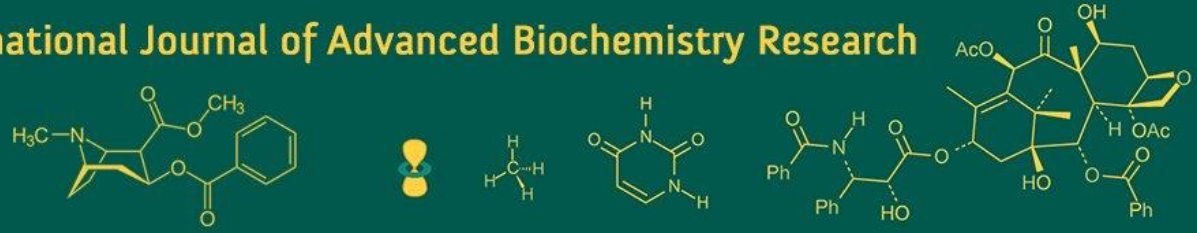
International Journal of Advanced Biochemistry Research



ISSN Print: 2617-4693
ISSN Online: 2617-4707
IJABR 2024; 8(7): 944-947
www.biochemjournal.com
Received: 06-04-2024
Accepted: 16-05-2024

Vikas Yadav
M.Sc. Scholar, Department of Vegetable Science, College of Horticulture and Forestry, Acharya Narendra Deva University of Agriculture & Technology, Kumarganj, Ayodhya, Uttar Pradesh, India

Dr. CN Ram
Professor, Department of Vegetable Science, Acharya Narendra Deva University of Agriculture & Technology, Kumarganj, Ayodhya, Uttar Pradesh, India

Agnivesh Yadav
PhD Scholar, Department of vegetable Science, College of Horticulture and Forestry, Acharya Narendra Deva University of Agriculture & Technology, Kumarganj, Ayodhya, Uttar Pradesh, India

Lokesh Yadav
PhD Scholar, Department of vegetable Science, College of Horticulture and Forestry, Acharya Narendra Deva University of Agriculture & Technology, Kumarganj, Ayodhya, Uttar Pradesh, India

Rohit Kumar Patel
M.Sc.Scholar, Department of vegetable Science,College of Horticulture and Forestry, Acharya Narendra Deva University of Agriculture & Technology, Kumarganj, Ayodhya, Uttar Pradesh, India

Corresponding Author:
Vikas Yadav
M.Sc. Scholar, Department of Vegetable Science, College of Horticulture and Forestry, Acharya Narendra Deva University of Agriculture & Technology, Kumarganj, Ayodhya, Uttar Pradesh, India

Mean performance of yield and its attributing characters in germplasm of Brinjal (*Solanum melongena* L.)

Vikas Yadav, Dr. CN Ram, Agnivesh Yadav, Lokesh Yadav and Rohit Kumar Patel

DOI: https://doi.org/10.33545/26174693.2024.v8.i7l.1632

Abstract
The present study was conducted at the College of Horticulture and Forestry, Acharya Narendra Deva University of Agriculture & Technology, Kumarganj, Ayodhya during the rainy season of 2022-23. The objective of this study is to find out the genetic variability within the genotypes. Plant material consisted of 40 genotypes of Brinjal including 1 check namely NDB-2 in randomized block design of 3x1.8m^2 with three replications. Evaluation was done for different yield and quality traits. Among the test entries, range for marketable yield *per* plant varied from 134.67 to 692 and it was highest total fruit yield per plant was observed in NDB-21-9 (2544.73) followed by NDB-24 (2539.89), NDB-21-4 (2520.78), which were found significant over check variety NDB-2 (1775.46).

Keywords: Brinjal, marketable yield, earliness

Introduction
Brinjal (*Solanum melongena* L.) is a self-pollinated annual herbaceous plant native to the tropical regions and subtropics, mainly India, Japan, and Indonesia. However, due to heterostyly, the level of cross pollination has been observed to be as high as 29%, hence it is classed as an often-cross pollinated crop or a facultative cross-pollinated crop. It is a diploid with the chromosomal number 2n=24 and belongs to the huge Solanaceae family, which also includes a number of other crop species, most notably potato, tomato, chilli, and tobacco.
Solanum incanum, a wild species with a wide distribution in at least ten regions in India, is the ancestor of the cultivated species, *Solanum melongena*. The earliest record of brinjal in India dates from 300 B.C. to 300 A.D. At least thirty-three Sanskrit names for brinjal have been mentioned in ancient Indian literature, with the most prevalent being Varttaka, Bhantaki, and Vattingan. It is grown across Africa since about the ninth century A.D.
Brinjal is being cultivated in India over an area of 1.18 million ha with an average annual production of 17.81 million tonnes and productivity of 15.09 mt/ha. It is distributed in Orissa, Bihar, Karnataka, West Bengal, Andhra Pradesh, Maharashtra and Utter Pradesh. In Uttar Pradesh, brinjal is being cultivated on an area of 4.70 lakh ha with annual production of 152.56 lakh tonnes. (Anonymous., 2022) [1].
In comparison to tomatoes, brinjal fruits are rich in carbohydrates (4.0 g), proteins (1.4 g), fiber (1.3 g), and minerals such as calcium (9.0 mg), copper (0.08 mg), manganese (0.25 mg), magnesium (14 mg), potash (2.0 mg), zinc (0.23 mg), phosphorus (47 mg), and iron (0.3 mg), as well as vitamins such as thiamine (124IU), niacin, pantothenic acid, and folate. Brinjal has a high-water content and is a great cholesterol regulator. It also contains fatty acids. It has therapeutic qualities.
Brinjal, often known as eggplant, is a perennial plant which is commercially cultivated as an annual crop. The inflorescence typically solitary, however it may develop into a cluster of 2-5 flowers. The solitary or clustered nature of the inflorescence is a varietal feature. The flower is complete and hermaphrodite. Heterostyly is a frequent characteristic, and fruit setting flowers are long (70-85%) and medium-styled (12-55%). Non-fruit setting flowers are short-styled and pseudo-styled. There are three main botanical variants of the *S. melongena* species, including the common brinjal, which has large, spherical fruits and is classified as

var. esculentum. The long, slender varieties are classified as var. serpentinum, whereas dwarf brinjal plants are classified as var. depressum (Choudhury, 1976) [4]. The degree of insect cross-pollination in India has been estimated to be 2-48%, making it a frequently cross-pollinated crop.

It can be grown successfully in almost all parts of India, with the possible exception of higher elevations. It is a warm-season crop that is extremely sensitive to frost. A long, warm growth season is ideal for best brinjal production. Brinjal is grown primarily throughout the autumn-winter season, but minor production occurs during the spring-summer season as well. However, throughout the spring-summer season, high temperatures (over 35 °C) result in a significant drop in brinjal production due to poor fruit set. The optimal temperature range for development and fruit set is 15.5-21.1 °C. Many round cultivars set fruit at slightly lower temperatures and are susceptible to frost, whereas long-fruited varieties set fruit at higher temperatures and are frost-tolerant.

Brinjal crops have a wide range of variation and higher genetic variance in terms of fruit color, shape, size, maturity, vegetative characteristics, and plant spinyness among the indigenous material.

Brinjal is the most significant crop for growers and consumers, so there is an acute need to boost productivity to meet increasing demand throughout the year. The information often required for generating high yielding varieties in a certain species concerns the level of genetic diversity for desirable features in the available germplasm. Evaluation of germplasm is the fundamental tool for identifying valuable genotypes. The high degree of natural diversity in many attributes among genotypes means that there is plenty of opportunity for improvement in economic traits. Large variety enhances the chance of developing new forms.

Phenotypic variability changes with changing environmental conditions, whereas genetic variability remains constant and is more valuable to a plant breeder for selection or hybridization. Yield is a fairly complicated trait that is regulated by multiple yield-contributing components and is heavily influenced by environmental influences; hence, estimations of heritability and genetic progress are valuable for selection.

Materials and Methods

The experimental plant material consists of 40 Genotypes of Brinjal. These genotypes were evaluated in a Randomized block design of 3x1.8 m^2 with three replications during spring summer season of 2022-23. Twelve plants of each entry per replication were transplanted in 1st week of September on raised beds of width 60 cm at plant to plant spacing 50 cm. The crop will be raised using recommended Package of Practices of Vegetables by Department of vegetable Science, Acharya Narendra Deva University of Agriculture & Technology, Kumarganj, Ayodhya.

The data were collected on the Days to 50% flowering, Days to first fruit harvest, Plant Height (cm), Number of Primary Branch per Plant, Polar diameter of Fruit(cm), Equatorial diameter of fruit (cm), Length of pedicel (cm), number of Fruit per cluster, Average fruit weight(g), number of fruits per plant, Dry matter content (%), TSS (%). Total Fruit yield per plant (g) The data were analysed by windostat 9.2 data analysis software.

Results and Discussion

Days to 50% flowering ranged from 49.33 days (NDB-32) to 63.67 days (NDB-29). Days to 50% flowering were minimum in the genotype NDB-32 (42.67) followed by NDB-21-6 (50.00) and 2021/ NDB-3 (44.67) and highest in the genotype NDB-29 (63.67) with the grand mean of 54.58 days. A similar result reported by Balasubramaniyam *et al.* (2021) [2].

Days to first fruit harvest varied from 59.33 days (NDB-32) to 75.33 days (NDB-29). Among the 40 genotypes fifteen genotypes ware found superior for earliness than the check NDB-2 (64.67) and twenty-four genotypes were founded later values than the best check.

The plant height (cm) at the time of final harvest varied from 61.93 cm in case of 2020/BRLHBY-3 to 81.33 in case of NDB-20-7. Among the 40 genotypes NDB-20-7 (81.33) fallowed by NDB-20-11 (77.37), NDB-21-9 (75.70), NDB-20-6 (75.53), NDB-29 (75.17) and nineteen others were found significant against the check NDB-2 (69.20 cm). A similar result reported by Bhandari *et al.* (2017) [3].

The primary branches per plant varies from 1.73 (NDB-30) to 3.80 (NDB-21-9). Among the 40 genotypes NDB-21-9 (3.80), followed by NDB-20-9 and NDB-21-7 (3.47), NDB-21-5 (3.33), NDB-21-2 and NDB-21-8 (3.27), and thirty-one others were found significant for this trait against the check NDB-2 (1.93). A similar result reported by Kuswaha *et al.* (2023) [7].

Polar diameter of fruit ranged from 9.87cm (NDB-20-1) to 16.63 (NDB-21-8). Polar diameter of fruit was maximum in the genotype NDB-20-1 (9.87) followed by NDB-32 (16.63) and NDB-29 (16.10) and minimum in the genotype NDB-20-1 (9.87) with the grand mean of 13.61 cm. while the check NDB-2 have 12.73 cm.

Equatorial length of fruit varies from 4.00 (NDB-20-3) to 7.17 (NDB-30). Among the 40 genotypes NDB-30 (7.17), followed by NDB-22 (7.07), NDB-28 (7.03), NDB-21-8 (6.90), NDB-26 (6.77), NDB-22-1, NDB-36 (6.67), NDB-33 (6.57), and twenty-six others were found significant for this trait against the check NDB-2 (5.30).

Length of pedicel varies from 3.73 cm (NDB-20-11) to 6.67 (NDB-22). Length of pedicel was maximum in the genotype NDB-22 (6.67) followed by NDB-20-6 (6.10) and NDB-29 (6.10) and minimum in the genotype NDB-20-11 (3.73) with the grand mean of 4.91 cm. while the check NDB-2 have 4.50 cm. A similar result reported by Chaudhary *et al.*, (2024) [6].

The number of fruits per cluster ranged from 2.67 (NDB-21-7) to 4.23 (NDB-20-11). Among the 40 genotype 2021/BRLVAR-10 (27.53), and 2020/ NDB-4 have lowest number of fruit per cluster (2.67), while maximum in the genotype 2020/BRLVAR-11 (4.23), followed by NDB-20-9, NDB-29 (4.20), and fourteen others were found significant for this trait against the check NDB-2 (3.53). A similar result reported by Srivastava *et al.* (2019) [9].

The average fruit weight ranged from 60.23 g (2020/BRLVAR-6) to 85.77 g (NDB-21-10). Among the 40 genotypes, only eight genotypes were found significant *viz.*, NDB-21-10 (85.77) have maximum average fruit weight fallowed by NDB-21-6 (83.13) and lowest observed in the genotype NDB-20-6 (60.23). The grand mean for this trait is 72.87 and the check NDB-2 have average weight (76.37 g). A similar result reported by Tirkey *et al.* (2018) [10].

The variations in the number of fruits per plant varied from

21.20 (NDB-20-11) to 33.57 (NDB-21-4), and the grand mean value was 27.47. The highest number of fruits per plant was noticed in NDB-21-4 (33.57) closely followed by NDB-21-5(33.57), and NDB-32 (33.33), While lowest in case of the genotype NDB-20-11(21.20) and check NDB-2 have (23.23) fruits per plant. A similar result reported by Chaudhary *et al.*, (2014) [6].

Result of dry matter content revealed significant variations among the population which ranged from 6.10% (NDB-31) to 8.13% (NDB-32) with a mean of 7.08%. The genotype NDB-31 (6.10%) followed by NDB-28 (6.23%), NDB-2 (6.30%), which were found significant for the dry matter content than best check NDB-2 (8.00%).

The TSS (^{0}Brix) varied from 4.57 (NDB-20-5) to 6.20 (NDB-20-9). Among the 40 genotypes, NDB-20-9 (6.20), followed by NDB-20-8 (5.80), 2021/ NDB-1 (5.80), and twenty-three others were found significant for this trait than the check NDB-2 (4.90). A similar result reported by Kuswaha *et al.* (2023) [7].

The result showed that a significant difference was observed between the genotypes for the total fruit yield per plant, which ranged from 1310.43 g (NDB-20-11) to 2544.73 g (NDB-21-9) with a mean value of 2003.13 g. The highest amount of total fruit yield per plant was observed in NDB-21-9 (to 2544.73) followed by NDB-24 (2539.89), NDB-21-4 (2520.78), which were found significant over check variety NDB-2 (1775.46). A similar result reported by Prasanna *et al.*, (2023) [8].

Table 4.2: Mean performance of fourty genotypes for thirteen characters in brinjal

Trait	Days to 50% flowering	Days to first fruit harvest	Plant Height (cm)	Number of Primary Branch per Plant	Polar diameter of Fruit (cm)	Equatorial diameter of fruit (cm)	Length of pedicel (cm)	number of Fruit per cluster	Average fruit weight (g)	number of fruit per plant	Dry matter content (%)	TSS (%)	Total Fruit yield per plant (g)
NDB-20-2	52.00	64.33	67.70	2.13	12.70	5.80	4.47	3.27	73.47	24.83	7.10	4.77	1826.07
NDB-20-3	51.33	65.67	70.27	2.53	11.20	4.00	4.07	3.80	75.23	30.73	7.23	5.37	2309.81
NDB-20-5	55.33	66.00	68.17	2.13	14.20	5.07	4.20	3.40	78.43	23.93	6.40	4.57	1877.33
NDB-20-6	54.67	61.67	75.53	3.13	15.60	6.00	6.10	4.07	60.23	31.93	6.67	5.67	1924.01
NDB-20-7	53.67	63.67	81.33	2.10	11.87	5.50	4.87	3.00	62.30	29.47	7.30	4.60	1835.11
NDB-20-8	52.33	62.67	66.63	2.27	15.23	5.60	5.07	3.53	79.67	27.20	6.63	5.80	2167.46
NDB-20- 9	61.67	70.33	73.23	3.47	12.60	5.47	4.20	4.20	72.57	25.33	7.37	6.20	1841.30
NDB-20-10	52.67	62.67	72.97	3.07	12.70	6.13	5.73	3.47	73.43	21.33	7.27	4.63	1574.50
NDB-20-11	52.00	63.67	77.37	3.07	14.83	5.27	3.73	4.23	61.83	21.20	8.00	4.93	1310.43
NDB-20-12	59.33	67.00	68.30	2.13	13.40	6.37	4.67	3.33	70.77	31.33	6.47	4.60	2217.90
NDB-21- 1	51.00	60.67	64.30	2.67	13.03	5.10	5.93	2.93	72.97	30.60	7.63	5.80	2231.42
NDB-21- 2	53.67	65.00	66.03	3.27	13.03	5.03	4.13	3.53	75.67	32.67	6.30	4.77	2472.27
NDB-21- 3	50.33	62.67	63.73	2.53	13.47	6.10	3.87	3.93	61.43	22.20	7.60	5.37	1364.40
NDB-21-4	53.33	63.00	64.93	2.60	13.20	5.03	5.87	3.27	75.17	33.57	7.40	4.90	2520.78
NDB-21-5	58.33	66.33	71.20	3.33	14.30	6.40	4.53	3.67	72.63	33.57	6.60	5.60	2435.17
NDB-21- 6	50.00	64.67	72.50	3.07	13.03	5.83	4.20	3.47	83.13	24.87	7.10	4.60	2067.65
NDB-21- 7	52.33	62.00	70.40	3.47	15.73	5.60	4.53	2.67	72.43	32.27	7.40	4.97	2336.91
NDB-21- 8	53.00	63.67	67.33	3.27	16.63	5.70	4.40	3.20	74.30	21.33	7.13	4.70	1584.30
NDB-21-9	53.33	63.67	75.70	3.80	13.57	6.90	4.53	2.73	79.27	32.10	7.10	5.53	2544.73
NDB-21-10	53.33	62.67	65.23	2.40	15.23	6.47	4.07	4.13	85.77	27.67	6.37	4.57	2370.23
NDB-22- 1	54.00	62.00	67.67	3.07	9.87	6.67	6.07	3.27	71.30	24.67	7.00	5.10	1759.37
NDB-22- 2	52.33	60.00	70.13	2.93	14.83	6.17	6.10	3.53	72.23	21.53	7.47	5.50	1556.09
NDB-22- 3	55.67	63.67	61.93	2.20	12.83	6.67	3.97	2.67	68.23	31.33	6.57	5.50	2139.70
NDB-22-4	59.33	67.33	66.73	2.73	11.47	6.60	5.47	3.93	81.20	29.20	7.30	5.03	2372.17
NDB- 22	56.00	64.67	73.67	3.40	13.27	7.07	6.67	3.40	65.60	28.67	7.13	5.50	1879.53
NDB-23	51.67	61.67	72.70	2.80	11.53	6.53	4.63	3.60	70.73	24.67	6.70	4.70	1745.47
NDB-24	56.33	65.33	63.23	2.27	15.17	4.97	4.27	3.40	81.30	31.27	7.57	4.70	2539.89
NDB-26	53.67	62.67	69.17	2.47	12.97	6.77	4.87	3.27	73.17	23.90	7.60	5.60	1750.29
NDB-27	57.00	65.33	72.37	2.40	16.00	5.77	6.03	3.40	72.67	30.87	7.27	5.30	2243.55
NDB-28	52.33	60.67	69.57	2.33	13.57	7.03	5.40	3.47	72.47	26.67	6.23	4.90	1935.47
NDB-29	63.67	75.33	75.17	2.47	16.10	5.37	5.63	4.20	71.43	25.50	6.83	5.13	1823.30
NDB-30	54.33	62.67	73.67	1.73	11.80	7.17	5.93	3.60	72.77	29.33	7.30	5.57	2135.37
NDB-31	58.00	66.67	70.07	2.07	13.30	5.70	4.93	3.73	70.07	24.27	6.10	5.07	1699.67
NDB-32	49.33	59.33	68.00	2.60	16.63	5.40	5.20	2.93	63.23	33.33	8.13	5.17	2108.37
NDB-33	60.00	68.33	72.50	2.60	12.57	6.57	4.57	3.33	79.43	30.67	6.93	4.90	2433.47
NDB- 34	52.67	62.00	74.23	3.27	13.07	6.43	3.73	3.80	74.13	22.33	7.27	5.57	1654.68
NDB-35	58.67	68.33	71.73	2.67	13.53	5.60	4.60	3.27	71.43	27.57	6.67	4.90	1969.43
NDB-36	53.67	63.00	70.80	1.93	13.53	6.67	5.40	4.03	74.77	28.67	7.20	4.83	2140.53
NDB-37	55.67	65.33	71.40	2.23	13.87	6.23	5.23	3.40	71.40	23.17	6.90	5.03	1651.57
NDB-2 (Check)	55.00	64.67	69.20	1.93	12.73	5.30	4.50	3.53	76.37	23.23	8.00	4.90	1775.46
Mean	54.58	64.28	70.17	2.66	13.61	5.95	4.91	3.49	72.87	27.47	7.08	5.12	2003.13
C.V.	6.49	5.79	6.62	6.28	7.73	7.43	10.99	8.33	2.33	6.28	2.43	2.02	6.38
S.E.	2.05	2.15	2.68	0.10	0.61	0.26	0.31	0.17	0.98	1.00	0.10	0.06	73.81
C.D. 5%	5.76	6.05	7.55	0.27	1.71	0.72	0.88	0.47	2.76	2.80	0.28	0.17	207.81
C.D. 1%	7.64	8.03	10.02	0.36	2.27	0.95	1.16	0.63	3.66	3.72	0.37	0.22	275.61
Range Lowest	49.33	59.33	61.93	1.73	9.87	4.00	3.73	2.67	60.23	21.20	6.10	4.57	1310.43
Range Highest	63.67	75.33	81.33	3.80	16.63	7.17	6.67	4.23	85.77	33.57	8.13	6.20	2544.73

Conclusion

Brinjal (*Solanum melongena* L.) is one of the important vegetable crops of Solanaceae family. The present investigation was undertaken to evaluate 40 genotypes of Brinjal for horticultural traits. The genotypes *viz*. NDB-21-9 (to 2544.73) followed by NDB-24 (2539.89), NDB-21-4 (2520.78), which were found significant over check variety NDB-2 (1775.46) in terms of marketable fruit yield. It can be concluded that, as a wide range of variation for almost all the economically important traits was present in this crop, so there is a vast scope for improvement through different breeding procedure.

Acknowledgement

I express my wholehearted gratitude and sincere thanks to my Major Advisor Dr. C.N. Ram, Department of Vegetable Science, College of Horticulture and Forestry, Acharya Narendra Deva University of Agriculture & Technology, Kumarganj, Ayodhya, for suggesting this interesting research work and for all her scholarly guidance, keen interest, support and suggestive criticism throughout the course of this investigation and preparation of this research. Despite her multidimensional responsibilities, the most affectionately extended kind cooperation and encouragement.

References

1. Anonymous. Data base National Horticulture Board. 85, Gurgaon, Haryana, India; c2022-23.
2. Balasubramaniyam K, Haripriya K, Kumar TB, Elangaimannan R. Assessment of genetic variability, heritability and genetic advance in brinjal (*Solanum melongena* L.). Plant Archi. 2021;21(1):1784-1786.
3. Bhandari HR, Srivastava K, Reddy GE. Genetic variability, heritability and genetic advance for yield traits in tomato (*Solanum lycopersicum* L.). Int J Curr Microbiol App Sci. 2017;6(7):4131-4138.
4. Choudhary B. Vegetables. 4th edition. New Delhi: National Book Trust; c1976. p. 50-58.
5. Chaudhary P, Kumar S. Variability, heritability and genetic advance studies in eggplant (*Solanum melongena* L.). Plant Archi. 2014;14(1):483-486.
6. Chaudhary AK, Yadav GC, Prasad L, Yadav A, Kumar R, Kumar L, *et al*. Effect of correlation and path analysis in brinjal (*Solanum melongena* L.). Plant Cell Biotechnol Mol Biol. 2024;25(1-2):100-109.
7. Kuswaha C, Singh L, Vyas RP, Singh PK, Rathore T, Yadav A, *et al*. Study about the genetic variability, heritability and genetic advance for yield and yield attributing traits of brinjal (*Solanum melongena* L.). Int J Environ Climate Change. 2023;13(11):4566-4574.
8. Prasanna K, Sarada C, Naidu LN, Rao MP, Salomi DR. Study on genetic variability, heritability and genetic advance for yield and its attributing parameters in brinjal [*Solanum melongena* (L.)] genotypes. The Pharm Innov J. 2023;12(9):2240-2242.
9. Srivastava S, Saidaiah P, Shivraj N, Reddy KR. Study of genetic variability, heritability and genetic advance for yield and yield related components of brinjal [*Solanum melongena* (L.)] genotypes. J Pharmacog Phytochem. 2019;8(4):917-919.
10. Tirkey M, Saravana S. Studies on variability, heritability and genetic advance for yield and its attributes in brinjal (*Solanum melongena* L.). J Pharmacog Phytochem. 2018;7(1):1181-1183.