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Studies on Combining Ability in Sesame (*Sesamum indicum* L.)*

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A diallel set of six strains of sesame was studied for their combining ability. Importance of general and specific combining ability and reciprocal effects were observed for yield and yield components. Parents Mrug-1 and MT-67-52 which were the best general combiners, were also involved in best specific combinations. This indicated the usefulness of general combining ability for prediction of yield of hybrids. Specific combinations for earlyness and yield viz. Mrug-1 x MT-67-52 and Mrug-1 x I-17-2 were identified. Hybrids which were found good in specific combinations were also found so in reciprocal combinations.

In recent years, studies on combining ability aspects have been undertaken on various oilseeds crops. In sesame several workers (Murty and Hashim 1973, Murty 1976 and Shrivas and Singh 1978) have reported the results of their studies, however, such studies in respect of crosses involving kharif and semirabi types are not adequate. Therefore, an attempt was made to study the combining ability for yield and its components among some diversed and promising strains of Sesame.

MATERIAL AND METHODS

A diallel set (including reciprocals) amoung six promising strains of Sesame viz. Mrug-1 and MT-67-52 of kharif type and Purva-1, T-85-N, I-17-2 and Panchtobra of semi rabi season was taken up for the present study. In kharif 1977, 36 entries including 30 F_1S and 6 parents were planted in Randomised Block Design in three replications, at the main Oilseeds Research Station, Gujarat Agricultural University, Junagadh. Each plot consisted of three rows of two meter length, accommodating a total of 60 plants spaced 45 × 10 cms apart.

The observations were recorded on five plants selected at random from the middle row in respect of the characters viz. days to flower, height of plant, number of effective branches, number of capsules per plant, ratio of capsule length to breadth, days to maturity, yield per plant, weight of 1000 seeds and percentage of oil. The combining ability effects were calculated according to Method-1 and model-2 of Gritting (1956).

RESULTS AND DISCUSSIONS

The combining ability analysis revealed that general as well as specific

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combining ability effects were highly significant for all the characters (Table-1).

In reciproeal crosses the variance was not significant for 2 characters viz. for number of capsules per plant and capsule length to breadth ratio. However, it was highly significant for the rest of the characters. The ratio general combining ability/specific combining ability revealed that the variances due to general combining ability were higher for all the characters except oil percentage and number of effective branches suggesting thereby that the additive type of gene action might be governing the former traits. The nonadditive type gene action appears to have been involved for the latter two traits.

It may be seen from that in general, Mrug-1 and MT-67-52 were the best combiners for all the characters (Table-2). It might be mentioned here that one semi-rabi parent viz T-85-N was found to be a better combiner for oil percentage only.

Among the hybrids Mrug-1 × MT-67-52, Mrug-1 × I-17-2 and Purva-1 × T-85-N were found to be high yielding combinations and appeared useful in future breeding programme. Hybrids which were found good in specific combinations were also found to be good in receprooal combinations except Mrug-1 × MT-67-52 (Table-3).

These findings are generally in agreement with those reported by several workers eg. in sesame (Murty and Hashim 1973) in castor (Varisai Mahammad *et al.* 1965, Sindagi 1972); in Soybean (Singh *et al* 1974, Paschal *et al* 1975); in Sarson (Swami Rao 1972); in Groundnut (Sandhu 1975); in Sunflower (Schulze 1973); In Linseed (Murty and Anand 1973, Anand *et al* 1969, Badwal and Gupta 1970, Murty and Anand 1973, Rai and Das 1974)

Conclusions

The combining ability analysis indicated that in the material studied, general combining ability, specific combining ability and reciprocal effects were found to be significant for all the characters.

GCA/SCA ratio revealed that the variance due to general combining ability was high for all the characters except oil percentage and number of effective branches This suggested that additive gene action was more important for the different characters except oil percentage and number of effective branches, whereas non additive gene action was important for the latter two trails Most of the parents were found to be good general combiness for different characters, however, Mrug-1 and MT-67·52 were found to be the best combiners for all the characters.

Among specific combinations Mrug-1 × MT-67-52, Mrug-1 × I-17-2 and Purva-×1T-85-N were found to contribute positively in respect of yield. It was therefore concluded that they would be useful in future breeding programme. Among these hybrids Mrug-1×MT-67-52 and Mrug-1×I-17-2 were the hybrides which were early in maturity possessing high yield.

Reciprocal effects were observed for all the characters, however hybrids which were found good in specific combinations were also found to be good in reciprocal combinations except Mrug-1 × MT-67-52.

Highest reciprocal effect was observed for number of capsules per plant followed by plant height and seed yield.

This study was confined for evaluation of parents and their hybrids for g.c.a. and s.c.a. in Kharif season through it included parents of both the seasons.

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TABLE 1. Analysis of combining ability variance for different characters studied in 6×6 diallel (with reciprocal) of Sesame (*Sesamum indicum* L)

Source	DF	Days to flowering.	Height of plant in cm.	No of effective branches	No. of capsules per plant	Capsule length to breadth ratio in cm.	Days to maturity	Yield of seeds per plant	1000 seed weight in gms.	Oil percent
General combing ability GCA	5	316.47**	1264.66**	0.22**	485.53**	0.36**	413.90**	8.08**	1.80**	3.29**
Specific combining ability SCA	15	8 32**	400,43**	1,19**	52,85**	0,24**	30,45**	0,65**	0.09**	5,72**
Reciprocal	15	0 61**	47,50**	0,49**	47.95*	0 22*	3.74**	0.49**	0.11**	3,46**
Error (M'e)	70	0,093	9,173	0.051	14.466	0,009	0,04	0.086	0.001	0.163
GCA / SCA		38,03	3,15	0.19	9.18	1.49	13,59	12,43	20,000	0.57

* Denotes significant at 0,05 probability level

** Denotes significant at 0.01 probability level

TABLE-2 Estimate of general combining ability effects of the parents for different characters in a 6×6 diallel gross in Sesame (*Sesamum indicum* L.)

Parents	Days to flowering	Height of plant in cm.	No of effective branches	No. of capsules per plant	Capsule length to breadth ratio in cm.	Days to maturity	Yield of seeds per plant in gm.	1000 seed weight in gm.	Oil percent
Mrug-1	-7.30**	-14.12**	+0 21**	+7.33**	+0.15**	-7 63**	+1.25**	-0 53**	+2 92**
MT-67-52	-8.36**	-12.06**	+0.01**	+9.01**	+0.27**	-7.46**	+0 82**	+0.44**	+0.11**
Purva-1	+4 12**	+4.50**	-0.04**	-4 26**	-0 10**	+3 52**	-0.67**	-0.13**	-1.14**
T-85-N	+3.54**	+5.46**	-0.01**	-4.59**	-0.04**	+3.37**	-0.45**	-0.17**	+0.69**
T-17-2	+4.02**	+9.22**	-0 21**	-3 41**	-0.13**	+3 95**	-0.45**	-0.41**	-1.08**
Panchtobra	+3.99**	+7.00**	+0.05**	-4.08**	-0.15**	+4 30**	-0.50**	-0.26**	-1.50**

** Denotes significant at 0.01 probability level

TABLE : 3 Estimate of specific combining ability effect of grosses for different characters in 6×6 diallel cross in Sesame (*Seamum indicum* L.)

Crosses	Days to flowering	Height of plant in cm.	No. of effective branches	No. of capsules per plant	Capsule length to breadth ratio in cm.	Days to maturity	Yield of seed weight in gm	1000 seed weight in gm	Oil Percent
Mrug - 1 × MT - 67--52	-1.42**	-18.17**	-0.93**	-2.65	-0.15**	-6.91**	×1.64**	-0.27**	-0.62**
Mrug - 1 × Purva - 1	+0.28	+6.18**	+1.14**	+0.45	-0.03	+3.38**	-0.63**	+0.13**	-0.57
Mrug - 1 × T - 85 - N	+0.11	+8.79**	+0.70**	+3.65*	+0.20**	+3.86**	-0.04	+0.21**	+0.41
Mrug - 1 × I - 17 - 2	+1.07**	+14.71**	+0.30**	+4.80**	-0.02	+4.25**	+0.47**	+0.15**	+1.14
Mrug - 1 × Panchrobra	+0.07	+10.07**	+0.37**	+1.44	-0.02	+3.35**	-0.23	+0.06**	-0.48
MT - 67 - 52 × Purva - 1	+0.50	+17.07**	+0.75**	+8.24**	+0.13**	+3.22**	-0.45*	-0.19**	-0.60
MT - 67 - 52 × T - 85 - N	+2.51**	+15.75**	+0.59**	+4.86**	+0.08	+3.71**	-0.04	+0.19**	-2.04**
MT - 67 - 52 × I - 17 - 2	+2.03**	+12.85**	+0.48**	+3.36*	+0.08	+3.56**	-0.51**	+0.25**	-1.54*
MT - 67 - 52 × Panchtobra	+0.72**	+ 9.95**	+0.71**	+4.62**	+0.15**	+3.05**	-0.17	+0.34**	+0.95
Purva-1 × T - 85 - N	+0.24	-14.78**	-0.78**	-2.61	+0.02	-1.94**	+0.75**	+0.02	+0.36
Purva - 1 × I - 17 - 2	-0.94**	- 7.78**	-0.57**	-2.24	+0.08	-1.86**	+0.06	-0.13**	+2.78**
Purva - 1 × Panchtobra	-0.59**	- 0.86	-0.27*	-2.14	-0.04	-1.32**	+0.25	-0.04	+1.18
T - 85 - N × I - 17 - 2	-0.63**	- 1.41	+0.32*	-2.08	-0.06	-2.14**	-0.01	-0.21**	+1.80*
T - 85 - N × Panchtobra	-0.01	-17.28**	-0.63**	-2.25	-0.06	-1.68**	-0.09	+0.15**	+0.58
I - 17 - 2 × Panchtobra	-0.65**	- 7.25**	+0.07	+0.71	+0.06	-1.63**	+0.23	-0.14**	-0.89

* Denotes significant at 0.05 probability level

** Denotes significant at 0.01 probability level