

Combining Ability Analysis in Okra

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Selection of suitable parents is an important step in a breeding program. Study of gca helps in selection of suitable parents and sca for identifying superior hybrids. There are only few reports available on these aspects in okra. The present investigation was therefore, undertaken to study the combining ability in okra.

Ten promising lines namely, Kheda-11, Vadodara-1, Vadodara-4, Vadodara-7, Bhavnagar-8, Pusa Sawani, DL-1-87-5, HRB-55, JO-5 and Chhodavadi were selected for the study. These were crossed in all possible combinations, excluding reciprocals, during *khari* 1997. The 55 entries comprising ten parents and their F_1 S were planted in a randomized block design with three replications at the Vegetable Research Station, Gujarat Agricultural University, Junagadh during summer 1998. Each entry was represented by a single row of 10 plants spaced at 22.5 x 60 cm. The normal agronomic and plant protection practices were followed. The observations were recorded on five randomly selected competitive plants in each row for eleven characters viz., days to 50 per cent flowering, days to first

picking, first fruiting node, pod length, pod girth, number of pods per plant, number of nodes per plant, internal length, plant height, number of branches per plant and yield per plant. The combining ability analysis was done following Model 1, Method 2 of Griffing (1956).

There were significant differences among the genotypes for all the characters studied. The mean sum of squares for gca as well as sca were significant for all the characters studied except in case of sca for days to 50 per cent flowering, days to first picking, number of pods per plant, number of nodes per plant and yield per plant. These indicated that both additive and non-additive gene effects were important in the inheritance of most of the characters, which is akin to the findings of Thaker *et al.* (1981), Poshiya and Shukla (1986) and Kulkarni *et al.* (1991). The comparison of components of variance due to gca and sca revealed preponderance of additive gene effect for all the characters.

The estimates of gca effects indicated that none of the parents was a good general combiner for all the characters studied (Table 1). However, parents HRB-55, Pusa Sawani, DL-1-87-5 and JO-5 were good general combiner for yield per plant and many other traits and could be used in crossing program to isolate superior segregants. Estimates of sca effects revealed that no cross combination was consistently good for all the characters studied. These results were in

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TABLE 1

Estimates of general combining ability effects of the parents for different traits.

Parents	Days to 50% flowering	Days to first picking	First fruiting node	Pod length	Pod girth	No. of pods per plant	No. of nodes per plant	Internodal length	Plant height	No. of branches per plant	Yield per plant
Kheda-11	0.62	0.68	-0.44**	0.09**	0.13**	-0.94**	-1.31**	-0.14**	-5.98**	-0.16**	-7.78**
Vadodara-4	0.51	0.51	0.22**	-0.45**	0.18**	-0.15	0.88**	0.19**	1.58*	-0.17**	-1.42
Vadodara-7	-0.02	0.09	-0.36**	-0.10**	-0.01	-0.79**	-0.97**	0.01	-6.27**	0.18**	-7.94**
Vadodara-1	0.20	-0.29	-0.84**	-0.12**	0.02	-0.85**	-1.24**	-0.32**	-7.98**	-0.26**	-23.86**
Bhavnagar-8	1.67**	1.32*	0.01	-0.77**	0.21**	-0.71**	-0.11	0.10**	0.90	-0.07	-5.72*
Pusa Savani	-1.99**	-2.02**	0.64**	0.45**	-0.13**	0.77**	1.72**	0.03	8.90**	0.10	8.92**
DL-1-87-5	-0.61	-0.77	-0.41**	0.46**	-0.23**	0.40*	-0.57	-0.09**	-4.78**	0.03	13.08**
HRB-55	-2.77**	-2.13**	0.43**	0.53**	-0.21**	0.60**	1.28**	-0.28**	6.27**	0.18**	9.25**
JO-5	-0.47	-0.54	0.70**	0.26**	-0.08**	0.81**	0.77*	0.29**	6.66**	-0.28**	6.89*
Chhodavadi	3.03**	3.15**	0.08	-0.34**	0.14**	0.84**	-0.45	0.21**	0.70	0.44**	8.58**
S. E. (g_i) $\pm$	0.57	0.58	0.03	0.02	0.03	0.19	0.30	0.02	0.69	0.05	2.84
S. E. ($g_i - g_j$) $\pm$	0.85	0.87	0.04	0.03	0.04	0.28	0.45	0.03	1.02	0.08	4.24

*, ** Indicates significance at 5 and 1 per cent, respectively.

TABLE 2

Estimates of specific combining ability effects of some selected okra crosses.

Crosses	Days to 50% flowering	Days to first fruiting	Pod length	Pod girth	No. of pods per plant	No. of nodes per plant	Internodal length	Plant height	No. of branches per plant	Yield per plant	
Kheda-11 x Pusa Sawani	0.69	0.74	-0.35**	-0.42	0.23**	2.10**	0.59	0.10	3.71	0.19	55.88**
Vadodara-4 x Pusa Sawani	-0.70	3.24	0.40**	0.67**	0.04	1.37**	1.60	-0.36**	6.95**	0.13	20.11**
Vadodara-4 x JO-5	1.44	2.11	0.10	0.01	0.14	0.40	-1.64	0.11	-5.55	0.66**	33.13**
Vadodara-7 x Chhodavadi	2.96	2.83	-0.16	-0.22	-0.04	1.61*	1.69	0.08	7.40	0.18	32.97**
Vadodara-1 x DL-1-87-5	1.05	-1.87	-0.33**	-0.16**	-0.05	0.17	0.15	-0.11	-0.35	0.10	45.72**
Bhavnagar-8 x DL-1-87-5	1.58	2.86	-0.95**	-0.38**	0.17**	0.77	1.16	0.17*	0.91	-0.03	38.58**
Bhavnagar-8 x JO-5	1.44	1.30	0.48**	0.08	0.13	-0.57	1.15	0.15*	-0.33	0.02	27.11**
Pusa Sawani x HRB-55	0.08	-0.45	0.03	0.52**	-0.01	1.69**	0.61	-0.06	-2.34	0.25	32.77**
HRB-55 x JO-5	-1.12	-0.92	-0.44**	-0.01	-0.04	0.52	1.29	-0.41**	5.50*	0.04	28.47**
S. E. (S_{ij}) $\pm$	1.92	1.96	0.09	0.07	0.82	0.64	1.01	0.07	2.03	0.18	9.56
S. E. ($S_{ij} - S_k$) $\pm$	2.82	2.88	0.13	0.10	0.12	0.93	1.48	0.10	3.39	0.26	14.06
S. E. ($S_{ij} - S_d$) $\pm$	2.69	2.74	0.12	0.09	0.12	0.89	1.41	0.09	3.23	0.25	13.40

*, ** Indicates significance at 5 and 1 per cent, respectively.

agreement with the results of Pratap *et al.* (1981) and Poshia and Shukla (1986) in okra. The top yielding cross combination Kheda-11 x Pusa Sawani showed significant sca positive effects for number of pods per plant, pod girth and yield per plant which resulted from the involvement of good x good and/or poor x average combining parents for these traits (Table 2). Vadodara-1 x DL-1-87-5 cross ranked second in sca effects for yield per plant and involved poor x good combining parents. Cross combination Bhavnagar-8 x DL-1-87-5 exhibiting third position in sca effect for yield per plant, involved poor x good combining

parents. This hybrid also recorded significant sca effect for pod girth. Therefore in the present study, sca effects indicated that crosses Kheda-11 x Pusa Sawani, Vadodara-1 x DL-1-87-5 and Bhavnagar-8 x DL-1-87-5 could be exploited for improvement of yield.

Under a situation where non-additive gene effects are predominant, yield could be improved through exploitation of hybrid vigour and when both additive and non-additive gene effects are important, a few cycles of recurrent selection could lead to identification of superior genotypes.

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