

Studies on Heterosis and Mean Performance in Chillies (*Capsicum annuum* L.)

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ABSTRACT: The heterosis and mean performance in chilli were evaluated during 2009-2011 for 10 quantitative characters in chilli. The data generated was subjected to test hybrid vigour in terms of heterosis. It was found that for number of fruits per plant significant positive heterosis was exhibited by the cross CA 197 x Kashi Anmol. High magnitude of average heterosis (160.33% in CA 71 x CA 97), better parent heterosis (79.70%) and economic heterosis (30.70%) was recorded by the cross CA 197 x Kashi Anmol for dry fruit yield per plant.

Keywords: Chilli, Yield Components, Heterosis

INTRODUCTION

Chilli (*Capsicum annuum* L.) a spice cum vegetable crop belongs to the family solanaceae and has chromosome number of $2n=24$. It is valued for its pungency, which is due to crystalline alkaloid called capsaicin, present in the placenta of fruits. Chilli has become a part and parcel of our daily diet. It is a rich source of vitamin C. The yield potential and total production of chilli crop is low due to poor yielding varieties and high incidence of pests and diseases. One of the methods to achieve quantum jump in yield is heterosis breeding. Therefore, to meet this objective in shorter time heterosis breeding has been undertaken to develop and identify the suitable best performing hybrids.

MATERIALS AND METHODS

An experiment was conducted at Dept. of vegetable Crops, Horticultural college and Research Institute, Tamil Nadu Agricultural University, Coimbatore during 2009-2011. The experimental material consisted of 15 lines (CA 112, CA 24, CA 192, CA117, Selection 1, CA 197, CA 207, 09CHIVAR03, CA 158, CA 172, CA 106, CA 72, CA 27, CA 71, CA 173) and two testers (CA 97 and Kashi Anmol) and commercial check NS 1701. These parents were crossed in line x tester design to produce 30 hybrids, along with parents and commercial check (NS 1701) were sown in 2009-2011 with two rows of ten plants of each entry

in a randomized block design with two replications. Observations were recorded on ten quantitative traits of chilli. The mean over two replications for all the hybrids for each of the trait was calculated over mid parent, better parent and standard check and used in the estimation of heterosis as per the standard procedure given by Turner (1953) and Fonesca and Patterson (1968).

RESULTS AND DISCUSSION

The mean sum of squares of 10 quantitative characters are presented in Table 1. The analysis of variance for parents showed significant differences for all the characters studied indicating the presence of sufficient variability among parents. The variance due to females were significant for all the traits indicating the existence of enormous amount of genetic variability for yield attributes among the female parents. Similarly, male parents showed significant difference for all the traits. The interaction between female x male and crosses was significant for all the characters studied.

The heterosis range for 10 quantitative traits is presented in Table 2. High magnitude of average heterosis (160.33% in CA 71 x CA 97), better parent heterosis (79.70%) and economic heterosis (30.70%) was recorded by the cross CA 197 x Kashi Anmol for dry fruit yield per plant. Heterosis for fruit yield per plant was also reported by Gaddagimath (1992) and

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Shukla *et al.* (1999). For fresh fruit weight, significant positive heterosis was exhibited in 09CHIVAR03 x Kashi Anmol, magnitude of average heterosis (125.96%), better parent heterosis (104.12%) and economic heterosis (96.53%).

For number of fruits per plant significant positive heterosis was exhibited by the cross CA 197 x Kashi Anmol and magnitude of average heterosis (250.31%), better parent heterosis (166.38%) and economic heterosis (39.19%) was high for yield contributing characters such as days to 50 per cent flowering in CA 158x CA 97 (26.81%), fruit girth in CA 117 x Kashi Anmol (25.00%), fruit length in 09CHIVAR03 x CA 97 (46.80%), plant height in CA 207 x CA 97 (13.95%) exhibited high value of useful heterosis. Significant

positive heterosis in respect of yield contributing characters like number of fruits, fruit width, fruit length, fruit weight and plant height was also reported by Bhagyalakshmi *et al.*, (1991), Mishra *et al.*, (1991) and Lippert (1975). Maximum standard heterosis for dry yield per plant was observed in the cross CA 197 x Kashi Anmol (30.70%) followed by CA 71 X Kashi Anmol (23.29%) and CA 172 x Kashi Anmol (15.36). The heterosis values revealed that the hybrids CA 197 x Kashi Anmol and 172 x Kashi Anmol exhibited significant standard heterosis for major growth parameters and yield components, while the hybrid CA 192x CA 97 produced appreciable dry fruit yield per plant.

Table 1
General ANOVA for 14 traits in dry chilli

Source	Mean sum of squares									
	Plant height	Number of branches per plant	Days to 50% flowering	Fruit length	Fruit girth	Fresh fruit weight	Number of seeds per fruit	Thousand-seed weight	Number of fruits per plant	Dry fruit yield per plant
Parents	1027.708**	1.573**	38.441**	11.754**	0.702**	3.646**	1329.35**	1.261**	2235.229**	818.60**
Hybrids	294.933**	1.637**	110.955**	3.910**	0.882**	2.434**	927.17**	1.640**	4273.285**	2617.79**
Parents x Hybrids	97.556*	0.393*	3258.885**	0.879*	2.058*	9.027**	3754.23**	20.124**	22575.466**	21954.42**
Lines	281.390**	2.760**	82.736**	3.181**	0.681**	3.624**	529.15**	1.363**	4706.262**	2836.31**
Testers	1753.490**	1.244*	529.016*	5.186**	1.045*	1.865*	347.47*	2.641*	20991.874**	11006.93**
Lines x Testers	204.294**	0.542**	109.312**	4.547**	1.071**	1.286**	1366.60**	1.846**	2646.123**	1800.05**
Error	0.218	0.0007	0.061	0.123	0.0004	0.0013	0.4497	0.0008	1.583	0.964
GCA	2.037	0.024	0.036	-0.014	-0.0042	0.025	-9.878	-0.0046	36.579	18.383
SCA	102.088	0.270	54.636	2.273	0.5353	0.642	683.11	0.9231	1322.206	899.50
GCA: SCA	0.019	0.090	0.0006	-0.006	-0.0078	0.0401	-0.014	-0.004	0.027	0.020

* Significant at 5 per cent level

** Significant at 1 per cent level

Table 2
Heterosis range for 10 quantitative traits in dry chilli

S.No.	Characters	Heterosis range (%)		
		Mid parent	Better parent	Commercial check
1	Plant height	-29.60 to 38.95	-49.19 to 34.39	-45.84 to 13.95
2	Number of branches per plant	-46.44 to 32.02	-50.94 to 12.00	-40.98 to 26.32
3	Days to 50% flowering	-26.10 to 15.88	-26.68 to -1.28	-9.46 to 26.81
4	Fruit length	-23.11 to 65.96	-48.22 to 46.88	-32.99 to 46.80
5	Fruit girth	-31.12 to 61.00	-34.14 to 59.93	-45.50 to 25.00
6	Fresh fruit weight	-31.60 to 125.96	-46.96 to 104.12	-21.59 to 96.53
7	Number of seeds per fruit	-42.12 to 99.47	-56.48 to 19.81	-52.30 to 38.00
8	Thousand-seed weight	50.32 to -69.91	-76.25 to 28.42	-69.04 to 34.67
9	Number of fruits per plant	-64.22 to 250.31	-74.57 to 166.38	-75.83 to 39.19
10	Dry fruit yield per plant	-43.76 to 160.33	-57.60 to 79.70	-69.16 to 30.70

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