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Research Note

Genetic variability in sesame (*Sesamum indicum* L.)

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Abstract:
Genetic parameters of variability and heritability of different characters were studied in four crosses of sesame. In the present study, variability parameters were observed in two crosses viz., Paiyur 1 x SVPR 1, F_2 of TMV 4 x SVPR 1 and their BC1F1s. High genotypic coefficient of variability and phenotypic coefficient of variability were observed for number of branches per plant, number of capsules per plant and seed yield per plant. High heritability along with high genetic advance as per cent of mean for number of branches per plant, number of capsules per plant and seed yield per plant will be useful for further breeding programme. Based on *per se* performance, heritability, genetic advance as per cent of mean, F_2 and BC_1F_1 of TMV 4 x SVPR 1 were considered as superior crosses. This cross can be subjected to selection programme to obtain high yielding segregants.

Key words: Sesame, variability, heritability, genetic advance, selection.

Sesame (*Sesamum indicum* L.) is one of the world's oldest oilseed crop and is under cultivation in Asia for over 5000 years. In, India, the antiquity of sesame is known from the use of its seed in religious ceremonies. About 36 species, (Kobayashi, 1981) are said to be in existence and *Sesamum indicum* is commonly cultivated species. Sesame seed is highly nutritive (oil 50%, protein 25%) and its oil contains an anti-oxidant called sesamol which imparts to it a high degree of resistance against oxidative rancidity (Ashri, 1989). India holds a premier position in the global oilseeds scenario accounting for 29 per cent of the total area and 26 per cent of production. Globally, China and India are the major sesame producers. Rajasthan, Gujarat, Madhya Pradesh, Andhra Pradesh, West Bengal and Tamil Nadu put together constitutes nearly 72 per cent of total area and 58 per cent of total production of sesame in the country. Sesame is a plant breeder's dream because it has high variability. The presence of variability in crop is important for genetic studies and consequently used for improvement and selection. It is essential to partition the overall variability into heritable and non-heritable components with the help of genotypic coefficient of variation, heritability and genetic advance. In the present study, variability parameters were observed in two crosses and their BC1F1s were studied for the yield improvement programme.

The material for present investigation comprised three parents., Paiyur 1, SVPR 1 and TMV 4 which involved four cross combinations namely F_2 of Paiyur 1 x SVPR 1, F_2 of TMV 4 x SVPR 1, BC_1F_1 of (Paiyur 1 x SVPR 1) x Paiyur 1 and BC_1F_1 of (TMV 4 x SVPR 1) x TMV 4. The experiment was conducted at Department of Oilseeds, TNAU, Coimbatore. For each F_2 and BC_1F_1 progenies comprising 200 individuals were raised with spacing of 30 x 30 cm. The observation was recorded on plant height, number of branches per plant, number of capsules per plant and seed yield per plant. Phenotypic and genotypic components of traits were worked out based on formula given by Goulden (1952). Heritability in broad sense was worked out as per Allard (1960) and genetic advance as per cent of mean according to Johnson *et al*. (1955).

Parent TMV 4 recorded high mean performance for the traits plant height, number of capsules per plant and seed yield per plant. Paiyur 1 recorded high mean for number of branches per plant. Among the crosses, BC_1F_1 of TMV 4 x SVPR 1 recorded significantly superior in seed yield per plant and number of capsules per plant followed F_2 of TMV 4 x SVPR 1 and BC_1F_1 of Paiyur 1 x SVPR 1. In case of number of branches per plant, F_2 of Paiyur 1 x SVPR 1 followed by BC_1F_1 of Paiyur 1 x SVPR 1 had more number of branches per plant. With regard to plant height, F_2 of both crosses had dwarf plant height and BC_1F_1 crosses had more plant height.

Phenotypic coefficient of variation was higher than the values of genotypic coefficient of variation for all the characters. Among the crosses, high PCV was

observed in F_2 of TMV 4 x SVPR 1. With regard to GCV, all crosses recorded moderate level except BC_1F_1 of TMV 4 x SVPR 1 for plant height. High level of variability was observed in all the crosses for both PCV and GCV in number of branches per plant, number of capsules per plant and seed yield per plant. This result were in confirmation with Parameshwarappa *et al.* (2009); Sumathi and Muralidharan (2009); Chowdhury *et al.* (2010) and Sumathi and Muralidharan (2010) in sesame.

High heritability and high genetic advance as per cent of mean was recorded in three crosses except for BC_1F_1 of TMV 4 x SVPR 1 in plant height, F_2 and BC_1F_1 of (Paiyur 1 x SVPR 1) for number of branches per plant. High heritability and high genetic advance as per cent of mean was observed in all crosses for number of capsules per plant. All crosses except F_2 of TMV 4 x SVPR 1 exhibited high heritability and high genetic advance as per cent of mean for seed yield per plant. Similar findings were reported by Parameshwarappa *et al.* (2009); Toprope *et al.* (2009); Chowdhury *et al.* (2010). The result indicates the lesser influence of environment in expression of characters and prevalence of additive gene action in their inheritance, hence it is amenable for simple selection for crop improvement. The F_2 of TMV 4 x SVPR 1 recorded moderate heritability with high genetic advance as per cent of mean for number of branches per plant and seed yield per plant. This result was in conformity with the findings of Sarwar and Haq (2005) indicating that these characters controlled by non-additive gene action.

Considering the forgoing discussion, based on *per se* performance, heritability, genetic advance as per cent of mean, F_2 and BC_1F_1 of TMV 4 x SVPR 1 were considered as superior crosses. This crosses can be subjected to selection programme to obtain high yielding segregants.

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Table 1. Variability parameters in crosses and parents

Parameter/	Paiyur 1 x SVPR 1	(Paiyur 1 x SVPR 1) x Paiyur 1	TMV 4 x SVPR 1	(TMV 4 x SVPR 1) x TMV 4	Paiyur 1	SVPR 1	TMV 4
Generation	F_2	BC_1F_1	F_2	BC_1F_1	Parent	Parent	Parent
Plant height (cm)							
Mean	127.92 a	139.28 c	130.04 ab	136.17 c	89.33 x	101.81 y	129.64 z
PCV (%)	15.37	17.01	21.37	12.72	-	-	-
GCV (%)	12.08	14.58	18	6.37	-	-	-
h^2 (%)	61.6	73.41	70.92	25.1	-	-	-
GA	24.98	35.84	40.61	8.95	-	-	-
GA (%)	19.53	25.73	31.23	6.57	-	-	-
Number of branches per plant							
Mean	8.25 a	7.95 b	6.35 c	5.4 d	6.67 x	4.81 z	5.36 y
PCV (%)	27.02	27.27	24.85	24.85	-	-	-
GCV (%)	24.47	24.54	16.52	11.71	-	-	-
h^2 (%)	82	80.96	44.17	22.78	-	-	-
GA	3.76	3.62	1.44	0.63	-	-	-
GA (%)	45.57	45.53	22.61	11.67	-	-	-
Number of capsules per plant							
Mean	154.49 b	166.45 ab	154.62 b	179.48 a	86.5 y	69.19 z	132.5 x
PCV (%)	55.22	50.88	61.57	47.89	-	-	-
GCV (%)	53.43	49.21	58.26	44.7	-	-	-
h^2 (%)	93.63	93.54	89.51	87.13	-	-	-
GA	164.55	163.2	175.56	154.27	-	-	-
GA (%)	106.51	98.05	113.54	85.95	-	-	-
Seed yield per plant (g)							
Mean	15.71 d	19.07 bc	20.83 b	25.38 a	13.27 y	10.9 y	21.84 x
PCV (%)	63.53	70.78	46.63	63.49	-	-	-
GCV (%)	57.4	67.13	29.19	56.08	-	-	-
h^2 (%)	81.62	89.95	39.31	78.01	-	-	-
GA	16.78	25.01	7.88	25.89	-	-	-
GA (%)	106.81	131.15	37.83	102.01	-	-	-

Note: Similar letter indicates significantly on par at 5 per cent level.