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**Pooja Sahu**  
Department of Vegetable  
Science, R.A.K. College of  
Agriculture, Sehore, Madhya  
Pradesh, India

**Saurabh**  
Department of Vegetable  
Science, R.A.K. College of  
Agriculture, Sehore, Madhya  
Pradesh, India

**Manjula Mandloi**  
Department of Vegetable  
Science, R.A.K. College of  
Agriculture, Sehore, Madhya  
Pradesh, India

**RK Jaiswal**  
Department of Vegetable  
Science, R.A.K. College of  
Agriculture, Sehore, Madhya  
Pradesh, India

## Evaluation of different varieties of brinjal (*Solanum melongena* L.) For growth, yield and economics attributing characters

**Pooja Sahu, Saurabh, Manjula Mandloi and RK Jaiswal**

### Abstract

The present investigation entitled “Evaluation of different varieties of brinjal (*Solanum melongena* L.) for growth, yield and economics attributing characters” was carried out during *Rabi* season of 2020 at Horticulture Research Farm, Department of Horticulture, R.A.K. College of Agriculture, Sehore (M.P.). The results indicated that growth in terms of plant height (80.27 cm), number of branches plant<sup>-1</sup> (20.20), number of leaves plant<sup>-1</sup> (70.13), leaf area plant<sup>-1</sup> (14738.33 cm<sup>2</sup>), leaf area index (5.45) were found maximum in the variety Kashi Taru whereas, stem girth (4.67 cm), days to first flowering (38.39 days) and days to 50% flowering (46.55 days) were found maximum in variety Kavya. In the respect of yield contributing characters *i.e.* days to first fruit harvesting (56.43 days), fruit length (36.92 cm), fruit shape index (2.11), pedicel length (6.57 cm) were found maximum in variety Niranjana Baigan and average fruit weight (125.63g), number of fruits plant<sup>-1</sup> (28.17), fruit yield plant<sup>-1</sup> (2.37 kg plant<sup>-1</sup>), fruit yield plot<sup>-1</sup> (39.02 kg), fruit yield hectare<sup>-1</sup> (60.62 t) and economics analysis; gross income (3,03,100₹/ha), net income (2,40,972₹/ha), benefit cost ratio (3.87) were found maximum in the variety Kashi Taru, while the variety V<sub>12</sub> Sehore Selection-12 showed minimum least response in terms of growth, yield and economics of brinjal.

**Keywords:** *Solanum melongena* L., growth, economics, brinjal and yield

### Introduction

Brinjal (*Solanum melongena* L.) belongs to the family Solanaceae and genus *Solanum*. It is also known as eggplant, aubergine (French), guinea squash (English) and has chromosome number (2n=2x=24). It is normally self-fertilized hermaphrodite annual crop and originated from India. It is the most common and popular vegetable crop grown in all most all the parts of India except higher altitudes, round the year.

Brinjal is a versatile crop adapted to different agro-climatic regions and can be grown throughout the year. A number of cultivars are grown in India, consumer preference being dependent upon fruit color, size, and shape. The varieties of Brinjal display a wide range of fruit shapes and colours, ranging from oval or egg-shaped to long club-shaped; and from white, yellow, green, bicolor through degrees of purple pigmentation to almost black.

Brinjal is grown mainly for its tender and immature fruits. They are primarily used as cooked vegetable for the preparation of various dishes in different parts of the world. It is also used for making pickles and dehydrated products.

Brinjal is low in calories and has various macro and micro minerals which are beneficial for human health. Potassium is presented abundant in the eggplant, ranged from 200 to 600 mg/100 g of fresh fruit. It is also a rich source of magnesium, calcium and iron. The edible fresh and mature fruit contain 92.7 per cent moisture and a large number of chemical compounds including vitamin A (12.4 IU), vitamin C (12.0 mg), and vitamin B1 (0.04 mg) apart from organic acid and minerals. It is used in *Ayurveda* as appetizer, cardiotoxic and useful in *Vata* and *Kaph* etc. It is said to be good for diabetic patients.

Eggplant is reported to stimulate interapeptic metabolism of blood cholesterol resulting in marked drop in blood cholesterol level. The decholesterolizing action is attributed to presence of poly unsaturated fatty acids namely linoleic and linoleic acids and minerals like magnesium and potassium.

Brinjal being a long duration crop, higher fertility levels and better soil condition have significant and positive effect on productivity with proper crop management. Today we have so many varieties of brinjal available in the market, and it necessitates their evaluation to find

**Corresponding Author:**  
**Pooja Sahu**  
Department of Vegetable  
Science, R.A.K. College of  
Agriculture, Sehore, Madhya  
Pradesh, India

out the best suited varieties for a particular place that fulfill the requirement of farmers and consumers of specific choice. Looking at above facts and experiment was designed to evaluate the different varieties for growth and yield attributing parameters.

### Materials and Methods

The present investigation conducted at the Horticulture Research Farm, R.A.K. College of Agriculture, Sehore (M.P.). India during the *rabi* season of 2020-21. Twelve varieties V<sub>1</sub> (Kavya), V<sub>2</sub> (Nano), V<sub>3</sub> (Kashi Taru), V<sub>4</sub> (Sweta-12), V<sub>5</sub> (NBH-1156), V<sub>6</sub> (Ankur Sachin), V<sub>7</sub> (Pant Samrat), V<sub>8</sub> (Ankur-786), V<sub>9</sub> (Niranjan Baigan), V<sub>10</sub> (Ankur Vinayak), V<sub>11</sub> (Sehore selection 1), V<sub>12</sub> (Sehore selection 2) were sown in different rows on a raised bed nursery followed by normal nursery practices. The experiment was laid out in a randomized block design with three replications at the spacing of 60 cm and 45 cm between rows and plants, respectively. All the recommended cultural practices and plant protection

measures were followed to raise a healthy crop. The observations were recorded on growth characters; number of branches plant<sup>-1</sup>, leaf area plant<sup>-1</sup> (cm<sup>2</sup>), leaf area index, stem girth (cm), and yield characters; fruit length (cm), pedicel length (cm), fruit yield plot<sup>-1</sup>(kg) and fruit yield hectare<sup>-1</sup>(q) and economics analysis; cost of cultivation, gross income, net income, benefit cost ratio. The data was analyzed with respect to following characters were recorded on five plants selected at randomly and tagged in each plot excluding the border plant. Wherever, the results were found significant, critical differences (CD) were computed at 5 percent level of probability to draw statistical conclusions.

### Results and Discussion

The result obtained from this investigation, according to different parameter was presented in different tables. Statistically the data recorded on different parameters were analyzed as per experiment randomized block design. It explains the results obtained as follows:

**Table 1:** Performance of different brinjal varieties for growth parameters

| S. No.          | Varieties          | Number of branches plant <sup>-1</sup> | Leaf area plant <sup>-1</sup> (cm <sup>2</sup> ) | Leaf area index | Stem girth (cm) |
|-----------------|--------------------|--|--|-----------------|-----------------|
| V <sub>1</sub>  | Kavya              | 13.20                                  | 5269.93  | 1.95            | 4.67            |
| V <sub>2</sub>  | Nano               | 11.60                                  | 4796.03  | 1.78            | 4.33            |
| V <sub>3</sub>  | Kashi Taru         | 20.20                                  | 14738.33   | 5.45            | 3.80            |
| V <sub>4</sub>  | Sweta-12           | 12.20                                  | 5730.23  | 2.12            | 3.99            |
| V <sub>5</sub>  | NBH-1156           | 10.20                                  | 5877.09  | 2.18            | 3.22            |
| V <sub>6</sub>  | Ankur Sachin       | 15.07                                  | 7283.63  | 2.68            | 2.65            |
| V <sub>7</sub>  | Pant Samrat        | 17.87                                  | 11117.00   | 4.12            | 3.19            |
| V <sub>8</sub>  | Ankur-786          | 15.87                                  | 10408.67   | 3.85            | 4.35            |
| V <sub>9</sub>  | Niranjan Baigan    | 19.47                                  | 12230.00   | 4.51            | 3.21            |
| V <sub>10</sub> | Ankur Vinayak      | 12.00                                  | 6448.33  | 2.38            | 3.48            |
| V <sub>11</sub> | Sehore selection 1 | 12.43                                  | 4529.13  | 1.68            | 3.50            |
| V <sub>12</sub> | Sehore selection 2 | 9.80                                   | 4293.53  | 1.62            | 2.99            |
| S. E±           |                    | 0.59                                   | 20.27  | 0.01            | 0.07            |
| C.D. (5%)       |                    | 1.74                                   | 60.21  | 0.03            | 0.21            |

### Number of branches plant<sup>-1</sup>

The number of branches plant<sup>-1</sup> at 90 DAT (20.20) were substantially higher in variety Kashi Taru followed by Niranjan Baigan (19.47) and Pant Samrat (17.87) as compare to other varieties. While minimum number of branches plant<sup>-1</sup> was recorded in variety Sehore Selection-2 (9.8). Probable reason for increased number of branches due to the increased rates of photosynthesis and photosynthetic rate supply for maximum branches growth or change in endogenous auxin in turn in apical dominance. These findings are in agreement with the findings of Tripathi *et al.* (2009)<sup>[22]</sup>, Ranjan *et al.* (2009), Kumar *et al.* (2011), Nirmala *et al.* (2013)<sup>[14]</sup>.

### Leaf area plant<sup>-1</sup> (cm<sup>2</sup>) and Leaf area index

The mean leaf area plant<sup>-1</sup>(cm<sup>2</sup>) was recorded at 90 DAT were considerably maximum in variety Kashi Taru (14738.33cm<sup>2</sup>), followed by Niranjan Baigan (12230.00 cm<sup>2</sup>), Pant Samrat (11117.00 cm<sup>2</sup>) and Ankur-786 (10408.67 cm<sup>2</sup>), as compare to other varieties. However, it was observed minimum leaf area plant<sup>-1</sup> in variety Sehore Selection-2 (4293.53 cm<sup>2</sup>).

The mean leaf area index was recorded at 90 DAT were considerably maximum in variety Kashi Taru(5.45), followed by Niranjan Baigan (4.51), and Pant Samrat (4.12), as compare to other varieties. While, it was observed minimum

leaf area index in variety Sehore Selection-2 (1.62). Leaf area and leaf area index was significantly increased by nitrogen, possibly because nitrogen helps in greater assimilation of food material by the plant which resulted in greater meristematic activities of cells and consequently the number of leaves, length and width of leaf of plant. These findings are in agreement with the results reported by Ranjan *et al.* (2009), Nirmala *et al.* (2013)<sup>[14]</sup>, Chaturvedi *et al.* (2016)<sup>[5]</sup>.

### Stem Girth (cm)

The stem girth at all stages of measurement was manifested significantly in brinjal cultivars. The growth rate of the girth was less during early period than later one after transplanting under field conditions. The maximum girth was varying from one stage to other and variety to variety. At 90 DAT the final measurement, maximum stem girth was attained by Kavya (4.67 cm), followed by Ankur-786 (4.35 cm) and Nano (4.33 cm) as compare to other varieties. While minimum girth of stem was noted in the variety Ankur Sachin (2.65cm). The multiplication of horizontal cells of stem anatomy would have been the prime cause of stem girth. The findings are in agreement with the findings of Tripathi *et al.* (2009)<sup>[22]</sup>, Ranjan *et al.* (2009), Nirmala *et al.* (2013)<sup>[14]</sup> and Chaturvedi *et al.* (2016)<sup>[5]</sup>.

**Table 2:** Performance of different brinjal varieties for yield parameters

| S. No           | Varieties          | Fruit Length (cm) | Pedicel length (cm) | Fruit yield plot <sup>-1</sup> (kg) | Fruit yield hectare <sup>-1</sup> (t) |
|-----------------|--------------------|-------------------|---------------------|-------------------------------------|---------------------------------------|
| V <sub>1</sub>  | Kavya              | 12.83             | 4.73                | 32.61                               | 38.50                                 |
| V <sub>2</sub>  | Nano               | 5.85              | 4.60                | 27.01                               | 30.77                                 |
| V <sub>3</sub>  | Kashi Taru         | 20.90             | 5.17                | 39.02                               | 60.62                                 |
| V <sub>4</sub>  | Sweta-12           | 10.23             | 3.23                | 31.68                               | 35.55                                 |
| V <sub>5</sub>  | NBH-1156           | 15.13             | 5.23                | 25.41                               | 25.48                                 |
| V <sub>6</sub>  | Ankur Sachin       | 20.30             | 6.10                | 30.64                               | 32.50                                 |
| V <sub>7</sub>  | Pant Samrat        | 14.27             | 5.77                | 34.78                               | 44.89                                 |
| V <sub>8</sub>  | Ankur-786          | 16.70             | 4.90                | 33.16                               | 40.72                                 |
| V <sub>9</sub>  | Niranjan Baigan    | 36.92             | 6.57                | 35.67                               | 48.67                                 |
| V <sub>10</sub> | Ankur Vinayak      | 23.80             | 6.10                | 30.82                               | 33.50                                 |
| V <sub>11</sub> | Sehore selection 1 | 14.47             | 4.60                | 28.71                               | 30.83                                 |
| V <sub>12</sub> | Sehore selection 2 | 8.13              | 4.57                | 23.55                               | 25.05                                 |
|                 | S. E±              | 0.61              | 0.36                | 0.22                                | 0.48                                  |
|                 | C.D. (5%)          | 1.82              | 1.06                | 0.67                                | 1.42                                  |

### Fruit Length (cm) and Pedicel length (cm)

The mean length of fruit recorded were substantially maximum in variety Niranjan Baigan (36.92 cm) and followed by Ankur Vinayak (23.80 cm), Kashi Taru (20.90 cm), Ankur Sachin (20.30 cm) and Ankur-786 (16.70 cm) as compare to other varieties. While, the minimum fruit length (5.85 cm) was found in the Nano.

The maximum pedicel length (6.57 cm) was found in Niranjan Baigan, which was found statistically superior then all the varieties and minimum pedicel length (3.23 cm) was observed in Sweta-12. This may be due to increased supply of major plant nutrients. Nitrogen accelerates the development of growth and reproductive phases and protein synthesis, thus promoting fruit length and pedicel length. The findings of this study agree with those of Rai *et al.* (2000)<sup>[16]</sup>, Sao and Mehta (2009)<sup>[17]</sup>, Kumar *et al.* (2011), Kafyullah and Santhosha (2011)<sup>[9]</sup>, Karak *et al.* (2012)<sup>[10]</sup>, Chourasia and Sangeeta (2012)<sup>[6]</sup>, Kumar *et al.* (2013)<sup>[11]</sup>, Singh *et al.* (2014)<sup>[20]</sup>, Tripathy *et al.* (2017)<sup>[21]</sup>.

### Fruit yield plot<sup>-1</sup> (kg) and Fruit yield hectare<sup>-1</sup> (t)

Fresh fruit yield averaged data in the Table 2 indicate significant variation in different varieties. The highest fruit yield plot<sup>-1</sup> was obtained from the variety Kashi Taru (39.02 kg) and data for the fruit yield plot<sup>-1</sup> under different varieties were recorded and converted into fruit yield hectare<sup>-1</sup> (t). Fruit yield hectare<sup>-1</sup> were substantially highest in the variety Kashi Taru (60.62 t). The probable reason for enhanced fruit yield may be due to cumulative effects of nutrient (macro and micro) on vegetative growth which ultimately lead to more photosynthetic activities while, application of nutrient levels enhance carbohydrate and nitrogen metabolism of pectic substances, as well as improve the water metabolism and water relation in the plants. The findings of this study agree with those Negi *et al.* (2000)<sup>[13]</sup>, Baswana *et al.* (2002)<sup>[3]</sup>, Chattopadhyay *et al.* (2011)<sup>[4]</sup>, Singh *et al.* (2014)<sup>[20]</sup>, Ansari *et al.* (2014)<sup>[2]</sup>, Gogoi, *et al.* (2018)<sup>[8]</sup>, Vhankhande and Singh (2018)<sup>[22]</sup>, Alam *et al.* (2021)<sup>[11]</sup>.

### Economics analysis

**Table 3:** Economics of different varieties of brinjal

| S. No.          | Varieties          | Total cost of Cultivation (Rs ha <sup>-1</sup> ) | Gross income (Rs ha <sup>-1</sup> ) | Net income (Rs ha <sup>-1</sup> ) | B:C ratio |
|-----------------|--------------------|--|-------------------------------------|-----------------------------------|-----------|
| V <sub>1</sub>  | Kavya              | 62228  | 192500                              | 130272                            | 1: 2.09   |
| V <sub>2</sub>  | Nano               | 61628  | 153850                              | 92222                             | 1: 1.49   |
| V <sub>3</sub>  | Kashi Taru         | 62128  | 303100                              | 240972                            | 1: 3.87   |
| V <sub>4</sub>  | Sweta-12           | 60428  | 177750                              | 117322                            | 1: 1.94   |
| V <sub>5</sub>  | NBH-1156           | 61628  | 127400                              | 65772                             | 1: 1.06   |
| V <sub>6</sub>  | Ankur Sachin       | 61828  | 162500                              | 100672                            | 1: 1.62   |
| V <sub>7</sub>  | Pant Samrat        | 62228  | 224450                              | 162222                            | 1: 2.60   |
| V <sub>8</sub>  | Ankur-786          | 62028  | 203600                              | 141572                            | 1: 2.28   |
| V <sub>9</sub>  | Niranjan Baigan    | 61428  | 243350                              | 181922                            | 1: 2.96   |
| V <sub>10</sub> | Ankur Vinayak      | 62128  | 167500                              | 105372                            | 1: 1.69   |
| V <sub>11</sub> | Sehore selection 1 | 60128  | 154150                              | 94022                             | 1: 1.56   |
| V <sub>12</sub> | Sehore selection 2 | 59628  | 125250                              | 65622                             | 1: 1.10   |

Higher money value and less cost of cultivation are desirable traits for getting higher returns. Hence economics of the different varieties was work out. It is revealed from the data obtained that a significantly maximum yield of fruit of 606.2q ha<sup>-1</sup>, net income of 240972 Rs ha<sup>-1</sup> and benefit cost ratio of

3.87 was found in variety Kashi taru. While minimum yield of fruit of 250.5q ha<sup>-1</sup>, net income 65622 Rs ha<sup>-1</sup> and benefit cost ratio of 1.10 was found in variety Sehore Selection-2. Similar results have been reported by Shinde *et al.* (2010)<sup>[18]</sup> and Pan *et al.* (2011)<sup>[15]</sup>.



**Plate 1:** Standing crop at 90 DAT



**Plate 2:** Overview of the experiment field

## Conclusion

After the evaluation of varietal performance for growth and yield attributing characters of twelve different varieties, it was revealed that the fruits of V<sub>3</sub> (Kashi Taru) found significantly superior as compare to all varieties included in this study with respect to growth parameters, yield parameters and economic analysis of brinjal.

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