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HETEROSIS IN CHICKPEA

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CHICKPEA *(Cicer arietinum* L.) is a highly self-pollinated crop and the scope for exploitation of hybrid vigour will depend on the direction and magnitude of heterosis, biological feasibility and the type of gene action involved. Also, study of heterosis will have a direct bearing on the breeding methodology to be employed for varietal improvement. There is limited published data on heterosis in chickpea.

MATERIALS AND METHODS

Seven chickpea varieties of diverse origin, two from India (C 235 and P 1139), two from Mexico (P 813 and P 9624), one from USSR (P 851), one from USA (P 1821) and one from Jordan (ICP 71), were selected to attempt single crosses. Of the seven varieties, P 9624 and ICP 71 were bold seeded and salmon white coloured *(kabuli* type), P 1821 was bold seeded and black coloured and remaining four varieties were small seeded and brown coloured *(desi* types). The 21 possible crosses were made in winter of 1973 at New Delhi and in summer of 1973 at Wellington (Nilgiris). Twenty one F_1's plus seven parents were planted at New Delhi in 1973-74, in a randomised block **with** two replications. The seeds were space planted at 15 cm. intervals in rows 60 cms apart. Following observations were recorded on three randomly selected plants from each plot: a. *Plant height*—Distance in cms from the ground level to the tip of the longest branch; b. *Number of branches per plant*—Number of branches arising within two inches above ground level; c. *Number of pods per plant*—Number of seed bearing pods at maturity; d. *Days to flowering*—Number of days from seeding to initial flowering; e. 100-*seed weight*—**Weight** of 100 seeds in grams. In some cases, where seeds were less, 100-secd weight was calculated from the weight of the available number of seeds; f. *Seed yield per plant*—Weight in grams of the seed yield per plant.

Heterosis (%) was calculated over both mid-parent and better parent.

RESULTS & DISCUSSION

The analysis in respect of parents and hybrids showed that mean differences were different for all the six characters. The mean values of F_1, expression of heterosis over midparent and better parent for different characters are given in Table 1.

The degree of heterosis varied considerably for seed yield and its components'. Maximum positive heterotic values for individual F_1 hybrids were observed for number of pods per plant, number of branches per plant and seed yield per plant. Taking the average of 21 crosses, maximum heterosis over mid-parent was observed for number of pods per plant (35.62%) and it was closely followed by seed yield per plant (34.65%) and number of branches per plant (27.72%), in that order. The corresponding better parent heterotic values for

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TABLE 1—*(Contd.)*

Cross	Days to flower			100 seed weight			Yield per plant		
	F_1	MP	BP	F_1	MP	BP		MP	BP
P813 X P851	103.00	-1.59	-5.78*	7.90	+6.18	-13.37	6.28	+81.50	+64.44
P813 X P1139	103.83	+0.56	-5.03	11.62	+50.42**	+38.00*	7.95	+84.45	+50.00
P813 X P1821	102.67	-5.87*	-6.09*	14.51	+37.92**	-5.10	14.18	+251.86**	+199.78**
P813 X P9624	101.16	+8.38**	-7.47**	15.17	-3.06	-38.34**	7.82	-44.81*	-68.74**
P813 X ICP71	105.83	+0.07	-3.20	12.02	+6.09	-28.91**	16.72	+164.97**	+79.78*
P813 x C235	102.67	-0.24	-6.07*	8.14	+12.74	-6.32	4.08	-37.03	-57.63
P851 X P1139	100.83	+2.27	+0.83	9.54	+8.77	+4.60	6.25	+40.44	+17.92
P851 x P1821	105.00	+2.43	-3.51	10.24	-16.13*	-33.02**	4.90	+17.50	+3.59
P851 X P9G24	102.00	+0.99	+2.00	15.02	-13.37	-41.21**	9.40	-34.31	-62.43**
P851 X ICP71	105.67	+2.75	+3.43	13.21	+1.45	-21.88**	10.47	+62.32	+12.58
P851 X C235	105.67	+2.75	+5.67*	8.45	-5.16	-7.34	7.05	+6.49	-26.79
P1139 X P1821	101.33	-1.62	-6.89**	14.33	+20.82*	-6.27	5.17	+2.57	-2.45
P1139 x P9624	99.66	+13.83**	+2.56	18.28	+7.59	-28.45**	16.37	+7.98	-34.57**
P1139 X ICP71	100.17	+3.56	-0.96	13.74	+8.44	-18.74*	10.37	+42.05	+11.50
P1139 X C235	101.67	+4.98*	+4.63	11.04	+28.97*	+27.04	10.83	+44.97	+12.46
P1821 X P9624	109.00	+17.10**	+0.15	19.75	-3.28	-22.70**	10.90	-26.74	-56.43**
P1821 X ICP71	108.00	+2.32	-0.76	15.63	-2.91	-7.56	15.78	+124.78**	+79.67*
P1821 X C235	104.00	+1.28	-4.43	11-43	-4.67	-25.24**	5.18	-27.85	-46.20
P9624 x ICP71	100.67	+12.16**	-1.45	17.78	-16.25*	-30.41**	11.18	-34.84*	-55.31**
P9G24 x G235	96.83	+11.40**	+0.34	15.13	-11.62	-40.78**	18.37	+6.00	-26.57*
ICP71 x C235	99.83	+0.51	-2.28	11.35	-11.32	-32.87**	9.87	+4.22	+2.49
Average of 21 crosses		+3-71	-1.21		+4.58	-17.62		+34.65	+1.62