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Performance of sesame hybrids in multilocation trial

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Abstract : Eight sesame *(Sesamum indicum* L.) hybrids and three check varieties were studied at five locations of sesame growing areas of Tamilnadu. Five characters namely plant height, number of branches per plant, number of capsules per plant, seed yield (kg ha^{-1}) and oil content (per cent) were observed. All the hybrids recorded significant standard heterosis for seed yield confirming the superiority of hybrid at all locations. Among the hybrids SI 861 X BS 6-1-1, SI 2257 X SO 573 and IS 200 X IS 305 are recommended for commercial cultivation. *(Keywords: Sesame hybrids, multilocation trial).*

Sesame *(Sesamum indicum* L.) is an ancient oilseed crop grown in India. The productivity of sesame is very low. The crop has been grown mostly under rainfed with marginally fertile lands. Many breeders in India are working on sesame to increase the productivity. Varietal improvement of sesame during the past had been oriented towards developing pure line varieties through conventional breeding. In recent years developing hybrid varieties through heterosis breeding is being attempted. The genotype x environment interaction plays an important role in the performance of genotypes. Hence, a multilocation evaluation of eight high yielding hybrids along with local cultivars was done to assess the superiority of hybrids.

Materials and Methods

The experiment was conducted at Faculty of Agriculture, Annamalai University, Annamalainagar during June-July, 1997. Eight high yielding hybrids (SI 861 x SI 2257, SI 861 x BS 6-1-1, SI 861 x IS 207, SI 2257 x S 0573, SI 2257 x IS 305, S 0573 x IS 207, S 0573 x IS 534 and IS 200 x IS 305) were chosen

Table 1. Analysis of variance for genotypes in individual environment for various characters

Source	df	Mean squares				
		E1	E2	E3	E4	E5
Plant height (cm)						
Genotypes	10	65.56	295.73**	174.05*	245.02**	485.93**
Error	10	28.25	18.97	57.56	20.23	17.73
Number of branches per plant						
Genotypes	10	1.53*	3.11**	6.00**	2.50**	3.44**
Error	10	0.40	0.23	0.36	0.27	0.09
Number of capsules per plant						
Genotypes	10	348.08**	1124.43**	1712.03**	1883. 10**	955.42**
Error	10	24.15	45.71	38.56	39.01	48.95
Seed yield (kg ha^{-1})						
Genotypes	10	57735.88**	38416.05**	66005.58**	15339.73**	41183.90**
Error	10	2538.93	405.40	2821.78	1383.40	268.60
Oil content (%)						
Genotypes	10	2.99*	3.30**	21.89**	7.62**	15.38**
Error	10	0.33	0.36	0.90	0.74	0.61

*, ** Significant at 5 and 1 per cent level respectively

Table 2. Analysis of variance over environments for various characters

Source	Df	Mean squares				
		Plant height (cm)	Number of branches/ plant	Number of capsules /plant	Seed yield (kg/ha)	Oil content (%)
Environments	4	9692.84**	30.45**	16160.45**	94680.50**	205.58**
Genotypes	10	671.06**	12.61 **	3441.1 1**	77585.00**	22.84**
Genotype x Environments	40	148.55**	0.99**	645.49**	35273.90**	7.08**
Pooled Error	50	28.55	0.27	39.27	1483.62	0.59

*, ** Significant at 5 and 1 per cent level respectively

from the previous study and three check varieties namely TMV 3, TMV 4 and Co 1 were evaluated in five sesame growing areas. The locations are namely Nallampalli (El), Palacode (E2) and Pauparappatti (E3) of Dharmapuri district and Annamalainagar (E4) and Virudhachalam (E5) of Cuddalore district of Tamilnadu. The trial was conducted in randomized block design replicated twice in a plot size of 12 sq.m. with spacing of 45 x 20 sq.cm. The recommended cultural practices were followed. Observations were recorded on five plants per replication per entry for plant height, number of branches per plant and number of capsules per plant. The seed

yield (kg ha^{-1}) and oil content (per cent) were estimated for each replication from the plot yield. The data were subjected to location wise analysis of variance and pooled analysis as suggested by Panse and Sukatme (1976).

Results and Discussion

Among the five locations used for the study, locations El and E3 were in rainfed areas and locations E2, E4 and E5 were irrigated areas. The soil types were heavy clay at Annamalainagar, clay loam at Nallampalli and Pauparappatti, clay soil at Palacode and red soil at Virudhachalam. Four of the trials were conducted in farmers' holdings and one trial at Plant Breeding Farm, Annamalai University, Annamalainagar. Hence, location chosen for multilocation trial has fairly represented the sesame growing zones and appropriate. The varieties TMV 3 and TMV 4 which are cultivars of this area and the variety Co 1 a cosmopolitan high yielding variety were included in the trial as checks. All these three checks were used for comparative study with hybrids. The variety Co 1 was treated as standard variety for the purpose of estimating standard heterosis.

Vasal (1993) emphasised that the evaluation of hybrids over environment helps in understanding the role of genotype x environment interaction in the expression of heterosis and identification of stable hybrids. Ouijada and Layrisse (1995) studied Fl hybrids in five environments at Venezuela and found significant G X E interaction for yield and yield components. He suggested that hybrids should be produced for specific locations. In the present study, the analysis of variance of multilocation trials showed significant differences for seed yield and other yield components among the hybrids, in individual as well as pooled

Table 3. Performance of sesame hybrids and varieties in multilocation trial

Hybrids/ Varieties	Plant height (cm)	Number of branches plant	Number of capsules/	Seed yield (kg ha^{-1})	Oil content (%)
Mean performance.					
S1 861 x SI 2257	113.2	5.3	103.4	907	47.7
SI 861 x BS 6-1-1	94.7	5.3	78.4	921	44.21
SI 861 x IS 207	108.9	5.9	98.5	799	48.5
SI 2257 x S 0573	111.7	5.6	106.3	852	47.1
SI 2257 x IS 305	111.9	6.4	117.6	751	46.7
S 0573 x IS 207	108.7	6.4	110.9	821	48.5
S 0573 x IS 534	97.3	6.7	96.3	722	49.0
IS 200 x IS 305	94.1	7.4	109.3	909	48.6
TMV 3	101.7	4.1	69.7	524	47.2
Co 1	94.6	4.3	70.7	515	48.9
TMV 4	93,4	3.9	67.1	501	49.6
Grand Mean	102.7	5.6	93.4	747	47.8
S.Ed.	5.3	0.5	6.3	71	0.8
C.D.(P=05)	10.5	1.0	12.3	140	1.5
Standard heterosis (%)					
S1 861 x SI 2257	19.7*	23.3 *	46.3**	76.1**	-2.4
SI 861 x BS 6-1-1	0.1	23.3 *	10.9	78.8**	-9.6*
SI 861 x IS 207	15.1**	37.2**	39.3**	55.1**	-0.8
SI 2257 x S 0573	18.1**	30.2**	50.4**	65.4**	-3.6**
SI 2257 x IS 305	18.3**	48.8**	66.3**	45.8**	-4.5**
S 0573 x IS 207	14.9**	48.8**	56.9**	59.4**	-0.8
S 0573 x IS 534	2.9	55.8**	36.2**	40.2**	0.3
IS 200 x IS 305	-0.5	72.1**	54.6**	76.5**	-0.5

*,** Significant at 5 and 1 per cent respectively.

environments except for plant height at E1 (Table 1). Superior performance of hybrids at environment E2 was observed for all the characters followed by E5 compared to other environments. The hybrids SI 861 x BS 6-1-1, IS 200 x IS 305 and SI 861 x SI 2257 recorded significantly superior seed yield (921 kg ha^{-1}, 909 kg ha^{-1} and 907 kg ha^{-1} respectively) in the pooled analysis than the general mean (747 kg ha^{-1}) (Table 3). The hybrid SI 2257 x SO 573 (852 kg ha^{-1}) closely followed these hybrids for seed yield. Hybrids SI 2257 x SO 573 and IS 200 x IS 305 combined significantly superior number of capsules per plant than the general mean over locations. The hybrid IS 200 x IS 305 combined superior number of branches per plant than general mean over locations and also at four locations. Considering the location wise performance, the hybrid IS 200 x IS 305 recorded significant superior seed yield at three locations and SI 861 x BS 6-1-1 and SI 2257 x SO 573 recorded superior seed yield at two locations. The hybrids SI 2257 x SO 573 and IS 200 x IS 305 recorded superior number of capsules per plant at three locations.

All the hybrids recorded significant standard heterosis for seed yield confirming their superiority as hybrid variety at all locations individually and pooled over all locations. Among the hybrids, SI 861 x BS 6-1-1 (78.8 %), IS 200 x IS 305 (76.5 %), SI 861 x SI 2257 (76.1%) and SI 2257 x SO 573 (65.4 %) registered maximum standard heterosis (pooled over all locations) for seed yield (Table 3). Observing the performance at individual location, hybrids SI 2257 x SO 573 and IS 200 and IS 305 combined significant standard heterosis for number of capsules per plant at all locations individually and also pooled over all locations. Hybrids SI 861 x BS 6-1-1, SI 2257 x SO 573 and IS 200 x IS 305 recorded significant standard heterosis for number of branches per plant individually at four locations and pooled over all locations. With regard to plant height and oil content, it was observed that all the hybrids failed to show such contrasting improvement over the local cultivar. Hence to conclude, the hybrids SI 861 x BS 6-1-1, SI 2257 x SO 573 and IS 200 x IS 305 may be recommended for commercial cultivation because of its high yielding in all the locations.

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Residual effects of inorganic and organic manuring on certain soil properties and yields of rice crop

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Abstract : In a Permanent Manurial Experiment (PME) conducted since 1975, pH has decreased from neutral to slightly acidic in the manured treatments. The organic carbon and cation exchange capacity have increased significantly in the manured treatments and in the treatments that received N with or without P and K. Grain, straw and total dry matter yield of rice crop in NPK, NP, NK and N treatments were on par and higher than the yields in the treatments without N. *(Key words: PME, Rice, Soil properties, Yield).*