SHORT COMMUNICATION

INDIAN JOURNAL OF ARID HORTICULTURE
2009, Vol. 4 (2) : 118-119

Heterotic response in sponge gourd [Luffa cylindrical (Roem) L.]

P.K. Singh. B.R. Choudhary. D.R. Bhardwaj and Rarnesh Singh
Indian Institute of Vegetable Research. Varanasi (UP) 221 005

Sponge gourd [*Luffa cylindrica* (Roem) L.] plays a significant role in the diet of human nutrition, especially in tropical countries. It is one of most popular vegetable during summer and rainy seasons in northern India. Sponge gourd is a monoecious crop and cross pollination is a general rule which facilitates exploration of heterosis. It exhibits high heterosis (Mole *et al.*, 2001 and Ram *et . al.* 2004) which suggest a great scope of improvement through heterosis breeding. Today hybrids are gaining popularity due to their earliness, high productivity, better quality and adaptation to environmental condition. Realizing the importance of hybrid vigour, an investigation was undertaken to identify potential parental combinations in order to have superior hybrids with good yield and quality traits.

Fifteen diverse sponge gourd inbreds viz., VRSG-l. VRSG-4. VRSG- 5. VRSG-6, VRSG-8. VRSG-ll, VRSG-12, VRSG-41. VRSG-42. VRSG-44, VRSG-45, VRSG-46, VRSG-49, VRSG-52. VRSG-61 were selected and crossed with three testers (VRSG-2. VRSG-3 and VRSG-66) resulting in 45 F_1s. The F_1s and parents were evaluated under complete randomized block design replicated thrice at IIVR Seed Production Centre. Kushinagar (UP) during rainy season of 2009. Seeds were sown keeping row to row and plant to plant spacing 3 m and 70 cm, respectively. Eight competitive plants in each treatment under each replication were recorded for node on which first female flower appeared, days to anthesis of first female flower, fruit length (cm), circumference of fruit (cm), marketable fruits per plant, early yield per plant (g) and total marketable yield per plant (g). The data were analyzed by Line x Tester analysis outlined by Kempthorne (1957) and heterosis was calculated as percentage of F_1 performance in the favourable direction of its better parent (BP) as suggested by Hayes *et al.* (1955).

The data presented in Table 1 revealed significant and desirable heterosis over BP for all the characters except circumference of fruit. For two traits namely node on which first female flower appeared and days to anthesis of first female flower negative heterosis was considered to be better, whereas for remaining five traits the positive heterosis was considered to be desirable for judging good F_1 hybrids in sponge gourd. The results indicated that early yield per plant and total marketable yield per plant were most heterotic traits. The highest positive heterosis was recorded for early yield per plant in VRSG-l x VRSG-66 (76.31 %) followed by total marketable yield per plant in VRSG-4 x VRSG-66 (72.84%). Only one cross combination VRSG-8 x VRSG-66 exhibited significant and positive heterosis (15.53%) for fruit length The highest fruit yield recorded by the best performing hybrid VRSG-4 x VRSG-66 could be attributed due to increased number of marketable fruits, fruit length and circumference of fruit. The best performing hybrid for number of marketable fruits per plant was found to be VRSG-4 x VRSG- 66 which showed 44.70% heterosis over BP. These findings are supported by the results of Ram *et al.* (2004) in sathputia and Mole *et al.* (2001) and Hedau *et al.* (2004) in ridge gourd.

The characters as node on which first female flower appeared and days to anthesis of first female flower for which negative heterosis is desirable was shown by the crosses VRSG-6 x VRSG-66 (-45.09%) and VRSG-5 x VRSG-2 (-22.37%). respectively. The results are also in conformity with those obtained by Ram *et al.* (2004) in sathputia and Singh *et al.* (2007) in bitter gourd. The number of significant crosses and range of heterosis based on BP are presented in Table 2. Among 45 F_1s. only 13 cross showed overall best performance for different traits. Considering the marketable fruits per plant and total marketable fruit yield per plant the best performing hybrid is VRSG-4 x VRSG-66 which may be tested for yield and other economic traits for performance under different agro climatic conditions for the development of hybrids.

References

Hayes, H.K., Immer., F.H. and Smith, D.C. 1955. Methods of Plant Breeding. Me Graw Hill Book Co. Inc., New York. p. 535.

Hedau, N.K. and Sirohi, P.S. 2004. Heterosis studies In ridge gourd. *Indian Journal of Horticulture.* 61 (3): 236-239.

Kempthorne, O. 1957. An introduction to genetic statistics. John Wiley and Sons. Inc., New York. pp. 458-671.

Mole, T.J., Nirmal Devi, N., Rajan, S. and Sadhankumarm, P.G. 2001. Heterosis and combining ability in ridge gourd (*Luffa acutangula* (Roxb.) L.). *Vegetable Science.* 28(2): 165-167.

Ram, D., Rai, M., Verma, A. K. and Pandey, S. 2004. Heterosis and combining ability in sathputia *(Luffa hermaphroditai). Vegetable Science.* 31 (2): 129-134.

Singh, S.K., Singh, B .. Kumar, U. and Rai. M. 2007. Heterosis analysis in bitter gourd through line x tester design. *Vegetable Science.* 34(1): 95.

Table 1. Top three hybrids selected separately on the basis of heterosis over better parent

S. No.	Character	Cross	Heterosis (%)
1.	Node on which first female flower appeared	VRSG-6 x VRSG-66	-45.09**
		VRSG-52 x VRSG-66	-38.30*
2.	Days to anthesis of first female flower	VRSG-52 x VRSG-2	-34.04*
		VRSG-5 x VRSG-2	-22.37**
		VRSG-46 x VRSG-66	-20.93**
3.	Fruit length (cm)	VRSG-44 x VRSG-66	-16.27**
		VRSG-8 x VRSG-66	15.53*
		VRSG-49 x VRSG-66	13.19
4.	Circumference of fruit (cm)	VRSG-41 x VRSG-66	12.59
		VRSG-5 x VRSG-3	10.91
		VRSG-41 x VRSG-66	9.65
5.	Marketable fruits per plant	VRSG-5 x VRSG-66	7.49
		VRSG-4 x VRSG-66	44.70**
		VRSG-46 x VRSG-2	36.40*
6.	Early yield per plant (g)	VRSG-46 x VRSG-3	31.93*
		VRSG-1 x VRSG-66	76.31**
		VRSG-4 x VRSG-2	62.29**
7.	Total marketble yield per plant (g)	VRSG-5 x VRSG-2	23.23*
		VRSG-4 x VRSG-66	72.84**
		VRSG-8 x VRSG-2	48.03*
		VRSG-8 x VRSG-66	42.62*

Table 2. Mean performance and range of heterosis in sponge gour

S. No.	Characters	Mean of parents	Mean of hybrids	Range of heterosis (%)	No. of desirable and significant cross over better parent
1.	Node on which first female flower appread	15.10	13.49	-45.09 to 68.87	5
2.	Days to anthesis of first female flower	56.19	51.86	-22.37 to 6.21	7
3.	Fruit length (cm)	28.41	31.15	-8.95 to 15.52	1
4	Circumference of fruit (cm)	6.05	6.26	-20.48 to 10.91	–
5.	Marketable fruits per plant	4.78	5.74	-36.67 to 44.70	3
6.	Early yield per plant (g)	64.01	72.39	-68.48 to 76.31	6
7	Total marketable yield per plant (g)	404.81	531.81	-34.78 to 72.84	5