

## Studies on exploitation of heterosis in bottlegourd (*Lagenaria siceraria* (Mol.) Standl.)

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**Abstract:** The study was conducted in bottlegourd (*Lagenaria siceraria* (Mol.) Standl.) to investigate extent of heterosis for yield and its contributing characters with five parents and their 10 F<sub>1</sub> hybrids. Maximum heterosis over the better parent was expressed for fruit weight (108.3%) and fruit yield per vine (98.12%) in F<sub>1</sub> cross Pratik x TPT local while AB with TPT local and PSPL registered high heterobeltiosis for fruits per vine (22.95%) fruit girth (30.69%) and fruit flesh thickness (34.05%) respectively.

**Key words :** Bottlegourd, Parents, F<sub>1</sub> hybrids, Heterobeltiosis, Fruit weight, Fruit yield per vine.

### Introduction

Bottlegourd is one of the important vegetable crops grown in warmer climatic regions of the world. The natural genetic variability that exists in this crop is unexploited for improvement of yield. However, very little attention was given for its genetical improvement. Rapid improvement in yield may be brought about by utilizing the genetic variability in exploitation of heterosis. The production of hybrids is most easiest in bottlegourd being monoecious. The present investigation was therefore, undertaken to study the magnitude of heterosis among economic characters in bottlegourd.

### Materials and Methods

The experimental material consisted of five parental genotypes and their 10 direct F<sub>1</sub> combinations. The experiment was conducted during spring summer season of December 2000 to May 2001 at Horticultural Garden, Sri Venkateswara Agricultural College, Tripati. The crop was raised in rows of 2m apart with a spacing of 1.5 m between the plants. Observations were recorded on five randomly selected plants for 14 characters as mentioned in Table 1. Heterosis was calculated as percentage of F<sub>1</sub> performance in the favourable direction over better parent.

### Results and Discussion

The magnitude of percentage of heterosis expressed by the hybrids for fourteen characters varied among themselves. The cross Arka Bahar x Pusa Summer Prolific Long showed significant negative heterobeltiosis for node at which is in desirable direction. The heterosis percentage over better parent ranged from -51.51 to 7.4 for sex ratio, -3.81 to 22.95 for fruits per vine, 17.61 to 108.34 for fruit weight, -6.29 to 50.28 for fruit length, -6.62 to 30.69 for fruit girth, -5.11 to 34.05 for fruit flesh thickness, -45.98 to 45.27 for seeds per fruit, -25.90 to 28.19 for hundred seed weight and 24.30 to 98.12 for yield per vine. The best performing heterotic F<sub>1</sub> hybrids over the respective top parental lines for each character were AB x Pratik for sex ratio, AB x IC 92330 and AB x TPT local for fruits per vine, Pratik x TPT local and AB x Pratik for fruit weight, AB x Pratik for fruit length, AB x PSPL for fruit girth and fruit flesh thickness and PSPL x IC 92330, AB x Pratik for total yield per vine. Pal *et al.* (1984), Sirohi *et al.* (1987), Janakiram and Sirohi (1989), Pitchaimuthu and Sirohi (1994) observed heterosis for earliness in bottlegourd. Sirohi *et al.* (1987), Janakiran and Sirohi (1989), Kumar *et al.* (1999) reported significant heterosis for fruits per vine, fruit

Table 1. Heterobeltiosis for 14 characters in bottlegourd

Hybrids	Vine length	Node at which first male flower appeared	Node at which first female flower appeared	Days to first male flowering	Days to first female flowering	Sex ratio (female to male flowers)	Fruits per vine	Fruit weight	Fruit length	Fruit girth	Fruit flesh thickness	Yield per vine	Seeds per fruit	Hundred seed weight
<i>Arka bahar X</i>														
PSPL	-15.68**	20.97**	-8.89**	-6.17**	-8.39**	-28.63**	0.00	17.61*	-4.97*	30.69**	34.05**	24.30**	10.20**	28.19**
Pratik	17.67**	-30.00**	-13.77**	1.12	-1.45	7.14	2.29	73.74**	31.38**	12.21**	14.69**	87.65**	-2.14	-5.40
IC 92330	0.31	-4.48	-2.96	8.87**	6.10**	-44.15**	11.47*	39.20**	50.28**	18.15**	20.43**	72.02**	-14.63**	6.60
Tirupati local	5.21	6.39	-17.78**	4.20	-3.76*	-20.48**	22.95**	26.25**	10.68**	4.73	5.80	51.85	-45.98**	17.84**
<i>PSPL X</i>														
Pratik	3.92	-27.50**	-28.26**	-5.21*	-12.45**	-33.48**	8.39	53.73**	-2.64	10.40**	12.77**	73.70**	-3.88*	-16.88**
IC 92330	16.93**	-25.37**	-6.49*	-2.74	-0.78	-51.51**	11.86	85.27**	1.55	8.81**	8.11*	98.12**	-17.35**	5.11
Tirupati local	-24.10**	-6.45	2.59	0.68	-0.25	-40.08**	13.55	29.26**	-6.29**	0.31	2.04	47.73**	-23.99**	-9.21
<i>Pratik X</i>														
IC 92330	4.07	-7.5**	-3.26	9.95**	25.23**	-20.77**	-3.81	66.95**	15.04**	6.71*	9.48**	67.72**	4.98**	-25.90**
Tirupati local	-10.74*	-12.50**	-7.60**	-4.34	0.00	-44.87**	-2.29	108.34**	3.48	11.67**	13.99**	93.84**	10.71**	-18.85**
<i>IC 92330 X</i>														
Tirupati local	-31.55**	-19.40**	27.53**	-1.40	-4.79**	-36.36**	7.27	36.27**	5.31	-6.62*	-5.11	47.89**	45.27**	1.81
CD at P=0.05	0.95	0.42	0.43	3.18	1.58	0.10	0.36	0.31	3.36	0.63	0.57	0.74	16.25	1.64
P=0.01	1.28	0.57	0.59	3.19	2.14	0.13	0.49	0.41	4.53	0.85	0.77	1.00	21.92	2.21

\* Significant at 1% level

\*\* Significant at 5% level

weight and yield per vine. Pal *et al.* (1984) reported significant heterobeltiosis for fruit girth and fruit flesh thickness and Kumar *et al.* (1999) for fruit girth in this crop. In order of merit, F<sub>1</sub> hybrids PSPL x IC 92330, Pratik x TPT local and Arka bahar x Pratik were found to be the best performers for total yield per vine which showed 98.12, 93.84 and 87.65 per cent heterosis respectively over the better parent. The F<sub>1</sub> hybrid Pratik x TPT local was identified as the best performer of all the combinations for fruit weight and yield per vine with maximum heterosis. The results of the present study suggest that from an economic point of view it is useful to select parental lines having high per se performance for one or more important characters *viz.* fruit number and fruit weight besides early flowering in order to achieve higher gains in the F<sub>1</sub> hybrid through heterosis breeding.

### Summary

Five parental lines and their 10 F<sub>1</sub> hybrids of bottlegourd obtained from partial diallel were studied to investigate the extent of heterosis for yield and its contributing traits. The maximum and significant heterobeltiosis was expressed for fruit weight (108.34%) and fruit yield per vine (98.12%) besides highest per

The performance in cross combination Pratik x IPT local while AB x PSPL had showed high heterobeltiosis for fruits per vine, fruit girth and fruit flesh thickness. Further, it is evident that in most cases heterosis for yield was associated with heterosis for yield components.

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(Received: May 2003; Revised: June 2004)

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