF 2	138.3	—22.1**	10.2	—30.6**	419	—35.1*	18.7	—7.7
,, x BSH 1	160.7	—9.5**	11.9	—19.1**	519	—19.7	23.5	15.9
,, x Morden	148.1	—16.6**	11.8	—20.2**	866	33.9	45.9	126.5**
,, x EC68414	144.7	—18.5**	12.2	—17.0*	941	45.4*	42.5	105.6**
EC 101494 x SUF 2	125.3	—27.8**	13.1	—2.5	614	—10.0	18.9	—21.6
,, x BSH 1	143 2	—17.5**	9.3	—30.7**	428	—37.3*	14.6	—39.4*
,, x Morden	121.0	—30.3**	9.6	—28.7**	365	—46.4**	12.0	—50.0**
,, x EC68414	178.8	2.9	14.4	6.9	854	25.2	39.5	63.5**
SED	5.702	—	1.047	—	111.734	—	4.096	—
CD (5%)	11.460	—	2.100	—	224.585	—	4.233	—

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

five plants in each replication. Heterosis was estimated as percentage increase in F1 generation over the better parent.

RESULTS AND DISCUSSION :

The analysis of variance showed significant differences among the parents and their hybrids for all the characters studied (Table 1). The mean performance of the parents and hybrids and the percentage of increase in F1 generation over the better parent revealed varying degrees of heterobeltiosis for different traits (Table 2). Most of the crosses mainfested negative heterosis for plant height and diamater of capitulum. The significant negative heterosis observed for plant height would provide scope for developing short statured hybrid in sunflower. Three crosses viz. EC 85820x BSH 1, SUF 1 x BSH 1 and EC 82362x EC 68414 exhibited significant positive heterosis for seeds/capitulum, the increase being 39.43 percent to 147. 72 percent over the better parent. Seven of the crosses expressed significant positive heterosis for seed yield/ capitulum over the better parent with a range of increase from 52.30 percent to 147.03 percent. The hybrids EC 85820 x BSH 1, EC 82362 x Morden and EC 82362 x EC 68414 recorded 147.03, 126.59 and 105.65 percent increased seed yield/capitulum respectively over their better parents and scored the first three ranks among the hybrids studied.

The maximum degree of heterosis for seeds/capitulum and seed yield/ capitulum was realized in the combination EC 85820 x BSH 1. The significant heterotic potential exhibited by a few hybrids in the present study indicated considerable breeding and commercial value. New hybrids merit consideration only if they exceed in yield the widely adopted hybrid by atleast 25 percent margin (Akhtar and Singh, 1981). In the present investigation the three way cross combination EC 85820 x BSH 1 recorded significantly superior yield over the better parent BSH 1, a single cross hybrid. In the recent years increasing evidences are available on the role of additive genetic variance in sunflower populations in addition to non-additive gene actions (Srivastava and Mishra, 1976; Gupta and Khanna, 1982 and Shinde *et al.* 1983). Some of the superior cross combinations identified in this study could therefore be utilized for a recurrent selection programme to obtain superior derivatives and better inbred lines.

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