The Pharma Innovation Journal 2022; 11(11): 1799-1801

www.ThePharmaJournal.com

The Pharma Innovation

ISSN (E): 2277-7695
ISSN (P): 2349-8242
NAAS Rating: 5.23
TPI 2022; 11(11): 1799-1801

www.thepharmajournal.com
Received: 25-09-2022
Accepted: 29-10-2022

Dibyabharati Sahu
Department of Plant Breeding and Genetics, OUAT, Bhubaneswar, Odisha, India

Tapash Kumar Mishra
Department of Plant Breeding and Genetics, OUAT, Bhubaneswar, Odisha, India

Banshidhar Pradhan
Department of Plant Breeding and Genetics, OUAT, Bhubaneswar, Odisha, India

Corresponding Author:
Dibyabharati Sahu
Department of Plant Breeding and Genetics, OUAT, Bhubaneswar, Odisha, India

Genetic variability, heritability and genetic advance in different genotypes of sesame (*Sesamum indicum* L.)

Dibyabharati Sahu, Tapash Kumar Mishra and Banshidhar Pradhan

Abstract
Nineteen genotypes of sesame were subjected to *per se* performance analysis and variability study for eight morphological traits. All the traits were highly variable except capsule length and 1000-seed weight. The highest difference between phenotypic coefficient of variation and genotypic coefficient of variation was observed in seed yield per plant, no. of capsules per pant and number of seeds per capsule indicating the traits are highly influenced by environment. High to moderate heritability with high genetic advance was observed for plant height, number of branches per plant and capsule length, number of capsules per plant, seeds per capsule and seed yield per plant. So simple selection is highly effective for improvement of these traits as they are controlled by additive gene action.

Keywords: Genetic variability, heritability, genotypes of sesame, morphological traits

Introduction
Sesame is known as queen of oilseed crop, grown throughout the tropical and sub-tropical regions of world and accounts for around 2.7% of global production (Thapa *et al*., 2019) [4]. In terms of production Sesame occupies the fifth position in India after soybean, groundnut, sunflower and mustard amongst the minor oilseed crops. Sesame is popular for its oil quality and medicinal properties. Oil quality is excellent as it is consisted of majority of unsaturated fatty acids like linoleic acid, oleic acid, palmitic and stearic acids. For its stablity against oxidative rancidity, the sesame oil is useful in cooking, confectionary purposes. It is also useful for manufacturing of pharmaceuticals, making soaps, paints, and insecticides. Sesame is considered as queen of oilseeds crop because of its high nutritional value and health benefits. Due to the presence of lignans mainly sesamin, sesamolin, sesamol and γ- tocopherol It's oil is highly resistant to oxidative deterioration as compared to other edible oils. Despite of having high nutritional value, medicinal properties and excellent oil quality low productivity is the main constraint associated with its improvement. It is due to the low yield potential and fluctuating yield performance of the sesame genotypes as it lacks broad genetic base and variability in natural population. Hence, it is now important to develop a comprehensive strategy to enhance genetic variability of sesame through proper genetic analysis.

Materials and Methods
The materials for present investigation is consisted of nineteen genotypes collected from different corners of India. Nineteen genotypes were sown in randomized complete block design (RBD) with three replications The observations were recorded for eight morphological traits *viz.* days to 50% flowering, plant height, number of branches per plant, capsule length, number of capsules per plant, number of seeds per capsule, 1000- seed weight and seed yield per plant. The data were recorded on five randomly selected plants in each entry in each replication. The mean values were used for analysis of variance. Phenotypic coefficient of variation, genotypic coefficient variation, heritability and genetic advances were estimated in addition to *per se* performance.

Results and Discussion
Mean performance of sesame genotypes based on morphological traits
In the present study significant difference was observed among nineteen genotypes for all the characters *viz.* days to 50% flowering, plant height, no. of branches per plant, capsule length, no. of capsules per plant, no. of seeds per capsule, 1000-seed weight, Seed yield per plant and oil content. The mean value of all the nineteen genotypes for eight morphological traits is represented in table 1.

Days to 50% flowering
The genotypes showed wide variation for days to 50% flowering. It varied from 40.51 days in PKDS-11 to 51.12 days in TKG-308, with a grand mean of 45.91.

Plant height
The overall mean for plant height was 77.52cm with a range from 58.15 cm to 95. 51cm.The plant height was maximum in Uma (95.51 cm) followed by Amrit (92.50cm) and PKDS-11 (88.51). Genotype Prachi (58.12 cm) was shortest in plant height.

Number of branches per plant
There was less variability among genotypes for this character which ranged from CO-1 (2.56) to 7.01 (PKDS-11). Maximum no. of branches was observed in PKDS-11 followed by OSM-22 (6.52).

Capsule length
Capsule length was maximum in the genotype Uma (1.34cm) followed by Nirmala (1.25cm), whereas the lowest capsule length (0.75 cm) was recorded in Rama and Amrit followed by GT-10 and RT-127 both (0.812cm).

Number of capsules per plant
A wide range of variability was observed for this character among the nineteen sesame genotypes. The highest no. of the capsule was recorded (69.52) in Uma followed by PKDS-11 (69.13), whereas the lowest no. of capsules per plant (35.54) was recorded in GT-10.

Number of seeds per capsule
The maximum no. of seeds per capsule was recorded in the genotype Sabitri (76.54) followed by Nirmala (74.51), whereas the lowest no. of seeds per capsule (53.52) was recorded GT-10 indicating a moderate variability among the thirty sesame genotypes for this character.

1000-seed weight
A moderate amount of variability was found among nineteen genotypes for this character which varied from 2.561g (Rama) to 3.234g (Uma). Highest seed weight was observed by Uma followed by Sabitri and Sekhar each having seed weight of 3.121g.

Seed yield per plant
A wide range of variability was observed among nineteen genotypes for this character. Highest yield was observed by AT-403 (15.311g) followed by Uma (15.140g) and PKDS-11 (14.017g), whereas GT-10 was the lowest yielding genotype (6.121 g) followed by Amrit (8.901g) and Prachi (8.733g).

Table 1: Mean performance of yield and its related traits in nineteen genotypes of sesame

	Days to 50% flowering	Plant height	No. of primary branches/plant	Capsule Length	No. of capsules/plant	No. of seeds /capsule	1000-Seed weight	Seed yield /plant
AMRIT	44.11	92.50**	5.11	0.70	48.00	62.12	2.7.130	8.901
AT-403	45.56	77.78	3.56	1.12**	68.56	74.12	3.090	15.311**
CO1	54.09**	64.07	2.56	1.12**	48.56	74.65	2.761	10.651
GT10	50.12**	76.23	4.12	0.89	35.54	53.52	2.512	6.121
KANAK	49.11**	77.13	5.00	0.82	63.23	74.12	2.761	11.814
KRISNA	45.51	77.21	4.51	0.92	50.12	66.13	2.741	10.515
NIRMALA	43.13	65.51	5.5	1.21**	60.53	74.51	3.001	13.086*
OSM-22	44.00	84.01	6.52**	1.01	64.89	65.45	2.912	11.926
PKDS-11	40.51	88.51*	7.01**	1.22**	69.13	73.56	2.933	14.017**
PRACHI	50.51**	58.12	5.00	0.91	49	59.52	2.622	8.733
RAMA	44.51	64.52	3.53	0.75	48.54	56.54	2.561	8.713
RT127	46.51	77.00	4.00	0.81	65.67	64.12	2.911	12.835*
RT-54	44.51	81.52	4.51	0.91	50.53	64.23	2.611	10.745
SABITRI	48.00**	87.12*	4.03	0.92	60.14	76.54	3.121	12.553*
SEKHAR	49.00**	85.12	5.13	1.25**	52.53	56.08	3.121	10.843
SMARAK	44.12	87.53*	5. 52	0.61	55.02	67.52	2.913	10.312
TKG-308	51.12**	72.12	4.12	1.12	40.34	72.54	2.823	9.013
UMA	40.51	95.51**	6.34**	1.34**	69.52	75.51	3.234	15.140**
VRI1	38.51	64.23	4.50	0.75	40.23	50.52	2.600	5.702
Grand mean	45.91	77.52	4.73	0.92	54.54	66.22	2.84	10.95
CD 5%	1.60	8.31	0.92	0.11	17.24	12.11	0.12	2.81
CD 1%	1.91	10.12	1.13	0.12	20.84	14.65	0.166	3.465

Genetic variability, genotypic coefficient of variation, phenotypic coefficient of variation, heritability and genetic advance
An assessment of total variability and partitioning it into heritable and non-heritable components are crucial factors in adopting a suitable breeding procedure. The heritable portion of the observed variation can be assessed by studying coefficients of genotypic and phenotypic variability, heritability and genetic advance. The genetic variability and it's parameters are represented in table 2. Although a range can provide a preliminary idea about the variability, but coefficient of variation is reliable as it is independent of the unit of measurement. The phenotypic coefficient of variation (PCV) and genotypic coefficient of variation (GCV) showed wide variation for most of the characters of sesame under study. Further, the extent of the environmental effect on the character was observed from the difference between the phenotypic coefficient of variation (PCV) and genotypic coefficient of variation (GCV). GCV is considered to be more useful in breeding programme than PCV as it accounts for only the heritable portion of variability. The phenotypic coefficient of variation is highest in seed yield per plant

(41.364) followed by no. of capsules per plant (25.541). High genotypic coefficient of variation was observed in seed yield per plant (30.203%) followed by no. of branches per plant (21.656%). The highest difference between phenotypic coefficient of variation and genotypic coefficient of variation was observed in seed yield per plant, no. of capsules per pant and number of seeds per capsule. For characters like days to 50% flowering, plant height, number of branches per plant and capsule length were not much affected by the environment as there was narrow gap between PCV and GCV. Observable variability for these characters was mostly due to genetic factors so selection will be periodically effective for the above characters. Similar results were also reported by Singh *et al.* (2018) [1], Patil *et al.* (2018) [2] and Teklu *et al.* (2019) [3].

Heritability (broad sense) ranged from 44.4% for 1000- seed weight to 94.6% for days to 50% flowering. The genetic advance as percentage of mean at 5% selection intensity varied from 8.57 for 1000- seed weight to 45.489% for seed yield per plant. High heritability was observed in days to 50% flowering (94.600%) followed by capsule length (88.487%) and plant height (81.550%) where as moderate heritability was recorded in seed yield per plant (53.336), no. of capsules per plant (46.162%) and no. of seeds per capsule (47.045%). High heritability with high genetic advance was observed for plant height, number of branches per plant and capsule length, so selection is highly effective for these traits as it is controlled by additive gene action. Moderate heritability with high genetic advance was observed for number of capsules per plant, seeds per capsule and seed yield per plant also indicating preponderance of additive gene action and moderate heritability with low genetic advance was recorded 1000- seed weight indicating role of non-additive gene action in controlling the trait. This estimates of heritability and genetic advance in present findings were in broad agreement with earlier findings of Patil *et al.* (2018) [2], Patidar *et al.* (2020) [6] and Kiruthika *et al.* (2018) [5] in sesame.

Table 2: Mean, range, PCV, GCV, heritability, Genetic advance for different quantitative traits in Sesame

Characters	Mean	Range	PCV (%)	GCV (%)	h^2_{bs}	GA	GA % of mean
Days to 50% flowering	46.00	38.50-54.00	8.862	8.618	94.600	7.942	17.266
Plant height	77.55	58.21-95.50	14.499	13.094	81.550	18.890	24.358
No. of primary branches/plant	4.71	2.50-7.00	24.807	21.656	76.231	1.835	38.956
Capsule Length	0.95	0.65-1.30	21.152	19.898	88.487	0.366	38.557
No. of capsules/plant	54.60	40.00-72.00	25.541	17.353	46.162	13.23	24.288
No. of seeds/capsule	66.23	50.50-76.50	14.443	9.909	47.045	9.271	13.997
1000-Seed weight	2.753	2.75-3.20	9.355	6.240	44.489	0.236	8.570
Seed yield/plant	10.441	5.76-15.34	41.364	30.203	53.336	4.745	45.448

Conclusion

All the traits under study are highly variable except capsule length and 1000-seed weight. Additive gene action plays important role for expression of plant height and capsule length, number of capsules per plant, seeds per capsule and seed yield per plant whereas non additive gene action is important for improvement of 1000-seed weight.

Reference

1. Singh A, Bisen R, Tiwari A. Genetic Variability and character association in sesame (*Sesamum indicum* L.) genotypes, International Journal of Current Microbiology Applied Science. 2018;7(11):2407-2415.
2. Patil M, Lokesha R. Estimation of genetic variability, heritability, genetic advance, correlations and path analysis in advanced mutant breeding lines of Sesame (*Sesamum indicum* L.). Journal of Pharmacognosy and Natural Products, 2018;4(1):1-5.
3. Teklu DH, Kebede SA, Gebremichael DE. Assessment of genetic variabilty, genetic advance, correlation and path analysis for morphological Traits in sesame genotypes, International Journal of Novel Research in Life Sciences. 2019;4(8):181-194.
4. Thapa S, Baral R. Status, challenges and solutions of oil-seed production in India. research & reviews. Journal of Agriculture and Allied Sciences; c2019.
5. Kiruthika S, Subramanian LN, Chidambaram P, Mini ML, Arunachalam P. Genetic variability studies for yield and yield components in sesame (*Sesamum indicum* L.) Electronic Journal of Plant Breeding. 2018;9:1529-37.
6. Patidar B, Tripathi D, Patidar S, Patidar M, Singh Y, Kumari G Genetic variability, heritability and genetic advance studies in sesame (*Sesamum indicum* L.) Journal of Pharmacognosy and Phytochemistry. 2020;9(3):1679-83.