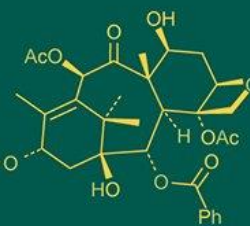
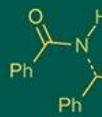


International Journal of Advanced Biochemistry Research



ISSN Print: 2617-4693
ISSN Online: 2617-4707
NAAS Rating (2026): 5.29
IJABR 2026; 10(6): 1181-1184
www.biochemjournal.com
Received: 01-03-2026
Accepted: 05-04-2026

Priyanka Inaniyan
Department of Horticulture
Janta Vedic College, (C. C. S.
U.) Baraut, Baghpat, Uttar
Pradesh, India

Abhay Vikram Singh
Department of Horticulture
Janta Vedic College, (C. C. S.
U.) Baraut, Baghpat, Uttar
Pradesh, India

Juhi Aswani
Department of Horticulture,
Rajasthan Agricultural
Research Institute (S. K. N. A.
U.) Durgapura, Jaipur,
Rajasthan, India

Kuldeep Puniya
Department of Plant
Pathology, Govind Ballabh
Pant University of Agriculture
and Technology Pantnagar,
Udham Singh Nagar,
Uttarakhand, India

Gulab Kumawat
Department of Horticulture,
Rajasthan Agricultural
Research Institute (S. K. N. A.
U.) Durgapura, Jaipur,
Rajasthan, India

Urmila Batesar
Department of Horticulture
Janta Vedic College, (C. C. S.
U.) Baraut, Baghpat, Uttar
Pradesh, India

Corresponding Author:
Priyanka Inaniyan
Department of Horticulture
Janta Vedic College, (C. C. S.
U.) Baraut, Baghpat, Uttar
Pradesh, India

Study of yield and its attributing traits of 20 genotypes in okra (*Abelmoschus esculentus* (L.) Moench)

Priyanka Inaniyan, Abhay Vikram Singh, Juhi Aswani, Kuldeep Puniya, Gulab Kumawat and Urmila Batesar

DOI: <https://www.doi.org/10.33545/26174693.2026.v10.i6o.8851>

Abstract

Genetic variability is a prerequisite for effective selection and plays a crucial role in the improvement of crop plants by providing a broad spectrum of genetic differences among the available genotypes. Recognizing the significance of genetic diversity in okra, this investigation was carried out to determine the extent of variability among various okra genotypes for various growth, flowering, fruit, seed and yield-related characters. The observations on various parameters were recorded at the appropriate stages like days to 50% flowering, plant height (cm), number of branches per plant, number of internodes per plant, average fruit weight (g), number of fruits per plant, fruit length (cm), fruit width (cm), number of seeds per fruit, leaf length (cm), number of leaves per plant, leaf width (cm), mature bud length (cm), pedicel length (cm), days to first fruit set, hundred seed weight (g), and fruit yield per plant (g) in twenty genotypes of okra. The experiment was conducted in a Randomized Block Design (RBD) with three replications to identify superior genotypes and important traits for future breeding programmes.

Keywords: Okra genotypes, genetic variability, yield attributes, randomized block design

Introduction

Okra (*Abelmoschus esculentus* (L.) Moench), commonly known as lady's finger or bhindi, is one of the most important vegetable crops cultivated in tropical and subtropical regions of the world. It is grown in India extensively throughout the year and holds a significant place among vegetable crops due to its acceptability to diverse agro-climatic conditions, short duration and high market demand. The tender fruits are consumed as a vegetable and are valued for their high nutrition amount, rich source of vitamins, minerals, carbohydrates and dietary fibre. Besides its use as a fresh vegetable, different parts of the plant have industrial and medicinal significance due to the presence of mucilage, antioxidants and other bioactive compounds.

The development of improved varieties is required to meet the increasing demand for higher productivity and good quality produce. Genetic variability present in the breeding material is a key factor governing the effectiveness of any breeding programme. Genetic variability serves as the basic raw material for selection and provides opportunities for identifying superior genotypes with desirable agronomic traits. A wider range of variation increases the probability of obtaining genotypes that can perform better under diverse environmental conditions and production systems.

Assessment of germplasm for genetic variability is thus a crucial component of any breeding programme. The valuation of genetic variability helps in understanding the nature and magnitude of variation present among genotypes and facilitates the selection of suitable parents for hybridization. Parameters such as genotypic coefficient of variation, phenotypic coefficient of variation, heritability and genetic advance provide valuable information regarding the inheritance of different characters and the effectiveness of selection. Traits exhibiting high heritability along with high genetic advance are generally considered to be governed by additive gene effects and can be improved effectively through selection. Fruit yield in okra is a complex trait influenced by several component characters and environmental factors. Hence, selection based only on yield may not consistently produce desirable results.

A detailed knowledge of variability among traits is necessary for effective breeding. A comprehensive understanding of the variability present in yield and its associated traits is essential for identifying promising genotypes and developing suitable breeding strategies. The Assessment and characterization of available genetic resources can also contribute to the conservation and efficient utilization of valuable germplasm in future improvement programmes.

Considering these aspects, the present investigation was conducted to examine the genetic variability among okra genotypes and to estimate important genetic parameters related to growth, yield, and yield-contributing traits. The information generated from this study will be useful for the identification of superior genotypes and for designing effective breeding programmes aimed at the genetic improvement of okra.

Materials and Methods

The present investigation on genetic variability in okra (*Abelmoschus esculentus* (L.) Moench) was conducted during the *Kharif* season of 2024 at the Research Farm, Department of Horticulture, Janta Vedic College, Baraut, Uttar Pradesh. The experimental material comprised twenty diverse okra genotypes collected from different agricultural universities and research institutes of India (Table 1).

Table 1: List of okra genotypes and their place of collection

Sl. No.	Genotype	Place of Collection
1	Hissar Unnat	CCS HAU, Hisar, Haryana
2	Pusa Sawani	IARI, New Delhi
3	Pusa A-4	IARI, New Delhi
4	Arka Abhay	IIHR, Bengaluru, Karnataka
5	Arka Anamika	IIHR, Bengaluru, Karnataka
6	Kashi Kranti	IIVR, Varanasi, Uttar Pradesh
7	Kashi Pragati	IIVR, Varanasi, Uttar Pradesh
8	Kashi Vibhuti	IIVR, Varanasi, Uttar Pradesh
9	Kashi Lila	IIVR, Varanasi, Uttar Pradesh
10	Kashi Mangali	IIVR, Varanasi, Uttar Pradesh
11	Kashi Satdhari	IIVR, Varanasi, Uttar Pradesh
12	Pusa Makhmali	IARI, New Delhi
13	Kashi Chaman	IIVR, Varanasi, Uttar Pradesh
14	Kashi Vardan	IIVR, Varanasi, Uttar Pradesh
15	Kashi Lalima	IIVR, Varanasi, Uttar Pradesh
16	Barahat Komal	BUAT, Banda, Uttar Pradesh
17	Varsha Uphar	CCS HAU, Hisar, Haryana
18	Pusa Bhindi-3	IARI, New Delhi
19	Pusa Bhindi-5	IARI, New Delhi
20	Parbhani Kranti	VNMKV, Parbhani, Maharashtra

The experiment was laid out in a Randomized Block Design (RBD) with three replications. Seeds were sown on 26 July 2024 at a spacing of 60 × 30 cm. Each genotype was grown in plots of 2 m × 1 m accommodating 16 plants per plot. All recommended agronomic and plant protection practices were followed uniformly throughout the crop growth period to ensure a healthy crop stand.

Five competitive plants were randomly selected from each genotype in each replication for recording observations. Data were recorded on nineteen quantitative traits, viz., days to first flowering, days to 50% flowering, plant height, number of branches per plant, number of internodes, average fruit weight, number of fruits per plant, fruit length, fruit width, number of seeds per fruit, internodal length, leaf length, number of leaves per plant, leaf width, mature bud

length, pedicel length, days to first fruit set, hundred seed weight and fruit yield per plant.

The experimental data were compiled by taking the mean values of the twenty okra genotypes for yield and its contributing traits from all the three replications. The data were subjected to statistical analysis following the method of Randomized Block Design (RBD). Analysis of variance was carried out according to the procedure described by Panse and Sukhatme (1967). Genotypic coefficient of variation (GCV), phenotypic coefficient of variation (PCV), heritability (broad sense) and genetic advance as percent of mean were estimated using standard biometrical methods to assess the extent of genetic variability among the genotypes.

Statistical analysis

The experimental data was compiled by taking the mean value of the twenty genotypes of okra for yield and its attributing traits from all the three replications. It was subjected to the statistical analysis as per the method of Randomized Block Design (RBD).

Result and Discussion

Days to First Flowering (DF): The character days taken to first fruit harvest plays a very important role in identifying the early genotype and it is one of the important characters for breeding a new variety. Among all the genotypes under the present study, the overall mean for days to first flowering was 37.76 days, ranging from 32.55 to 45.92 days. The earliest flowering was noticed in Kashi Kranti (32.55 days), while the latest flowering was found out in Hissar Unnat (45.92 days).

Days to 50% Flowering (DFF): The observation recorded on days to 50% flowering revealed significance differences among genotypes. The genotypes showed a mean of 50.70 days for 50% flowering, with a minimum of 44.94 days in Arka Abhay and a maximum of 54.93 days in Varsha Uphar, indicating significant variation in flowering behaviour.

Plant Height (PH): Plant height varied greatly among the genotypes, with a mean height of 108.45 cm. The tallest genotype was Kashi Lalima (130.56 cm), while the shortest plant height was recorded in Barahat Komal (85.56 cm).

Number of Branches per Plant (NBPP): More number of branches is a desirable trait as greater number of branches manufacturing ample flowers there by increasing the fruit yield per plant. The mean number of branches per plant was 5.68, with Kashi Lalima producing the highest number of branches (7.18) and Pusa A-4 the lowest (4.83), suggesting genotypic differences in branching ability.

Number of Internodes (NI): Across the genotypes, the number of internodes ranged from 9.26 to 19.39, with a mean of 13.80. The highest number of internodes was found in Arka Anamika (19.39), while the lowest was recorded in Barahat Komal (9.26).

Length of Internode (LI): Genotypes differed in internode length, ranging from 4.09 cm (Barahat Komal) to 5.79 cm (Kashi Lalima). The longest internodes were found in 5.79 cm (Kashi Lalima) while the shortest was recorded in Barahat Komal (4.09 cm). The overall mean was 4.93 cm, reflecting moderate variability.

Average Fruit Weight (AFW): Average fruit weight plays a vital role in overall yield. The higher average fruit weight is a desirable trait in case of okra as it directly contributes to the higher yield and helps the farmer to increase his/her income. The average fruit weight varies from 11.99 g (Barahat Komal) to 20.20 g (Kashi Lalima) with an overall mean of 15.74 g, showing variability in fruit size among the genotypes.

Number of Fruits per Plant (NFPP): Number of fruits per plant used to record the total yield. Genotypes exhibited a wide range in number of fruits per plant, with an average of 13.08. Kashi Kranti had the maximum number of fruits per plant (17.88), whereas Kashi Mangali had the lowest (9.69).

Fruit Length (FL): Fruit length is an important marketable trait in okra that significantly influences consumer preference and commercial value of the produce. Increased fruit length generally contributes to higher fruit weight and ultimately enhances overall yield potential. Fruit length ranged from 8.15 cm in Barahat Komal to 13.15 cm in Arka Anamika, with a mean value of 9.94 cm, indicating considerable variability in fruit morphology.

Fruit Width (FW): Fruit width is a major component of fruit size and plays a crucial role in determining the market quality and yield of okra. Wider fruits often indicate better fruit development and contribute positively to fresh fruit weight. The mean fruit width across all genotypes was 5.89 cm. The widest fruits were observed in Arka Anamika (7.03 cm) and the narrowest in Kashi Vibhuti (4.26 cm).

Number of Seeds per Fruit (NSPF): The number of seeds per fruit is an important reproductive parameter that reflects the fertilization efficiency and seed-bearing capacity of the genotype. A higher number of seeds per fruit is desirable for seed production programmes as it directly affects total seed yield. The number of seeds per fruit ranged from 40.82 to 80.83, with a mean of 61.29. The maximum seeds were recorded in Kashi Lalima (80.83), while Barahat Komal had the fewest seeds per fruit (40.82).

Leaf Length (LL): Leaf length is an essential vegetative character associated with photosynthetic surface area and overall plant growth. Larger leaves can enhance light interception and photosynthetic efficiency, thereby supporting better biomass production and yield. Leaf length varied from 11.75 cm in Varsha Uphar to 16.27 cm in Kashi Lalima, with a mean of 15.06 cm across genotypes.

Number of Leaves (NL): The number of leaves per plant determines the photosynthetic potential and vigour of the plant. A higher leaf number may improve the assimilation of photosynthates, which supports enhanced flowering, fruit development, and yield. The number of leaves per plant showed wide variation, with an average of 19.52 leaves. The maximum was observed in Kashi Lalima (25.45) and the minimum in Barahat Komal (15.13).

Leaf Width (LW): Leaf width contributes to the total leaf area available for photosynthesis and influences the plant's capacity to capture solar radiation. Broader leaves generally promote greater photosynthetic activity, which can positively affect growth and productivity. Leaf width varied

from 14.43 cm in Kashi Lila to 28.00 cm in Kashi Lalima, with a mean of 19.02 cm, indicating substantial variation among genotypes.

Mature Bud Length (MBL): Mature bud length is an important floral trait associated with the growth and development of reproductive structures in okra. Well-developed buds may contribute to efficient flowering and successful fruit formation. The length of mature buds ranged from 2.06 cm in Barahat Komal to 3.77 cm in Kashi Lalima, while the mean value stood at 2.94 cm.

Pedicle Length (PL): Pedicle length influences fruit attachment and positioning on the plant, which can affect ease of harvesting and fruit appearance. Appropriate pedicle length also facilitates proper exposure of fruits, reducing mechanical damage during harvesting. Pedicle length across the varieties ranged from 2.00 cm (Pusa Bhindi-5) to 3.70 cm (Kashi Lalima), with an average of 2.74 cm.

Days to First Fruit Set (DFFS): Days to first fruit set is an important earliness parameter that determines the duration required for the crop to enter the reproductive phase. Genotypes exhibiting early fruit set are advantageous as they allow early harvesting and may provide greater economic returns. The mean for days to first fruit set was 43.08, with the earliest fruit setting recorded in Kashi Kranti (36.80 days) and the latest in Barahat Komal (53.97 days).

Hundred Seed Weight (HSW): Hundred seed weight is an important seed quality parameter that reflects seed size, maturity, and reserve food accumulation. Higher seed weight generally indicates better seed vigour and is beneficial for improved germination and seedling establishment. Hundred seed weight ranged from 5.84 g in Kashi Lila to 11.15 g in Arka Anamika, with a mean of 8.26 g.

Fruit Yield per Plant (FYPP): The fruit yield per plant among all the genotypes varied considerably, ranging from 165.78 g to 239.81 g, with an overall mean of 209.50 g, indicating the presence of wide variability. The maximum fruit yield per plant was recorded in Kashi Chaman (239.81 g), followed closely by Pusa Makhmali (234.74 g), Parbhani Kranti (236.51 g), Kashi Vardan (232.32 g), and Kashi Lila (230.83 g), highlighting these as superior performers in terms of yield.

Arka Anamika and Kashi Kranti also performed well, producing 228.53 g and 227.38 g fruit yield per plant respectively. Kashi Satdhari (224.29 g), Kashi Pragati (213.03 g), and Varsha Uphar (213.74 g) were among the genotypes that recorded moderately high yields. In the mid-yielding category, genotypes such as Kashi Lalima (217.66 g), Pusa Sawani (196.30 g), Arka Abhay (194.75 g), Kashi Vibhuti (193.94 g), Pusa Bhindi-3 (193.33 g), and Pusa A-4 (172.85 g) were noted.

Lower yields were observed in Barahat Komal (190.72 g), Kashi Mangali (185.88 g), and Hissar Unnat (165.78 g). Among all, Hissar Unnat exhibited the lowest yield, making it the least productive genotype under the present study conditions. This wide range in yield performance provides an important scope for selection of superior genotypes for crop improvement programs aiming at higher productivity.

Table 2: Mean and Range value of 20 genotypes for 19 quantitative characters in okra [*Abelmoschus esculentus* (L.) Moench]

Genotype	DF	DFP	PH	NBPP	NI	AFW	NFPF	FL	FW	NSPF	LI	LL	NL	LW	MBL	PL	DFFS	HSW	FYPP
Hissar Unnat	45.92	53.18	99.34	6.07	13.39	14.75	12.25	9.57	6.09	58.87	4.66	14.76	19.07	19.37	2.09	2.57	44.76	8.37	165.78
Pusa Sawani	43.90	54.20	100.43	5.29	12.15	14.54	11.97	9.27	5.62	70.80	4.44	14.89	21.50	17.38	2.56	3.18	45.51	7.47	196.30
Pusa A-4	33.74	45.13	92.12	4.83	13.53	13.65	11.16	10.53	5.90	62.56	4.70	15.18	17.89	19.99	3.20	2.80	41.24	9.72	172.85
Arka Abhay	38.41	44.94	110.65	6.41	12.95	16.20	14.78	8.97	5.45	68.68	4.37	16.27	22.14	18.86	3.13	2.95	45.41	9.72	194.75
Arka Anamika	33.12	45.42	117.09	5.61	19.39	19.39	17.34	13.15	7.03	66.54	4.94	16.20	21.43	21.76	3.77	2.83	45.32	11.15	228.53
Kashi Kranti	32.55	48.98	127.45	6.62	14.32	17.35	17.88	9.55	6.01	74.45	5.20	15.66	17.03	21.52	2.93	3.18	36.80	10.56	227.38
Kashi Pragati	32.98	47.43	124.56	6.48	12.65	17.53	17.68	11.40	6.49	67.93	4.95	16.22	23.40	19.08	3.04	3.19	37.14	7.53	213.03
Kashi Vibhuti	39.54	48.86	99.45	5.61	12.14	13.72	10.13	9.70	4.82	45.86	4.24	14.33	17.23	16.49	2.74	2.15	45.40	9.09	193.94
Kashi Lila	39.65	54.06	110.71	4.89	14.33	15.74	11.22	9.07	4.26	52.74	5.14	15.11	17.72	14.43	3.03	2.57	44.81	5.84	230.83
Kashi Mangali	37.56	53.25	112.11	5.63	12.57	15.26	9.69	11.20	5.93	47.96	5.69	15.43	20.20	17.72	2.43	2.19	44.68	6.83	185.88
Kashi Satdhari	36.73	51.45	100.23	5.60	15.95	16.81	10.78	10.49	5.91	49.06	5.10	15.21	19.17	15.68	3.53	2.68	41.69	8.39	224.29
Pusa Makhmali	35.66	51.36	102.66	5.40	16.36	16.46	10.81	10.10	6.09	66.74	5.48	16.06	19.23	19.50	2.72	3.04	40.45	9.30	234.74
Kashi Chaman	35.41	50.88	107.09	5.76	11.59	15.70	10.81	8.97	6.03	53.07	4.49	15.42	21.30	18.43	2.71	3.13	41.76	6.38	239.81
Kashi Vardan	34.84	52.78	90.18	4.94	11.39	12.46	10.94	9.46	6.27	56.04	5.11	14.46	16.03	18.33	3.68	2.37	40.16	7.52	232.32
Kashi Lalima	32.72	46.78	130.56	7.18	17.32	20.20	13.36	11.26	5.82	80.83	5.79	15.69	25.45	28.00	3.20	3.70	39.53	9.39	217.66
Barahat Komal	44.80	54.31	85.56	5.46	9.26	11.99	16.16	8.15	6.78	40.82	4.09	14.17	15.13	15.47	2.06	2.14	53.97	5.96	190.72
Varsha Uphar	40.67	54.93	109.67	5.08	14.02	14.80	10.77	8.16	6.04	59.68	4.81	11.75	17.72	19.12	2.42	2.32	44.41	7.39	213.74
Pusa Bhindi-3	39.60	54.09	112.50	5.35	12.61	13.95	13.01	9.17	5.93	61.66	5.28	14.04	18.26	16.61	2.68	2.68	43.89	7.54	193.33
Pusa Bhindi-5	39.74	52.01	115.90	6.08	13.64	16.08	14.64	9.49	5.83	68.79	4.60	15.22	19.04	21.21	3.70	2.00	43.03	8.21	197.53
Parbhani Kranti	37.65	49.86	120.83	5.36	16.45	18.19	16.21	11.24	5.49	72.77	5.44	15.14	21.40	21.39	3.14	3.23	41.67	8.75	236.51
Mean	37.76	50.70	108.45	5.68	13.80	15.74	13.08	9.94	5.89	61.29	4.93	15.06	19.52	19.02	2.94	2.74	43.08	8.26	209.50

Conclusion

The results of the present study revealed that the evaluated genotypes possessed significant genetic variability for growth, yield and associated traits, providing huge opportunities for effective selection and crop improvement. The genotypes possessing superior performance for important traits may be effectively utilized as potential parents in future breeding and hybridization programmes. Furthermore, traits exhibiting a strong positive association and high direct effect on fruit yield can be considered as important selection criteria for enhancing yield potential. The distribution of genotypes into distinct clusters suggests the existence of substantial genetic divergence, and the utilization of genetically diverse parents from different clusters may facilitate the development of desirable recombinants and superior hybrids.

Reference

1. AdeOluwa OO, Kehinde OB. Genetic variability studies in West African okra (*Abelmoschus caillei* (A. Chev.) Stevels). *Agric Biol J N Am*. 2011;2(10):1326-1335.
2. Ahiakpa JK, Kaledzi PD, Adi EB, Peprah S, Dapaah HK. Genetic diversity, correlation and path coefficient analysis of okra (*Abelmoschus* spp.) germplasm. *Int J Dev Sustain*. 2013;2(2):1396-1415.
3. Arora D, Jindal SK, Ghai TR. Variability studies for yield and its contributing characters in okra (*Abelmoschus esculentus* (L.) Moench). *J Res Punjab Agric Univ*. 2008;45(3-4):224-227.
4. Das S, Chattopadhyay A, Chattopadhyay SB, Dutta S, Hazra P. Genetic parameters and path analysis of yield and its components in okra (*Abelmoschus esculentus* (L.) Moench). *Afr J Biotechnol*. 2012;11(95):16132-16141.
5. Kumar A, Kumar S, Singh PK. Studies on genetic variability and character association in okra (*Abelmoschus esculentus* (L.) Moench). *Int J Curr Microbiol Appl Sci*. 2017;6(10):1834-1840.
6. Kumar S, Kumar R, Kumar V, Singh M. Genetic variability, heritability, character association and path

analysis studies in okra (*Abelmoschus esculentus* (L.) Moench). *Int J Agric Sci*. 2015;11(1):9-13.

7. Mehta N, Asati BS, Mamidwar SR, Singh Y. Genetic variability, character association and path coefficient studies in okra (*Abelmoschus esculentus* (L.) Moench). *Agric Sci Dig*. 2007;27(1):15-17.
8. Patel RK, Yadav PK, Singh S. Genetic variability, correlation and path coefficient analysis for yield and yield contributing traits in okra (*Abelmoschus esculentus* (L.) Moench). *Int J Chem Stud*. 2019;7(3):3184-3188.
9. Singh B, Pal AK, Singh S. Genetic variability and correlation studies in okra (*Abelmoschus esculentus* (L.) Moench). *Indian J Agric Res*. 2014;48(2):140-146.
10. Yadav JR, Yadav RK, Kumar S, Singh B. Studies on genetic variability, correlation and path coefficient analysis in okra (*Abelmoschus esculentus* (L.) Moench). *Veg Sci*. 2013;40(2):165-169.