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Genetic Analysis in F_4 Generation of Bhendi [*Abelmoschus esculentus* (L.) Moench] for Growth and Yield

V. Sundaram[1*], Vinothmani[1] and E. Venkadeswaran[2]

[1]Department of Horticulture, [2]Contract Teacher (Horticulture), Department of Horticulture, Pandit Jawaharlal Nehru College of Agriculture and Research Institute, Karaikal, UT of Puducherry, India

**Corresponding author*

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A B S T R A C T

The material for the present study consisted of 30 F4 families of bhendi, to assess the genetic components for growth and yield at Pandit Jawaharlal Nehru College of Agriculture and Research Institute, Karaikal, UT of Puducherry, India. The mean values and ranges recorded for various traits under study revealed significant variation. The maximum range of variability was observed for fruit yield plant^{-1} (148.0 to 377.31 g), followed by plant height at final harvest (76.56 to 160.40 cm). The phenotypic coefficient of variation was found higher than genotypic coefficient of variation for all the traits. The highest value of genotypic coefficient of variation was observed for fruit yield plant^{-1} (20.48 per cent) and number of fruits plant-1 (20.204 per cent). The maximum value for phenotypic coefficient of variation was recorded for fruit yield plant-1 (29.824 per cent), followed by number of fruits plant^{-1} (28.952 per cent) and plant height at final harvest (27.202 per cent). The heritability in broad sense was found to range from 0.503 per cent (first flowering node) to 48.699 per cent (number of fruits plant^{-1}). Number of fruits plant^{-1}, fruit yield plant^{-1}, plant height at final harvest, fruit length, plant height at flowering, days to first flowering and fruit girth recorded moderate heritability and rest of the characters recorded low heritability. None of the characters studied recorded high or moderate magnitude of genetic advance as per cent of mean.

Introduction

The World Health Organization recommends daily intake of more than 400 g of vegetables person^{-1} (Kamatchi Kala and Nagajothi, 2019). The fresh fruits of okra [*Abelmoschus esculentus* (L.) Moench], a member of the hibiscus family Malvaceae originating from Africa is found rich in protein and thus assists in building muscle tissues and enzymes capable of controlling the hormones. It's soluble fibre helps in lowering serum cholesterol, reducing heart diseases and cancer, especially colorectal cancer (Aminu *et al.*, 2016). As okra plays an important role among other annual crops in the economy of nations, further consideration should be given in choosing varieties of higher yield. An

ideotype of bhendi should be high yielding, early maturing, having shorter internodes, producing fruits of uniform size, shape, colour and ridges, coupled with complemental nutritive value. The variability existing among the genotypes offers excellent scope for genetic improvement through selection (Mishra *et al.,* 2015). Hence, the major aim of any breeder is to evolve a superior variety simply through selection from among the available genotypes.

Yield and yield components are polygenic in nature and are subjected to different amount of non-heritable variation (Lush, 1940). In any selection programme, emphasis on yield and its component characters lies solely on their heritability and genetic advance(Reddy *et al.,* 2012).The knowledge on variability and heritability is of prime importance and greater practical utility in exercising selection. Hence, an attempt was made in the present investigation to estimate the extent of variability, heritability and genetic advance of F_4 families of bhendi.

Materials and Methods

The field experiment was conducted at Pandit Jawaharlal Nehru College of Agriculture and Research Institute, Karaikal, UT of Puducherry, India. The material for the present study consisted of 30 F_4 families of bhendi selected based on the earlier studies performed in F_3 generation. The experiment was laid out in a Randomized Block Design and was replicated twice. The mean data of selected plants in each replication for each F_4 families were subjected to analysis of variance (Panse and Sukhatme, 1957). Phenotypic and genotypic coefficient of variations was calculated based on the method advocated by Burton (1952).

Heritability in the broad sense was estimated by the method described by Lush (1940) and expressed in per cent. Genetic advance as per cent mean was estimated by the method suggested by Johnson *et al.,* (1955).

Results and Discussion

The estimates on mean, range, phenotypic coefficient of variation (PCV), genotypic coefficient of variation (GCV), heritability (h^2) and genetic advance as per cent of mean for the F_4familiesis presented in Table 1. The range of values revealed the existence of significant variation for all the traits under study. In the present study, maximum range of variability was observed for fruit yield plant^{-1} (148.0 to 377.31 g) followed by plant height at final harvest (76.56 to 160.40 cm).

The magnitude of phenotypic coefficients of variation (PCV) was higher than the corresponding genotypic coefficients of variation(GCV) for all the twelve characters under study, indicating that the apparent variation was not only due to genotype but also due to the favorable influence of environment and hence selection for these traits sometimes may be misleading. This environmental effect could be due to heterogeneity in soil fertility status and other unpredictable factors as reported earlier by Ahamed *et al.,* (2015) and Archana *et al.,* (2015).

However, there was a close correspondence between the estimates of phenotypic and genotypic coefficients of variation for majority of the characters under study indicating the fact that the environmental influence on the expression of the traits was very low. However, the magnitudinal difference between the estimates of GCV and PCV were highest for number of primary branches plant^{-1} at final harvest (11.007), followed by number of fruits plant^{-1} (8.748). The PCV and GCV values were classified as low (less than 10 per cent), moderate (10 - 20 per cent) and high (more than 20 per cent) as suggested by Sivasubramanian and Menon (1973).

Table.1 Mean, range, variability, heritability and genetic advance asper cent of mean for growth and yield traits in F_4 families of bhendi

Traits	Mean	Range		Variability (per cent)		Heritability (h^2) (per cent)	Genetic advance as per cent of mean
		Min.	Max.	PCV	GCV		
Days to first flowering	35.61	34.44	37.44	2.780	1.737	39.040	1.411
First flowering node	4.01	3.89	4.11	2.272	0.161	0.503	0.018
Inter nodal length (cm)	6.36	5.53	7.37	11.796	5.124	18.871	2.654
Plant height at flowering (cm)	31.91	27.38	40.66	14.084	8.945	40.340	1.654
Plant height at final harvest (cm)	104.10	76.56	160.40	27.202	17.532	41.542	0.530
Days to first harvest	41.87	41.00	43.89	2.837	1.532	29.170	0.775
Number of primary branches plant^{-1} at final harvest	3.40	2.33	4.00	18.126	7.119	15.427	3.671
Fruit length (cm)	12.97	11.47	14.94	10.161	6.507	41.005	4.170
Fruit girth (cm)	6.09	5.72	6.68	6.206	3.507	31.944	6.110
Individual fruit weight (g)	17.12	13.54	21.33	15.237	8.113	28.355	1.817
Number of fruits plant^{-1}	18.11	12.00	27.44	28.952	20.204	48.699	3.866
Fruit yield plant^{-1} (g)	240.34	148.00	377.31	29.824	20.484	47.176	0.278

The highest value of genotypic coefficient of variation (more than 20 per cent) was registered for fruit yield plant^{-1} (20.484 per cent) and number of fruits plant^{-1} (20.204 per cent). Higher the genotypic coefficient of variation, more are the chances of improvement in those characters.

The highest value of phenotypic coefficient of variation was recorded for fruit yield plant^{-1} (29.824 per cent), followed by number of fruits plant^{-1} (28.952 per cent) and plant height at final harvest (27.202 per cent). High magnitude (more than 20 per cent) of genotypic and phenotypic coefficients of variation were also reported by Dhall *et al.*, (2003) for number of fruits plant^{-1} and Gandhi *et al.*, (2001), Bendale *et al.*, (2003), Mehta *et al.*, (2006) and Singh *et al.*, (2006) for fruit yieldplant^{-1}.

The heritability values were classified as low (less than 30 per cent), moderate (30-60 per cent) and high (more than 60.00 per cent) as suggested by Johnson *et al.*, (1955).The heritability in broad sense was found to be range from 0.503 per cent (first flowering node) to 48.69 per cent (number of fruits plant^{-1}). Number of fruits plant^{-1} (48.66 per cent), fruit yield plant^{-1} (47.176 per cent), plant height at final harvest (41.54 per cent), fruit length (41.005 per cent), plant height at flowering (40.34 per cent), days to first flowering (39.04 per cent) and fruit girth(31.94 per cent) recorded moderate heritability and rest of the characters recorded low heritability. These results were found to be in consonance with the results of Reddy *et al.*, (2012).The estimates of genetic advance as per cent of mean was classified as low (less than 10 per cent), moderate (10-20 per cent) and high (more than 20 per cent)as suggested by Johnson *et al.*, (1955).The genetic advance as per cent of mean (GAM) *i.e.*, genetic gain was ranged from 0.018per cent (first flowering node) to 6.110per cent (fruit girth). None of the characters recorded high and moderate magnitude of genetic advance as per cent of mean.

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References

Ahamed, K.U., B. Akter, N. Ara, M.F. Hossain and M. Moniruzzaman. 2015. Heritability, correlation and path coefficient analysis in fifty seven okra genotypes. *Int. J. Appl. Sci. Biotech.*, 3(1): 127-133.

Aminu, D., O.B. Bello, B.A. Gambo, A.H. Azeez, O.J. Agbolade, A. Iliyasu and U.A. Abdulhamid. 2016. Varietal performance and correlation of okra pod yield and yield components. *Agriculture and Environment*, 8: 112-125.

Archana, M., H.N. Mishra, N. Senapati and P. Tripathy. 2015. Genetic variability and correlation studies in okra (*Abelmoschus esculentus* (L.) Moench). *Electronic J. Plant Breeding*, 6(3): 866-869.

Bendale, V.W., S.G. Bhare, J.L. Mehta, U.B. Pethe and S.R. Kadam. 2003. Genetic variability and correlation studies in okra. *Orissa Journal of Horticulture*, 31(2): 1-4.

Burton, G.W. 1952. Quantitative inheritance in grasses. Proc. 6th Int. Grassland Congr., 1: 277-283.

Dhall, R.K., S.K. Arora, T.S. Dhillon and R. Bansal. 2003. Evaluation of advance generations in okra (*Abelmoschus esculentus* (L.) Moench) for yield and yield contributing characters. *Environment and Ecology*, 21(1): 95-98.

Gandhi, H.T., M.D. Yadav and P.A. Naval.

2001. Studies on variability in okra (*Abelmoschus esculentus* (L.) Moench). *Journal of Maharashtra Agricultural Universities*, 26(2): 146-148.

Johnson, W.W., H.F. Robinson and R.E. Comstock.1955. Genotypic and phenotypic correlation in soybeans and their implications in selection. *Agron. J.*, 47: 477-483.

Kamatchi Kala, B. and N. Naga Jothi. 2019. Effect of vermicompost on nutritional status of some leafy vegetables. *J. Soils and Crops*, 29(1): 92-96.

Lush, J. L. 1940. Intersire correlations and regression of offspring on dams as a method of estimating heritability of characters. *Proceedings of American Society of Animal Breeding*, 33: 293-301.

Mehta, D.R., L.K. Dhaduk and K.D. Patel. 2006. Genetic variability, correlation and path analysis studies in okra (*Abelmoschus esculentus* (L.) Moench). *Agriculture Science Digest*, 261: 15-18.

Mishra, A., H.N.A. Mishra, N.B. Senapati and P. Tripathy. 2015. Genetic variability and correlation studies in okra (*Abelmoschus esculentus* (L.) Monech). *Electronic J. Plant Breeding*, 6(3): 866-869.

Panse, V.G. and Sukhatme, P.V. 1957. Statistical methods for agricultural workers. Indian Council of Agricultural Research. New Delhi, p. 97.

Reddy, M., K. Hari Babu, M. Ganesh, K. Chandrasekhar Reddy, H. Begum, B. Purushothama Reddy and G. Narshimulu. 2012. Genetic variability analysis for the selection of elite genotypes based on pod yield and quality from the germplasm of okra (*Abelmoschus esculentus* L. Moench). *Journal of Agricultural Technology*, 8(2): 639-655.

Singh, B., A.K. Pal and S. Singh. 2006. Genetic variability and correlation analysis in okra (*Abelmoschus esculentus* (L.) Moench). *Indian Journal of Horticulture*, 63(3): 63-66.

Sivasubramanian, S. and M. Menon. 1973. Heterosis and inbreeding depression in rice. *Madras Agricultural Journal*, 60: 1139.

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