Madras Agric. J., 97 (4-6): 114-116, June 2010
https://doi.org/10.29321/MAJ.10.100360

Short Note

Genetic Characteristics of Branching and Some Yield Components in F_2 Populations of Sesame

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An experiment was conducted with F_2 populations of eleven crosses to test the variation of individual F_2 s and to study the genetic characteristics of the trait branching, seed yield and other yield attributing traits. The magnitude of variability was much higher in all the eleven crosses for number of primary branches, number of capsules per plant and seed yield per plant. It was noticed that all the crosses showed desirable frequency of positive transgressive segregants (FPTS) for all the traits. All the crosses skewed positively for number of primary branches, number of capsules and seed yield per plant. The dispersion of F_2 population is of leptokurtic in nature for seed yield per plant in all the crosses except TMV 5 x KS 990812 which showed platykurtic distribution. The trait, number of branches showed platykurtic distribution in six crosses indicating wider variability in that population. The cross TMV 5 x KS990812 displayed favorable number of branches with high variability for seed yield and the cross TMV 4 x KS990813 displayed high mean and variability for seed yield and number of capsules per plant. Hence these two crosses could be considered as the most promising to obtain desirable segregants and the selected progenies from this population could be utilized for further study in the next generation.

Key words: Sesame, F_2 population, skewness, kurtosis and variability

Sesame (*Sesamum indicum* L.) commonly known as til, is one of the important edible oilseeds cultivated in India. Sesame is usually rich in oil (50%) and protein (18-20%). Its oil content generally varies from 46 to 52 per cent. Sesame oil is used as a cooking-oil in southern India. Identification of monostem / shy branching genotypes of sesame are important for high-density population. Plant breeders are commonly faced with problems of handling large segregating populations while applying selection procedures. Mean and variability are the important factors for selection. Mean performance serves as basis for eliminating undesirable crosses and variability helps to choose a potential cross since variability indicates the extent of recombination for initiating effective selection procedures. The F_2 is the critical generation in plant breeding and it determines eventual success or failure of the hybridization programme (Jennings *et al.*, 1979). Early generation testing and selection have gained momentum in autogamous crops, as additive genetic variance is more important. With this view, a study was conducted with the F_2 population of eleven crosses to analyze the transgressive segregants for branching and some yield attributes.

Materials and Methods

Five branched sesame cultivars *viz*., CO 1, Paiyur 1, TMV 3, TMV 4 and TMV 5 were crossed with six uniculm (un branched) germplasm lines *viz*, MT 34, Cordebergea, KS 990812, KS 99037, KS 990813 and KS 99153 in a line x tester mating design. The resulting 30 hybrids along with their parents were evaluated to study the general and specific combining ability of the parents and hybrids. Based on the mean performance and general combining ability effects for number of branches, number of capsules per plant and seed yield per plant a total of eleven crosses was selected and they were advanced to second generation. The F_2 population of eleven crosses were raised in 12 rows of 7 m length with a spacing of 30 x 30 cm. Observations were recorded for 300-350 plants in each cross for the traits *viz*., plant height, number of primary branches, number of capsules per plant, number of seeds per capsule and seed yield per plant. The range of coefficient of variation was categorized as per Sivasubramanian and Madhava Menon (1973). The segregation pattern of the crosses was analysed in terms of frequency of positive transgressive segregants (FPTS). Skewness and kurtosis were calculated using the frequency distribution (Kapur, 1981) of the above characters mentioned.

Results and Discussion

A wide range of variation was recorded for all the five characters in all the eleven crosses. Babu *et al*. (2004) observed wide range of variation for plant height, number of capsules per plant, number of seeds per capsule, 100-seed weight and seed yield

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per plant. The coefficients of variation were high for plant height and seed yield per plant (Table1). It was noticed that all the crosses showed desirable frequency of positive transgressive segregants (FPTS) for all the traits.

The magnitude of variability was much higher in all the crosses for number of primary branches, number of capsules and seed yield per plant. High variability was reported by Anitha Vasline *et al*. (2000) and Ashoka Vardhana Reddy *et al*. (2001) for plant height; Solanki and Deepak Gupta (2003) for number of primary branches; Senthil Kumar *et al*. (2002) for seed yield per plant. Moderate to high variability was observed for plant height and number of seeds per capsule. This result was in corroboration with the findings of Ashoka Vardhana Reddy *et al*. (2001) for number of seeds per capsule.

All the crosses skewed positively for number of primary branches, number of capsules and seed yield per plant, indicating that the larger number of plants with low mean values for the respective characters. It is more desirable for the trait number of branches i.e., monoculm/shy branching. The positive skewness of the population for branches is highly useful for the selection of uniculm or mono / shy branching types. Besides, the trait skewed positively, showed additive gene action and that can be improved by additive gene action. Transgressive

Table 1. Mean, variability and frequency of positive transgressive segregates (PTS) for branching, seed yield and its attributes

Cross	Mean (cm)	F_2 range (cm)	CV%	Skewness	Kurtosis	Frequency of PTS (%)
Plant height						
TMV 4 x KS99037	90.13	54 –125	15.31	-0.30	-0.16	40.25
TMV 4 x KS990812	85.35	44 – 136	18.94	-0.10	0.13	28.10
TMV 4 x KS990813	96.21	58 – 146	16.25	0.16	0.45	56.18
TMV 4 x KS99153	97.52	62 – 175	17.13	0.69	3.04	58.26
TMV 5 x KS99037	86.45	40 – 138	22.60	0.11	-0.30	16.46
TMV 5 x KS990812	89.51	37 – 141	21.08	0.021	-0.35	20.14
TMV 5 x KS990813	87.25	30 – 136	24.28	-0.30	0.16	19.35
TMV 5 x KS99153	82.78	38 – 133	22.77	-0.23	-0.39	6.54
Paiur1x Cordebergea	72.67	30 – 121	24.51	0.10	-0.49	3.08
TMV4x Cordebergea	80.84	37 – 125	21.49	-0.31	-0.11	19.69
TMV5x Cordebergea	72.82	30 – 148	27.59	0.68	1.29	5.10
Number of branches						
TMV 4 x KS99037	3.99	0.05 – 10.05	46.81	0.53	0.05	28.81
TMV 4 x KS990812	3.56	0.05 – 10.05	51.48	0.75	0.77	10.46
TMV 4 x KS990813	4.27	0.05 – 12.05	49.91	0.78	1.29	25.84
TMV 4 x KS99153	4.95	1.05 – 12.05	37.15	0.85	1.95	5.22
TMV 5 x KS99037	3.88	0.05 – 8.05	45.62	0.74	0.19	26.58
TMV 5 x KS990812	3.97	0.05 – 9.05	46.10	0.25	-0.31	24.46
TMV 5 x KS990813	3.44	0.05 – 9.05	52.62	0.45	0.11	36.77
TMV 5 x KS99153	4.12	0.05 – 10.05	45.27	0.39	-0.05	25.23
Paiur1x Cordebergea	2.88	0.05 – 9.05	56.27	0.84	1.21	47.58
TMV4x Cordebergea	3.62	0.05 – 10.05	48.54	0.87	1.37	33.07
TMV5x Cordebergea	3.31	0.05 – 10.05	47.66	1.05	2.41	38.78
Capsules per plant						
TMV 4 x KS99037	48.86	5 – 162	59.12	1.60	3.26	19.49
TMV 4 x KS990812	58.43	14 – 298	59.18	2.70	14.5	30.06
TMV 4 x KS990813	68.43	10 – 215	48.42	0.88	1.26	47.19
TMV 4 x KS99153	62.21	20 – 185	21.67	1.22	1.96	43.48
TMV 5 x KS99037	60.66	14 – 187	52.26	1.19	2.06	25.95
TMV 5 x KS990812	66.74	18 – 180	48.61	0.79	0.27	36.69
TMV 5 x KS990813	64.70	16 – 132	48.47	0.48	-0.95	34.19
TMV 5 x KS99153	68.40	6 – 154	48.03	0.56	-0.49	32.71
Paiur1 x Cordebergea	39.78	5 – 150	61.79	1.35	2.39	7.05
TMV4 x Cordebergea	69.87	15 – 152	46.33	0.55	-0.48	48..05
TMV5 x Cordebergea	60.70	20 – 148	53.74	1.11	0.31	26.53
No of seeds per plant						
TMV 4 x KS99037	50.91	25.33 – 73.33	18.96	-0.28	-0.16	25.85
TMV 4 x KS990812	52.72	25.33 – 69.00	15.59	-0.74	0.47	47.71
TMV 4 x KS990813	49.59	25.00 – 72.70	18.43	-0.37	-0.15	46.63
TMV 4 x KS99153	45.07	26.67 – 65.33	17.22	-0.19	-0.02	15.65
TMV 5 x KS99037	48.82	26.30 – 65.30	14.98	-0.19	0.63	11.39
TMV 5 x KS990812	48.15	25.00 – 71.30	16.33	-0.24	0.74	16.55
TMV 5 x KS990813	46.09	21.33 – 65.33	21.78	-0.67	-0.08	34.19
TMV 5 x KS99153	43.33	21.67 – 61.30	21.09	-0.66	0.04	18.69

Paiur1x Cordebergea	46.68	22.33 – 74.30	20.69	0.12	0.13	33.92
TMV4x Cordebergea	42.87	24.33 – 64.70	18.89	-0.32	0.03	14.17
TMV5x Cordebergea	45.88	22.00 – 71.33	21.63	-0.06	-0.01	31.63
Seed yield per plant						
TMV 4 x KS99037	4.52	0.25 – 18.34	68.35	1.63	3.83	8.47
TMV 4 x KS990812	5.75	0.34 – 28.25	75.63	2.09	7.00	23.53
TMV 4 x KS990813	7.28	0.48 – 25.43	61.90	1.20	1.95	38.20
TMV 4 x KS99153	5.99	0.79 – 21.50	70.30	1.40	2.44	24.35
TMV 5 x KS99037	5.16	0.52 – 22.81	63.37	1.32	4.31	12.66
TMV 5 x KS990812	6.31	0.53 – 18.67	66.39	0.88	0.07	27.34
TMV 5 x KS990813	6.23	0.55 – 23.57	66.45	1.07	1.52	27.10
TMV 5 x KS99153	6.76	0.38 – 26.21	75.93	1.51	2.32	23.36
Paiur1x Cordebergea	3.43	0.23 – 16.62	73.97	1.68	3.99	4.41
TMV4x Cordebergea	6.67	0.15 – 27.81	72.86	1.40	2.76	33.07
TMV5x Cordebergea	5.62	0.34 – 25.49	86.78	1.75	3.85	22.44

segregation for this trait was also high in the favourable direction. The trait number of seeds per capsule skewed negatively for all the crosses except Paiyur1 x Cordebergea. It revealed more number of plants with high mean number of seeds per capsule in these crosses. Negative skewness for the crosses *viz*., TMV 4 x KS 99037, TMV 4 x KS 990812, TMV 5 x KS 990813, TMV 5 x KS99153 and TMV 4 x Cordebergea showed more number of plants with high mean of plant height, while positive skewness in the remaining crosses exhibited larger number of plants with low mean height.

The platykurtic and leptokurtic nature indicates the wider and narrow variability of the population respectively. The platykurtic nature of the population will help in the selection programme due to wider variability in that population. Hence progress or improvement can be expected if selection pressure is applied in the crosses for the respective characters.

The dispersion of F_2 population is of platykurtic in nature for number of seeds per capsule, in all the crosses, while it was leptokurtic for seed yield per plant in all the crosses except TMV 5 x KS 990812 which showed platykurtic distribution. The trait, number of branches showed leptokurtic distribution in five crosses *viz.,* TMV 4 x KS 990813, TMV 4 x KS 99153, Paiyur1 x Cordebergea, TMV 4 x Cordebergea and TMV 5 x Cordebergea and platykurtic distribution in six crosses *viz.,* TMV 4 x KS 99037, TMV 4 x KS 990812, TMV 5 x KS 99037, TMV 5 x KS 990812, TMV 5 x KS 990813 and TMV 5 x KS 99153. The dispersion of F_2 population for plant height and number of capsules per plant is either way *viz.,* leptokurtic or platykurtic in nature for different crosses.

The frequency distribution of primary branches in F_2 of TMV 4 x KS 99153 and Paiyur1 x Cordeberegea formed a unimodal curve with transgression towards the less number of branches. All the other crosses displayed bimodal curve where one of the peak is much smaller than the other indicating pre dominance of one major gene. The frequency distribution of seed yield per plant in F_2 of most of the crosses showed unimodal curve with transgression towards low seed yield.

Based on the present investigation, none of the families could be considered as promising for all the characters. The cross TMV 5 x KS990812 displayed favorable number of branches with high variability for seed yield and the cross TMV 4 x KS990813 displayed high mean and variability for seed yield and number of capsules per plant. Hence these two crosses could be considered as the most promising to obtain desirable segregants and the selected progenies from this population could be utilized for further study in the next generation.

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Received: February 17, 2010; Accepted: June 15, 2010