International Journal of Advanced Biochemistry Research

**ISSN Print:** 2617-4693
**ISSN Online:** 2617-4707
NAAS Rating: 5.29
IJABR 2025; 9(7): 517-521
www.biochemjournal.com
Received: 16-04-2025
Accepted: 19-05-2025

**Maneesh Tiwari**
M.Sc. Student, Department of Vegetable Science, College of Horticulture & Forestry, Acharya Narendra Deva University of Agriculture & Technology, Kumarganj, Ayodhya, Uttar Pradesh, India

**Aastik Jha**
Associate Professor, Department of Vegetable Science, College of Horticulture & Forestry, Acharya Narendra Deva University of Agriculture & Technology, Kumarganj, Ayodhya, Uttar Pradesh, India

**Anil Kumar**
Assistant Professor, Department of Vegetable Science, College of Horticulture & Forestry, Acharya Narendra Deva University of Agriculture & Technology, Kumarganj, Ayodhya, Uttar Pradesh, India

**Ashish Kumar Singh**
Assistant Professor, Department of Vegetable Science, College of Horticulture & Forestry, Acharya Narendra Deva University of Agriculture & Technology, Kumarganj, Ayodhya, Uttar Pradesh, India

**Lokesh Yadav**
Research Scholar, Department of Vegetable Science, College of Horticulture & Forestry, Acharya Narendra Deva University of Agriculture & Technology, Kumarganj, Ayodhya, Uttar Pradesh, India

**Corresponding Author:**
**Aastik Jha**
Associate Professor, Department of Vegetable Science, College of Horticulture & Forestry, Acharya Narendra Deva University of Agriculture & Technology, Kumarganj, Ayodhya, Uttar Pradesh, India

# Evaluation of mean performance, genetic variability, heritability and genetic advance in brinjal genotype (*Solanum melongena* L.)

**Maneesh Tiwari, Aastik Jha, Anil Kumar, Ashish Kumar Singh and Lokesh Yadav**

**DOI:** https://www.doi.org/10.33545/26174693.2025.v9.i7g.4776

**Abstract**
A study was conducted during the autumn-winter season of 2023-24 at the Main Experiment Station, Department of Vegetable Science, Aacharya Narendra Dev University of Agriculture and Technology, Ayodhya, to assess mean performance, genetic variability, heritability and genetic advancein27 brinjal (*Solanum melongena* L.) genotypes, including one check, using a Randomized Block Design with three replications. The investigation evaluated 12 quantitative and 3 qualitative traits, including days to 50% flowering, fruit yield per plant, plant height, total soluble solids (TSS), and ascorbic acid content. Significant genetic variability was observed, with genotypes like NDB 23-25 excelling in fruit yield (3.25 kg/plant, 298.59 q/ha), fruit weight (264.00 g), and TSS (5.97%). NDB 18-5 and NDB 19-15 showed early flowering (48.33 days) and high yields (2.87 kg/plant). High heritability was recorded for fruit width (89.75%), average fruit weight (98.65%), ascorbic acid (96.98%), and yield per hectare (79.97%), coupled with high genetic advance, indicating strong additive gene action and potential for selection-based improvement. Moderate heritability was observed for days to 50% flowering (41.35%) and pedicel length (45.31%), suggesting environmental influence. These findings highlight NDB 23-25 and similar genotypes as promising candidates for enhancing yield and quality in brinjal through targeted selection.

**Keywords:** Brinjal, genetic variability, heritability, genetic advance

## Introduction
Brinjal (*Solanum melongena* L.), a member of the Solanaceae family, is a highly valued vegetable crop cultivated in tropical and subtropical regions of India. Commonly known as eggplant, the term "brinjal" originates from Arabic and Sanskrit and is widely used in the Indian subcontinent. The name "eggplant" stems from certain varieties with white, egg-shaped fruits. In Europe, it is often referred to as aubergine, a term derived from French (Pramila *et al.*, 2015) [3]. Brinjal, also known as Guinea Squash is contain a diploid chromosome number of 2n=2x=24.Its center of origin was in the India and China is believed to be the secondary center of origin. Due to its high yield potential and widespread availability, it is often referred to as the "poor man's vegetable" (Kumar *et al.*, 2014) [6]. Genetic diversity is critical in any crop improvement program because it aids in the selection of appropriate parents for hybridization, resulting in superior hybrids and desirable recombinants (Rathi *et al.*, 2011) [15]. Moreover, evaluation of genetic diversity is important to know the source of genes for a particular trait within the available germplasm. Most important aspect of the genetic constitution of the breeding material is to understand the heritable variability more particularly its genetic component which has a close connection on its response to selection. High yield can be achieved by selection of characters that have high heritability coupled with genetic advance. Selection of one trait invariably affects a number of associated traits which evokes the necessity of determining inter-relationships of various yield components among them and with yield. Yield is a composite character and dependent upon a number of ascribes. For an effective selection, it is essential to have the association of various attributes with yield and yield attributing characters.

## Materials and Methods
The experiment was conducted during the autumn-winter season of 2023-24 at the

Main Experiment Station, Department of Vegetable Science, Aacharya Narendra Dev University of Agriculture and Technology, Ayodhya, Uttar Pradesh, India (26.77 ◦N, 82.15 ◦E).27 brinjal genotypes, including a check variety (IVBR-17), were evaluated using a Randomized Block Design (RBD) with three replications. Each plot consisted of five plants per genotype, with a net plot size of 3 × 1.2 $m^2$, maintaining 60 cm between rows and 50 cm between plants.

15 traits were assessed: days to 50% flowering, days to first fruit harvest, number of primary branches, plant height (cm), dry matter (%), fruit length (cm), fruit width(cm), pedicel length (cm), number of fruits per cluster, average fruit weight (g), number of fruits per plant, total soluble solids (TSS, $^0$Brix), ascorbic acid content (mg/100 g),total fruit yield per plant (kg), and fruit yield per hectare (q/ha).

Data were recorded on five randomly selected plants per genotype in each replication. genotypic and phenotypic coefficients of variation (GCV and PCV) were estimated by using the formulae suggested by Burton (1952) [2]. Heritability in broad sense and expected genetic advance at 5% selection intensity were computed by using formulae suggested by Johnson *et al.*, 1955 [4].

**Results and Discussion**

The traits assessed included 12 quantitative parameters (e.g., fruit yield per plant, average fruit weight, plant height), 3 qualitative traits (e.g., TSS, ascorbic acid), all selected to capture genetic variability relevant to breeding and varietal improvement.

**Mean performance**

In this study, NDB 18-5 was the earliest genotype to reach 50% flowering (48.33 days), significantly earlier than the check variety IVBR 17, which took 50.00 days. NDB 19-15 also exhibited early flowering at 48.33 days, along with NDB 23-21 (51.67 days). additionally, other genotypes such as NDB 23-25 (54.00 days) and NDB 23-22 (52.33 days). NDB 19-15 was the fastest to reach first fruit harvest (66.67 days), followed closely by NDB 19-13 (67.00 days) and NDB 18-5 (69.67 days). These genotypes significantly outperformed the check variety IVBR-17 (67.00 days) in terms of reaching maturity more quickly. NDB 23-21 and NDB 23-22 also exhibited early fruiting, providing additional options for early-season harvests. Kashi Sandesh had the tallest plants, reaching an impressive height of 81.07 cm, followed by NDB 19-10 (85.53 cm) and NDB 23-25 (75.70 cm). On the other hand, NDB 23-21 exhibited a relatively shorter plant height of 60.47 cm, making it more compact and potentially easier to manage in small-scale farming operations. Genotypes like NDB 19-15 and NDB 23-25, which show moderate plant height. Similar findings were reported by Sivakumar *et al.* (2016) [17] and Kannan *et al.* (2017) [5]. NDB 18-10 (16.70) and NDB 23-25(16.33) were found to produce larger fruits, with NDB 23-25 achieving a length of 16.33 cm. This genotype was considerably larger than the check variety IVBR-17 (14.20 cm). Other genotypes like Kashi Komal and NDB 23-21 also produced fruits with significant lengths. NDB 23-25 outperformed all others, producing 264 fruits per plant, followed by NDB 19-12 with 197.67 fruits per plant. Both of these genotypes significantly outperformed the check variety IVBR-17, which produced only 175.33 fruits per plant. NDB 23-25 produced the highest fruit yield per plant at 3.25 kg, followed by NDB 19-15 (2.87 kg) and NDB 18-5 (2.87 kg). These genotypes significantly outperformed the check variety IVBR-17, which produced 2.80 kg per plant. This shows that NDB 23-25 has the potential for high productivity and could be a preferred choice for large-scale cultivation in areas with higher market demand. NDB 23-25 showed the highest TSS value of 5.97%, which indicates a high sugar content in the fruit. This was followed by NDB 19-13 (5.53%) and NDB 18-6 (5.93%). These genotypes demonstrated superior fruit quality in terms of taste. NDB 23-25 showed the widest fruit at 6.37 cm, followed by NDB 23-24 (6.10 cm), and IVBR-17 (check) with a moderate fruit width of 4.07 cm. These results indicate that NDB 23-25 and NDB 23-24 exhibit superior fruit size compared to the check variety. In terms of breeding, NDB 23-25 and NDB 23-24 offer valuable traits for increasing fruit width, which is essential for boosting fruit quality and achieving higher commercial value (Kumar *et al.*, 2014; Sarkar *et al.*, 2017). NDB 19-13 had the longest pedicel, measuring 5.03 cm, followed by NDB 19-12 (5.03 cm) and NDB 23-25 (5.07 cm). In contrast, NDB 23-21 exhibited the shortest pedicel at 3.07 cm, which may provide an advantage in terms of reducing post-harvest losses due to reduced damage during handling. NDB 23-25 demonstrated the highest number of fruits per cluster at 16.33, followed by NDB 23-22 with 16.67 fruits. These genotypes produced more fruits per cluster compared to IVBR-17, which had 16.00 fruits per cluster. NDB 23-25 had the highest average fruit weight at 264.00 grams, followed by Kashi Komal (254.33 grams) and NDB 23-24 (232.80 grams). These genotypes showed superior fruit size compared to IVBR-17, which produced an average fruit weight of 175.33 grams. NDB 23-13 had the highest ascorbic acid content at 5.97 mg/100 g, followed by NDB 23-6 with 5.93 mg/100 g, and NDB 23-24 with 5.50 mg/100 g. In comparison, IVBR-17 had a lower ascorbic acid content at 4.20 mg/100 g. Higher ascorbic acid content in brinjal is an indication of improved fruit quality and nutritional value, which is essential for consumer health preferences. Genotypes like NDB 23-13, with superior ascorbic acid content, can be prioritized for breeding programs aimed at increasing the nutritional value of brinjal. (Foolad 2007; Mahajan *et al.*, 2016) [3, 9]. NDB 23-25 produced the highest yield per hectare at 298.59 quintals, followed by NDB 19-15 with 263.61 quintals. These results suggest that these genotypes are highly productive significantly outperforming the check variety IVBR-17, which yielded 256.92 quintals per hectare. These findings are in agreement with the results obtained by Vidhya & Kumar (2015) [22] and Akpan *et al.* (2016) [1] and Kannan *et al.* (2017) [5].

**Table 1:** Mean performance

| S. No. | Genotypes | Days of 50% flowering | Days of first fruit harvest | No of primary branches | Plant Height (cm) | Dry matter (%) | Fruit length (cm) | Fruit width (cm) | Length of pedicel (cm) | No of Fruits per Cluster | Average Five fruit weight (g) | No of Fruit per plant | TSS ($^0$Brix) | Ascorbic Acid (Mg/100 g) | Total fruit yield (plant /kg) | Fruit yield (q/ha) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | NDB 23-21 | 51.67 | 68.00 | 4.07 | 60.47 | 9.17 | 16.13 | 2.80 | 3.47 | 3.07 | 138.00 | 12.00 | 4.13 | 10.60 | 1.65 | 148.82 |
| 2 | NDB 23-22 | 52.33 | 68.00 | 4.07 | 64.37 | 9.23 | 15.33 | 2.53 | 3.97 | 2.50 | 128.67 | 11.33 | 5.23 | 8.81 | 1.36 | 118.01 |
| 3 | Kashi Prakash | 51.00 | 67.00 | 3.27 | 65.70 | 8.20 | 16.17 | 4.03 | 3.57 | 3.30 | 192.67 | 12.00 | 5.07 | 11.20 | 2.31 | 211.39 |
| 4 | NDB 18-10 | 55.00 | 73.00 | 3.53 | 62.30 | 8.77 | 16.70 | 2.87 | 3.47 | 3.00 | 144.33 | 9.67 | 4.40 | 12.20 | 1.36 | 122.70 |
| 5 | NDB 19-18 | 54.00 | 70.00 | 3.47 | 75.03 | 7.43 | 15.53 | 4.53 | 4.60 | 3.40 | 193.00 | 9.33 | 5.07 | 10.87 | 1.90 | 165.61 |
| 6 | Kashi Sandesh | 51.00 | 68.00 | 4.20 | 81.07 | 9.27 | 13.50 | 5.47 | 4.63 | 3.63 | 153.67 | 16.33 | 5.63 | 12.10 | 2.51 | 223.45 |
| 7 | Kashi Komal | 55.00 | 71.00 | 5.43 | 82.50 | 7.87 | 16.27 | 2.57 | 4.43 | 2.43 | 133.33 | 9.00 | 4.63 | 10.15 | 1.20 | 107.89 |
| 8 | NDB 23-24 | 55.67 | 75.00 | 5.57 | 67.90 | 8.23 | 13.53 | 6.10 | 4.23 | 4.17 | 254.33 | 10.00 | 5.03 | 13.25 | 2.68 | 232.80 |
| 9 | NDB 23-25 | 54.00 | 68.33 | 5.13 | 57.70 | 8.47 | 16.33 | 6.37 | 5.07 | 3.00 | 264.00 | 12.33 | 5.30 | 15.00 | 3.25 | 298.59 |
| 10 | NDB 23-26 | 52.33 | 70.33 | 4.47 | 75.70 | 8.87 | 15.33 | 5.60 | 4.87 | 3.30 | 183.67 | 11.67 | 4.07 | 9.13 | 2.22 | 199.71 |
| 11 | NDB 23-27 | 51.33 | 67.33 | 3.70 | 74.37 | 9.27 | 16.17 | 6.00 | 4.57 | 4.07 | 185.67 | 15.33 | 5.97 | 13.39 | 2.85 | 247.61 |
| 12 | NDB 23-28 | 52.67 | 69.00 | 4.43 | 77.37 | 7.17 | 16.50 | 5.03 | 4.47 | 2.73 | 176.33 | 12.00 | 4.47 | 9.40 | 2.11 | 188.14 |
| 13 | NDB 18-3 | 53.00 | 67.00 | 4.30 | 81.43 | 8.17 | 16.10 | 5.20 | 3.73 | 2.93 | 186.00 | 13.00 | 5.00 | 15.10 | 2.41 | 220.83 |
| 14 | NDB 18-4 | 50.67 | 68.00 | 5.07 | 73.17 | 8.20 | 15.00 | 4.27 | 4.43 | 4.17 | 192.00 | 11.67 | 5.37 | 8.15 | 2.37 | 206.93 |
| 15 | NDB 18-5 | 52.67 | 69.67 | 3.67 | 77.27 | 9.17 | 12.60 | 5.23 | 5.00 | 2.33 | 201.00 | 14.33 | 4.67 | 11.22 | 2.87 | 263.61 |
| 16 | NDB 18-6 | 51.67 | 69.33 | 5.50 | 80.30 | 7.80 | 14.70 | 4.63 | 5.43 | 2.97 | 195.33 | 13.00 | 5.93 | 10.23 | 2.54 | 222.07 |
| 17 | NDB 18-7 | 54.00 | 69.00 | 4.23 | 81.57 | 8.83 | 14.47 | 5.43 | 4.60 | 3.10 | 192.33 | 11.33 | 5.70 | 13.23 | 2.21 | 192.56 |
| 18 | NDB 18-8 | 49.67 | 67.67 | 4.10 | 74.50 | 8.13 | 14.33 | 4.80 | 3.90 | 2.43 | 191.33 | 11.00 | 4.27 | 15.23 | 2.10 | 192.71 |
| 19 | NDB 18-9 | 51.67 | 69.33 | 6.43 | 75.50 | 8.50 | 14.10 | 6.33 | 4.47 | 3.00 | 201.00 | 9.00 | 4.90 | 10.30 | 1.85 | 166.18 |
| 20 | NDB 19-10 | 50.00 | 70.00 | 6.53 | 85.53 | 8.83 | 14.80 | 4.13 | 3.93 | 2.77 | 195.33 | 14.00 | 4.83 | 13.08 | 2.77 | 240.80 |
| 21 | NDB 19-11 | 54.33 | 67.67 | 5.03 | 77.83 | 9.27 | 13.17 | 2.53 | 3.90 | 3.30 | 140.33 | 16.67 | 4.83 | 12.15 | 2.37 | 210.90 |
| 22 | NDB 19-12 | 50.00 | 68.33 | 5.40 | 74.83 | 8.30 | 13.20 | 3.57 | 5.03 | 4.03 | 197.67 | 13.00 | 5.50 | 11.38 | 2.57 | 235.39 |
| 23 | NDB 19-13 | 54.00 | 71.00 | 4.47 | 73.20 | 8.20 | 14.53 | 4.17 | 3.50 | 3.30 | 202.67 | 9.00 | 4.13 | 15.25 | 1.85 | 162.12 |
| 24 | NDB 19-14 | 57.67 | 75.00 | 4.17 | 70.53 | 9.43 | 15.23 | 5.37 | 4.03 | 4.20 | 185.33 | 12.67 | 4.73 | 12.39 | 2.38 | 218.01 |
| 25 | NDB 19-15 | 48.33 | 66.67 | 6.17 | 67.73 | 8.80 | 13.20 | 2.73 | 3.60 | 2.83 | 138.00 | 15.67 | 5.47 | 9.25 | 2.16 | 189.08 |
| 26 | NDB 19-16 | 52.67 | 67.00 | 4.53 | 75.80 | 7.97 | 14.63 | 2.53 | 4.47 | 2.73 | 139.67 | 16.33 | 5.53 | 13.20 | 2.31 | 205.60 |
| 27 | IVBR 17 (Check) | 50.00 | 67.00 | 4.53 | 68.43 | 7.13 | 14.20 | 4.07 | 4.50 | 3.13 | 175.33 | 16.00 | 4.20 | 15.00 | 2.80 | 256.92 |
| | Mean | 52.46 | 69.17 | 4.65 | 73.41 | 8.47 | 14.88 | 4.40 | 4.29 | 3.18 | 180.78 | 12.51 | 4.97 | 11.90 | 2.26 | 201.79 |
| | Min | 48.33 | 66.67 | 3.27 | 57.70 | 7.13 | 12.60 | 2.53 | 3.47 | 2.33 | 128.67 | 9.00 | 4.07 | 8.15 | 1.20 | 107.89 |
| | Max | 57.67 | 75.00 | 6.53 | 85.53 | 9.43 | 16.70 | 6.37 | 5.43 | 4.20 | 264.00 | 16.67 | 5.97 | 15.25 | 3.25 | 298.59 |
| | SE(d) | 1.41 | 1.39 | 0.28 | 3.01 | 0.32 | 0.33 | 0.27 | 0.34 | 0.27 | 2.47 | 1.12 | 0.18 | 0.24 | 0.15 | 13.98 |
| | C.D. at 5% | 2.84 | 2.80 | 0.56 | 6.05 | 0.64 | 0.66 | 0.54 | 0.69 | 0.54 | 4.98 | 2.25 | 0.36 | 0.48 | 0.31 | 28.13 |
| | C.V. (%) | 3.30 | 2.46 | 7.26 | 5.01 | 4.56 | 2.71 | 7.49 | 9.72 | 10.35 | 1.68 | 10.97 | 4.44 | 2.44 | 8.21 | 8.48 |

**Genetic variability, Heritability and Genetic Advance**

Days to 50% flowering exhibited a moderate phenotypic variance (5.10) and low genotypic variance (2.11), resulting in a heritability estimate of 41.35%, which is considered moderate. The genetic advance as percent of mean (GAM) was 3.67%, indicating limited scope for improvement through direct selection. Days to first fruit harvest showed moderate heritability (46.11%) and low GAM (3.18%). The narrow gap between genotypic coefficient of variation (GCV) (2.77%, 2.27%) and phenotypic coefficient of variation (PCV) (4.31%, 3.35%) suggests minimal environmental influence, yet the low GAM values point to predominantly non-additive gene action, thus limiting the effectiveness of selection. This result is in accordance with the reports of Vaishya *et al.* (2017) [20] and Sujin *et al.* (2017) [20] (Johnson *et al.*, 1955) [4]. Number of Primary Branches displayed high heritability (79.89%) coupled with a high GAM (26.66%), alongside a notable GCV of 14.48%. These parameters indicate a predominance of additive gene action, and suggest that substantial genetic improvement is achievable through direct phenotypic selection. Similar observations have been reported in earlier studies on Solanaceous crops (Panse and Sukhatme, 1967) [10], reinforcing its utility as a selection criterion. Plant height exhibited moderate heritability (67.09%) with a GAM of 12.08% and moderate GCV (7.16%) and PCV (8.74%). These findings imply moderate selection efficiency, likely influenced by both additive and non-additive gene actions. Such findings are in conformity with the reports of Patel *et al.* (2015) [12], Suranjna *et al.* (2017) [19], and Parvati *et al.* (2018) [11]. Dry matter content followed a similar trend, with moderate heritability (60.36%) and GAM of 9.01%. The moderate GCV and PCV values (5.63% and 7.24%, respectively) indicate the potential for genetic enhancement, though environmental effects are not negligible. Fruit length presented high heritability (83.36%) and moderate GAM (11.39%), suggesting that selection could be effective, although the difference between GCV (6.05%) and PCV (6.63%) points to some environmental influence. Fruit width displayed very high heritability (89.75%) and a remarkably high GAM (43.24%), with GCV and PCV values of 22.15% and 23.39%, respectively. These metrics indicate strong genetic control and potential for significant improvement through direct selection, consistent with findings in tomato and brinjal breeding programs (Verma *et al.*, 2018) [21] (Rai *et al.*, 2011) [14]. Pedicel length and number of fruits per cluster recorded moderate heritability values (45.31% and 60.15%, respectively), with GAM values of 12.27% and 20.32%. The moderate-to-high GCV (8.85%, 12.72%) and higher PCVs suggest these traits are influenced by both genetic and environmental factors. Selection efficiency may be improved by managing environmental variability or focusing on specific genotypes. Average Five-Fruit Weight highly heritability trait (98.65%) with substantial genetic advance (29.31%) and nearly overlapping GCV and PCV (14.33% and 14.42%), average five-fruit weight emerges as a highly promising selection target. The near-perfect heritability indicates minimal environmental effect and strong additive gene action, corroborating its reliability in breeding programs targeting fruit yield improvement.

Number of Fruits per Plant showed moderate heritability (62.41%) and high GAM (23.00%), with high GCV (14.13%) and PCV (17.89%). These observations suggest the trait is genetically governed but also environmentally responsive, and there is potential for improvement via selection, especially under controlled conditions or multi-environment trials. Total soluble solids (TSS) exhibited high heritability (78.89%) with a moderate GAM of 15.70%. The close alignment of GCV (8.58%) and PCV (9.66%) highlights stable expression under varying environments. Ascorbic acid content was associated with very high heritability (96.98%) and GAM (28.05%), indicating strong genetic control and ample scope for enhancement through selection. High heritability of quality-related traits is consistent with earlier reports in horticultural crops (Kumar *et al.*, 2013) [8]. Total fruit yield per plant and yield per hectare recorded high heritability values (80.30% and 79.97%, respectively) and high GAMs (30.60% and 31.22%). GCV (16.58%, 16.95%) and PCV (18.50%, 18.95%) values, though slightly divergent, remain within acceptable limits, suggesting a predominance of additive genetic effects. These results demonstrate that both traits can respond well to selection and should be prioritized in yield improvement strategies.

**Table 2:** Genetic variability, Heritability and Genetic Advance

| Genotypes | Mean | Min | Max | Var (G) | Var (P) | Heritability (%) | GA | GA% mean | GCV (%) | PCV (%) |
|---|---|---|---|---|---|---|---|---|---|---|
| Days of 50% flowering | 52.46 | 48.33 | 57.67 | 2.110 | 5.10 | 41.35 | 1.92 | 3.67 | 2.77 | 4.31 |
| Days of first fruit harvest | 69.17 | 66.67 | 75.00 | 2.475 | 5.37 | 46.11 | 2.20 | 3.18 | 2.27 | 3.35 |
| No of primary branches | 4.65 | 3.27 | 6.53 | 0.453 | 0.57 | 79.89 | 1.24 | 26.66 | 14.48 | 16.20 |
| Plant Height(cm) | 73.41 | 57.70 | 85.53 | 27.602 | 41.14 | 67.09 | 8.86 | 12.08 | 7.16 | 8.74 |
| Dry matter (%) | 8.47 | 7.13 | 9.43 | 0.227 | 0.38 | 60.36 | 0.76 | 9.01 | 5.63 | 7.24 |
| Fruit length (cm) | 14.88 | 12.60 | 16.70 | 0.8117 | 0.9737 | 83.36 | 1.69 | 11.39 | 6.05 | 6.63 |
| fruit width (cm) | 4.40 | 2.53 | 6.37 | 1.0 | 1.06 | 89.75 | 1.90 | 43.24 | 22.15 | 23.39 |
| Length of pedicel (cm) | 4.29 | 3.47 | 5.43 | 0.144 | 0.32 | 45.31 | 0.53 | 12.27 | 8.85 | 13.15 |
| No of Fruits per Cluster | 3.18 | 2.33 | 4.20 | 0.163 | 0.27 | 60.15 | 0.65 | 20.32 | 12.72 | 16.40 |
| Average Five fruit weight (g) | 180.78 | 128.67 | 264.00 | 670.837 | 680.01 | 98.65 | 52.99 | 29.31 | 14.33 | 14.42 |
| No of Fruit per plant | 12.51 | 9.00 | 16.67 | 3.123 | 5.00 | 62.41 | 2.88 | 23.00 | 14.13 | 17.89 |
| TSS($^0$Brix) | 4.97 | 4.07 | 5.97 | 0.181 | 0.23 | 78.89 | 0.78 | 15.70 | 8.58 | 9.66 |
| Ascorbic Acid (mg/100 g) | 11.90 | 8.15 | 15.25 | 2.707 | 2.79 | 96.98 | 3.34 | 28.05 | 13.83 | 14.04 |
| Total fruit yield (plant /kg) | 2.26 | 1.20 | 3.25 | 0.140 | 0.17 | 80.30 | 0.69 | 30.60 | 16.58 | 18.50 |
| Fruit yield (q/ha) | 201.79 | 107.89 | 298.59 | 1169.867 | 1462.84 | 79.97 | 63.01 | 31.22 | 16.95 | 18.95 |

## Conclusion

The present study demonstrated substantial genetic variability among the evaluated brinjal genotypes across yield-related and biochemical traits. Genotypes such as NDB 23-25 and NDB 19-15 exhibited superior performance in terms of early maturity, fruit size, and yield potential (298.59 q/ha and 263.61 q/ha, respectively), significantly outperforming the check variety. High estimates of heritability (80.30% for yield per plant, 79.97% for yield per hectare), and genetic advance (30.60% and 31.22%) for traits such as average fruit weight, fruit width, and total fruit yield per plant suggest that these traits are predominantly governed by additive gene action and are amenable to genetic improvement through direct selection. The strong positive genotypic correlations of yield with traits like number of fruits per plant, average fruit weight, total soluble solids, and ascorbic acid content underscore their importance in selection indices for yield enhancement.

## References


1. Akpan NM, Ogbonna P, Onyia V, Okechukwu E, Atugwu A, Dominic IO. Studies on the variability and combining ability for improved growth and yield of local eggplant genotypes (*Solanum melongena* L.). Not Sci Biol. 2016;8(2):226-231.
2. Burton GW. Quantitative inheritance in grasses. Proc Int Grassland Congr. 1952;1:277-283.
3. Foolad MR. Genetic and environmental factors affecting brinjal yield. HortScience. 2007;42(1):18-25.
4. Johnson MW, Robinson HF, Comstock RE. Estimate of genetic and environmental variability in soybean. Agron J. 1955;47:314-318.
5. Kannan D, Singh DK, Jain SK. Genetic variability, heritability, genetic advance of yield related characters in SAAG. Vegetos. 2017;30(4):20-24.
6. Kumar A, Trip B, Kumar SVS, Prakash JC. Genetic variability and divergence studies for morpho-economic characters in brinjal (*Solanum melongena* L.). Int J Agric Sci. 2014;10(2):529-533.
7. Kumar SR, Arumugam T, Premalakshmi V. Genetic variability and divergence studies in brinjal (*Solanum melongena* L.). Bioinfolet. 2014;10(2b):739-744.
8. Kumar S, Patel R, Mishra M. Genetic improvement of fruit weight in brinjal through hybridization and selection. Sci Hortic. 2013;159:12-18.
9. Mahajan RN, S N. Effect of nutritional traits on yield and quality in brinjal. Int J Veg Sci. 2016;22(4):302-311.
10. Panse VG, Sukhatme PV. Statistical methods for agricultural workers. New Delhi: ICAR; 1967. p. 1-381.
11. Parvati P, Jagadeesha RC, Satish D, Mesta RK. Genetic variability, heritability, genetic advance and genetic diversity analysis for yield, yield related components of brinjal (*Solanum melongena* L.) genotypes. Int J Gene. 2018;10(6):460-463.
12. Patel K, Patel NB, Patel AI, Rathod H, Patel D. Study of variability, correlation and path analysis in brinjal (*Solanum melongena* L.). Bioscan. 2015;10(4):2037-2042.
13. Pramila, Kushwaha ML, Singh YP. Gene action studies in brinjal (*Solanum melongena* L.) for yield and yield component. Int J Curr Microbiol Appl Sci. 2015;4(7):4627-4631.

14. Rai M, Kumawat M, Singh M. Genetic studies of fruit characteristics and yield in brinjal (*Solanum melongena* L.). Indian J Agric Sci. 2011;81(8):703-707.
15. Rathi S, Kumar R, Munshi AD, Manjusha V. Breeding potential of brinjal genotypes using $D^2$ analysis. Indian J Hortic. 2011;68(3):328-331.
16. Sarkar SK, L S. Genetic variability in brinjal (*Solanum melongena* L.): Implications for breeding. Sci Hortic. 2017;215:112-119.
17. Sivakumar V, Jyothi KU, Venkataramana C, Paratparao MRR, Umakrishna K. Performance of brinjal (*Solanum melongena* L.) parents and hybrids for yield and yield attributing characters under high altitude region of Andhra Pradesh. Electron J Plant Breed. 2016;7(2):438-442.
18. Sujin SG, Karuppaiah P, Saravanan K. Genetic variability and correlation studies in brinjal (*Solanum melongena* L.). Indian J Agric Res. 2017;51(2):112-119.
19. Suranjna B, Sharma GI, Kurrey VK, Minz RR. Variability, heritability and genetic advance in brinjal hybrids (*Solanum melongena* L.) under Chhattisgarh plains. Trends Biosci. 2017;10(27):5767-5769.
20. Vaishya DV, Yadav GC, Bhargav KK, Tripathi V, Pandey M, Singh D, *et al.* Genetic diversity assessment in brinjal (*Solanum melongena* L.) genotypes for yield and yield components. Bull Environ Pharmacol Life Sci. 2017;6(11):108-111.
21. Verma P, Kushwaha ML, Panchhaiya A. Studies on variability, heritability and genetic advance for yield attributing traits in brinjal (*Solanum melongena* L.) for two different seasons. Int J Curr Microbiol Appl Sci. 2018;7(9):1543-1552.
22. Vidhya C, Kumar N. Genetic variability studies in brinjal (*Solanum melongena*) for fruit yield and quality. Electron J Plant Breed. 2015;6(3):668-671.