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**Nanthakumar S**
Professor and Head, Agricultural Research Station, Virinjipuram, Tamil Nadu Agricultural University, Tamil Nadu, India

**Pravinkumar P**
Department of Horticulture, APAC, Kalavai, Tamil Nadu, India

**D Rameshkumar**
Senior Research Fellow, Directorate of Agribusiness Development, TNAU, Coimbatore, Tamil Nadu, India

**Corresponding Author:**
**Nanthakumar S**
Professor and Head, Agricultural Research Station, Virinjipuram, Tamil Nadu Agricultural University, Tamil Nadu, India

# Effect of different growth regulators and their response to physiological and biochemical attributes in Brinjal (*Solanum melongena* L.)

**Nanthakumar S, Pravinkumar P and D Rameshkumar**

**Abstract**
The present investigation deals with the effects of foliar spray treatments on growth characters, biochemical attributes, yield attributes and quality parameters by using four growth regulators *viz*., Salicylic acid @ 200 ppm, Brassinosteriods @ 0.1 ppm, Triacontanol @ 5 ppm and NAA @ 40 ppm, and four organics *viz*., Seaweed extract @ 1.0%, Humic acid @ 1.0%, Panchagavya @ 5.0% and Vermiwash @ 5.0% were tested as foliar spray treatments in brinjal cv VRM-1. Water spray also was given as control treatment. Panchagavya treatment recorded maximum values in number of leaves, number of flowers per plant and number of fruits per plant. Panchagavya treatment as the best performing treatment among the foliar spray treatments in terms of fruit yield per plant. Next to Panchagavya treatment, foliar spray of Vermiwash produced maximum values on number of branches. Seaweed extract and Vermiwash sprays were found good in increasing ascorbic acid content in brinjal fruits. Triacontanol and Salicylic acid were effective in increasing total phenols. Humic acid and Seaweed extract treatment fared better in increasing total soluble solids.

**Keywords:** Regulators, response, physiological, biochemical, Brinjal, Solanum melongena L.

## Introduction
Brinjal or eggplant (*Solanum melongena* L.) Is also known as aubergine or guinea squash, an economically important vegetable crop, widely cultivated in the tropics, subtropics and warm temperate regions [1]. It originated in South East Asia [2] and belongs to solanaceae family. Studies on the effect of plant growth regulators in solanaceous vegetable crops have revealed that the application of some of the plant growth regulators has been found effective in reducing the flower and fruit drops, thereby enchancing production of brinjal per unit area and per unit time. This have been reported by [3, 4].

Salicylic acid, a naturally occurring plant hormone. It has numerous functions, particularly the inhibition of germination and growth, interference with root absorption, reduced transpiration and leaf abscission [5]. The brassinosteroids, especially brassinolide and homo brassinolides, have been evaluated for their role in increasing crop yield, stress tolerance and disease resistance [6]. The plant growth regulatory activity of triacontanol was first discovered by [7] in alfalfa (*Medicago sativa* L.). NAA (naphthalene acetic acid) is used to enhance fruit setting process, which is mostly auxin-like substance [8]. Humic substances, such as humic acid, fulvic acid are the major components (65-70%) of soil organic matter that increase plant growth enormously due to increasing cell membrane permeability, respiration, photosynthesis, oxygen and phosphorus uptake, and supporting root cell growth [9]. It is also used in different means such as foliar spray, soil application along with irrigation water, seed or seedling treatment [10]. Seaweed liquid fertilizer (slf) contains macro nutrients, trace elements, organic substances like amino acids and plant growth regulators such as, auxin, cytokinin and gibberellins. It has been proved that slf promoted the growth and yield of crop plants [11]. Vermiwash (vw), a foliar spray, is a liquid biofertilizer collected after the passage of water through a column of worm activation. In fact, the use of growth regulators and organics improved the production of brinjal including other vegetables in respect of better growth and quality, which ultimately lead to the general interest among scientists and farmers for commercial application of this substance.

## Materials and Methods
The experiments were conducted in the farm of the Adhiparasakthi Horticultural College,

Kalavai, Vellore District is situated at 2015' N latitude and 78020' E longitude. The maximum temperature ranges from $27^0$C in winter to $42^0$C in summer, while the minimum temperature varies from $19^0$C in winter to $24.5^0$C in summer. The spiny brinjal cv.VRM (BR) - 1 was selected for the study. It was a pure line selection from Elavambadi local of Vellore District released in 2010 by Krishi Vigyan Kendra, Vrinjipuram, Vellore District. It is highly popular in the Vellore District, because of spines on leaf, stem and calyx, and widely cultivated by the farmers. The experiment was laid out in a Randomized Block Design with three replications accommodating nine treatments in each replication. Experiment plot size 6 x 3 m and spaced under 60 x 60 cm were selected for the study. Treatments details are $T_1$ - Foliar spray of salicylic acid @ 200ppm, $T_2$ - Foliar spray of Brassinosteroids @ 0.1ppm, $T_3$- Foliar spray of Triacontanol @ 5ppm, $T_4$- Foliar spray of Triacontanol @ 5ppm, $T_5$- Foliar spray of Seaweed extract @ 1%, $T_6$ - Foliar spray of Humic acid @ 1%, $T_7$- Foliar spray of Panchagavya @ 5%, $T_8$- Foliar spray of Vermiwash @ 5% and $T_9$ - Control (Water spray). The foliar spray treatments will be given on 30 DAT and during 50 per cent flowering. Spray solutions will be mixed with surfactant @ one ml per litre. Observations were recorded on height of the plant, number of leaves, leaf area, leaf area index (LAI), number of branches per plant, days to first flowering, Number of flowers, Average fruit weight, Yield per plant, Yield per hectare, Total soluble solids, Ascorbic acid and Total phenol. The data generated were subjected to statistical scrutiny following the procedure outlined by [12].

## Result and Discussion

### Plant height (cm)

Pooled mean values for the both the crops indicated that Seaweed extract revealed maximum plant height value of 51.35 cm followed by Panchagavya (50.35 cm) indicating that these two treatments favoured increase in plant height (Table 1). Plant height was recorded at 50% flowering and at harvest stages in both the crops. Pooled mean values for both the crops at harvest showed dominance of Seaweed extract spray in promoting plant height (83.6 cm) followed by vermiwash spray (79.85 cm). Except humic acid and panchagavya treatments, the other treatments resulted in lower plant heights than control. Seaweed extract and Vermiwash sprays effected increase in plant height, while growth regulators like NAA, Triacontanol, Brassinosteroids and Salicyclic acid failed to increase plant height above control treatment [13]. recorded similar observation in brinjal [14]. recorded increased plant height in brinjal by applying Vermiwash which is in confirmity with the present experimental results, as Vermiwash spray resulted in better plant height, but next to Seaweed extract treatment.

### Number of leaves (no's)

Observation on leaf number at 50% flowering and at harvest in both the crops exhibited significant differences among the foliar spray treatments. Pooled mean values for the two crops established the superiority of Panchagavya (59.35) in producing more number of leaves followed by Vermiwash (58.8) (Table 1). Pooled mean values at harvest showed that Panchagavya, NAA, Seaweed extract and Vermiwash retained more number of leaves than the other treatments [15]. in tomato [17], in soyabean and in aswagandha obtained increased Number of leaves by Panchagavya spray [18]. reported that maximum leaf number was observed in okra, sugarcane and paddy by Vermiwash spray at 15 per cent concentration. In this experiment, Brassinosteroids treatment recorded low number of leaves indicating its inefficiency in increasing leaf number.

### Leaf area ($dm^2$)

Pooled mean values confirmed the superiority of Panchagavya in maintaining higher leaf area at 50% flowering. At harvest NAA and Panchagavya treatments performed far better than other treatments in terms of leaf area, as revealed by pooled mean values (130.78 $dm^2$ and 130.24 $dm^2$ respectively) (Table 2). Early development of Leaf area and maintaining at optimum level are important for harvesting maximum light energy. Panchagavya treatment efficiently promoted leaf area at 50% flowering stage itself with stable increase of leaf area until harvest. NAA treatment appeared to gain momentum in leaf area increase after 50% flowering and reached high values comparable with that of Panchagavya treatment at harvest [15, 16]. confirmed the beneficial effect of Panchagavya treatment in increasing leaf area, in the experiments on tomato and soyabean respectively.

### Leaf area index

At 50% flowering Panchagavya had maximum pooled mean value of 1.58 followed by NAA (1.51) and Triacontanol (1.50), exhibiting their influence in enhancing leaf area. Pooled mean values suggested that both NAA (3.63) and Panchagavya (3.62) favoured increment in leaf area index until harvest (Table 2). The optimum Leaf area index has been fixed at four at peak growth stage. Though no treatment had increased leaf area index above the optimum leaf area index, Panchagavya and NAA treatments were effective in increasing leaf area index among other treatments. Though Triacontanol performed poorly in this investigation [19, 20] reported beneficial effect of Triacontanol in increasing leaf area index.

### Number of branches per plant (no's)

Number of branches per plant varied between 21.53 in Vermiwash and 18.8 in NAA in first crop, while it varied between 21.05 in Panchagavya treatment and 17.95 in NAA treatment in both the crops (Table 3). NAA spray produced poor number of branches below that of control. Vermiwash and Panchagavya appeared to promote number of branches per plant. Contrary to present findings that NAA treatment failed to produce high number of branches, [21] recorded maximum number of branches in okra by spraying NAA.

### Days to first flowering

In both the first and second crops Salicylic acid treatment effected early flowering on 54.9 and 59.5 days after planting (DAP) respectively. Pooled mean values revealed the effectiveness of Salicylic acid in producing early flowering (57.2) followed by Humic acid (58.6) and Seaweed extract (58.7) (Table 3) [18]. advocated foliar application of Vermiwash for early flowering, which they attributed to enhanced biomass. Days to first flowering is an important attribute, as the farmers get early harvest. But, early flowering in many crops may be physiologically due to low nitrogen, drought or growth reduction.

### Number of flowers per plant (no's)

In the first crop, both Seaweed extract (53.5) and NAA

(53.20) treatments were exhibiting comparable values with that of Panchagavya (Table 3). In the second crop, except control and Salicylic acid treatment, all other treatments were having comparable values with Panchagavya. It appears that Panchagavya treatment can increase flower production more than the other treatment as indicated by pooled mean (55.45). Number of flowers per plant was the highest in Panchagavya treatment (55.45).Similar observation was recorded by [15] in tomato [22]. reported that Panchagavya contained several growth promoting substances like IAA, Cytokines and some nutrients, which could be the reason for promoting flowering in the present observation.

**Individual fruit weight (g)**

In the first crop, Vermiwash recorded fruit weight of 91.4g, which was on par with that of NAA treatment. In the second crop maximum individual fruit weight of 91.2g was recorded in Panchagavya, which was closely followed by Vermiwash (90.7g) and NAA (90.4g) which were having comparable values with that of Panchagavya treatment. The mean of two crops was highest in NAA (91.55g) followed by Vermiwash (91.05g) and Panchagavya (90.40g). Individual fruit weight was high in NAA treatment (91.55 g) followed by vermiwash treatment (91.05 g) (Table 3).

**Fruit yield per plant (g)**

Based on mean values of two crops, it could be inferred that Panchagavya treatment was able to enhance yield (2915.50 g) over other treatments, and the next best treatment was Vermiwash with 2802.5 g mean yield. Brassinosteroids (2265 g) treatment, resulted in lower fruit yield than control (Table 4). By producing more number of flowers and fruits per plant, Panchagavya treatment was able to achieve maximum fruit yield per plant. In consonance with this finding [15] recorded more number of flowers per cluster, fruits per plant and single fruit weight in tomato, which resulted in high fruit yield by application of Panchagavya as foliar spray. The superiority of Panchagavya treatment in various crops with respect to improvement in yield components and yield was reported by [23, 24] revealed that Panchagavya spray significantly increased number of fruits per plant, fruit weight and fruit yield in okra. [25] also recorded similar observation in some agriculture crop. Next to Panchagavya, Vermiwash also favorably increased fruit yield in brinjal and the increase might be due to high individual fruit weight, maximum fertility co-efficient, and by producing good number of fruits per plant. In support of these observation, [26] recorded more number of fruits/flowers per plant by Vermiwash spray (15%) in vegetables.

**Fruit yield per hectare (t ha$^{-1}$)**

In the first crop, apart from Panchagavya, which recorded maximum fruit yield, Vermiwash also recorded with comparable fruit yield of 61.53 t ha$^{-1}$.In the second crop also, Vermiwash treatment came close to Panchagavya treatment (61.78 t ha$^{-1}$) with comparable value (Table 4). Pooled mean values confirmed the superiority of Panchagavya treatment (64.14 t ha$^{-1}$) followed by Vermiwash (61.66 t ha$^{-1}$). Fruit yield per hectare followed the trend of fruit yield per plant.

**Ascorbic acid content (mg g$^{-1}$)**

Mean values of two crops revealed that Seaweed extract treatment enhanced ascorbic acid (16.05 mg g$^{-1}$) followed by Vermiwash (15.90 mg g$^{-1}$) Table 4. Except Triacontanol and NAA which had low values, the other treatments produced almost average values [27] reported that Seaweed extract treatment on tomato showed linear increase in Vitamin-C content with the increase in Seaweed extract concentration. Brassinosteroids treatment performed poorly in terms of ascorbic acid content, the result of which was supported by [28], as they observed decrease in ascorbic acid content by application of Epibrassinolide treatment in tomato.

**Total phenols contents (mg g$^{-1}$)**

Pooled mean values revealed that total phenols content is rich in Triacontanol treatment (2.45 mg g$^{-1}$) and NAA treatment (2.1 mg g$^{-1}$). Very poor values were observed in Humic acid (1.4 mg g$^{-1}$) and Panchagavya 1.45 mg g$^{-1}$ (Table 4) [29]. also observed that foliar application of Triacontanol promoted phenols content in greengram.

**TSS (ºbrix)**

Humic acid recorded high mean value (5.0) followed by Seaweed extract, Panchagavya both having 4.9 each (Table 5) [30]. observed increase in TSS of tomato fruit by foliar application of 20 per cent concentration of Seaweed extract, which observation was in conformity with the present study.

**Table 1:** Effect of foliar spray of growth regulators and organics on plant height (cm) and number of leaves (no's) of VRM-1 brinjal

| S. No | Treatments | At 50% Flowering | | | At Harvest | | | At 50% Flowering | | | At Harvest | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | First crop | Second crop | Pooled mean | First crop | Second crop | Pooled mean | First crop | Second crop | Pooled mean | First crop | Second crop | Pooled mean |
| 1 | Salicylic acid @ 200ppm | 45.00 | 43.50 | 44.25 | 68.60 | 67.80 | 68.20 | 54.90 | 52.70 | 53.80 | 78.50 | 76.90 | 77.70 |
| 2 | Brassinosteroids @ 0.1 ppm | 44.00 | 42.00 | 43.00 | 67.40 | 69.20 | 68.30 | 53.20 | 51.30 | 52.25 | 78.60 | 77.40 | 78.00 |
| 3 | Triacontanol @ 1.0 ppm | 42.50 | 43.70 | 43.10 | 64.60 | 65.40 | 65.00 | 55.80 | 56.00 | 55.90 | 77.40 | 78.70 | 78.10 |
| 4 | NAA @ 40 ppm | 47.00 | 45.90 | 46.45 | 69.80 | 70.20 | 70.00 | 58.50 | 56.30 | 57.40 | 85.30 | 84.60 | 84.95 |
| 5 | Seaweed extract @ 1.0% | 53.30 | 49.40 | 51.35 | 84.50 | 82.70 | 83.60 | 52.20 | 53.80 | 53.00 | 85.10 | 84.80 | 84.95 |
| 6 | Humic acid @ 1.0% | 46.70 | 45.20 | 45.95 | 76.70 | 74.90 | 75.80 | 52.90 | 53.60 | 53.25 | 81.10 | 79.60 | 80.35 |
| 7 | Panchagavya @ 5.0% | 51.70 | 49.00 | 50.35 | 75.20 | 77.40 | 76.30 | 60.30 | 58.40 | 59.35 | 85.70 | 84.30 | 85.00 |
| 8 | Vermiwash @ 5.0% | 49.90 | 47.70 | 48.80 | 80.90 | 78.80 | 79.85 | 59.70 | 57.90 | 58.80 | 84.00 | 85.20 | 84.60 |
| 9 | Control (Water spray) | 48.90 | 47.10 | 48.00 | 76.90 | 72.60 | 74.75 | 57.00 | 57.60 | 57.30 | 79.20 | 78.70 | 78.95 |
| | Total | 429.00 | 413.50 | 421.25 | 664.60 | 659.00 | 661.80 | 504.50 | 497.60 | 501.05 | 734.90 | 730.20 | 732.60 |
| | Mean | 47.66 | 45.94 | 46.80 | 73.84 | 73.22 | 73.53 | 56.10 | 55.29 | 55.67 | 81.65 | 81.13 | 81.40 |
| | S Ed | 1.56 | 1.96 | | 2.73 | 2.08 | | 1.41 | 1.26 | | 1.51 | 1.69 | |
| | CD (5.0%) | 3.26 | 4.09 | | 5.71 | 4.35 | | 2.95 | 2.63 | | 3.15 | 3.53 | |

**Table 2:** Effect of foliar spray of growth regulators and organics on leaf area ($dm^{-2}$) and leaf area index of VRM-1 brinjal

| S. No | Treatments | At 50% Flowering | | | At Harvest | | | At 50% Flowering | | | At Harvest | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | First crop | Second crop | Pooled mean | First crop | Second crop | Pooled mean | First crop | Second crop | Pooled mean | First crop | Second crop | Pooled mean |
| 1 | Salicylic acid @ 200ppm | 50.40 | 46.90 | 48.65 | 114.34 | 115.17 | 114.75 | 1.40 | 1.30 | 1.35 | 3.18 | 3.20 | 3.19 |
| 2 | Brassinosteroids @ 0.1 ppm | 47.10 | 43.30 | 45.20 | 111.20 | 118.36 | 114.78 | 1.31 | 1.20 | 1.26 | 3.09 | 3.29 | 3.19 |
| 3 | Triacontanol @ 1.0 ppm | 53.20 | 55.10 | 54.15 | 110.80 | 118.67 | 114.73 | 1.48 | 1.53 | 1.50 | 3.08 | 3.30 | 3.19 |
| 4 | NAA @ 40 ppm | 57.90 | 51.00 | 54.45 | 132.00 | 129.56 | 130.78 | 1.61 | 1.42 | 1.51 | 3.67 | 3.60 | 3.63 |
| 5 | Seaweed extract @ 1.0% | 44.60 | 44.20 | 44.40 | 128.40 | 127.86 | 128.13 | 1.24 | 1.23 | 1.23 | 3.57 | 3.55 | 3.56 |
| 6 | Humic acid @ 1.0% | 43.00 | 44.00 | 43.50 | 116.50 | 114.75 | 115.63 | 1.19 | 1.22 | 1.21 | 3.24 | 3.19 | 3.21 |
| 7 | Panchagavya @ 5.0% | 60.10 | 53.40 | 56.75 | 129.30 | 131.17 | 130.24 | 1.67 | 1.48 | 1.58 | 3.59 | 3.64 | 3.62 |
| 8 | Vermiwash @ 5.0% | 53.80 | 52.10 | 52.95 | 125.80 | 122.46 | 124.13 | 1.49 | 1.45 | 1.47 | 3.49 | 3.40 | 3.45 |
| 9 | Control (Water spray) | 51.10 | 50.50 | 50.80 | 119.80 | 118.74 | 119.27 | 1.42 | 1.40 | 1.41 | 3.33 | 3.30 | 3.31 |
| | Total | 461.20 | 440.50 | 450.85 | 1088.14 | 1096.74 | 1092.44 | 12.81 | 12.24 | 12.52 | 30.23 | 30.47 | 30.35 |
| | Mean | 51.24 | 48.94 | 50.09 | 120.90 | 121.86 | 121.38 | 1.42 | 1.36 | 1.39 | 3.36 | 3.39 | 3.37 |
| | S Ed | 2.17 | 1.84 | | 1.86 | 2.04 | | 0.15 | 0.10 | | 0.12 | 0.10 | |
| | CD (5.0%) | 4.53 | 3.85 | | 3.89 | 4.26 | | 0.32 | 0.21 | | 0.25 | 0.21 | |

**Table 3:** Effect of foliar spray of growth regulators and organics on number of branches per plant (no's), days to first flowering, number of flowers per plant (no's) and individual fruit weight (cm) of VRM-1 brinjal

| S. No | Treatments | No. of branches per plant | | | Days to first flowering | | | No. of flowers per plant | | | Individual fruit weight | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | First crop | Second crop | Pooled mean | First crop | Second crop | Pooled mean | First crop | Second crop | Pooled mean | First crop | Second crop | Pooled mean |
| 1 | Salicylic acid @ 200ppm | 20.80 | 19.90 | 20.35 | 54.90 | 59.50 | 57.20 | 51.90 | 50.60 | 51.25 | 89.90 | 88.50 | 89.20 |
| 2 | Brassinosteroids @ 0.1 ppm | 20.07 | 20.25 | 20.16 | 58.70 | 62.90 | 60.80 | 52.70 | 51.90 | 52.30 | 89.10 | 89.70 | 89.40 |
| 3 | Triacontanol @ 1.0 ppm | 20.73 | 19.58 | 20.16 | 62.50 | 63.50 | 63.00 | 52.50 | 51.80 | 52.15 | 85.30 | 86.50 | 85.90 |
| 4 | NAA @ 40 ppm | 18.80 | 17.95 | 18.38 | 62.00 | 64.80 | 63.40 | 53.20 | 52.70 | 52.95 | 92.70 | 90.40 | 91.55 |
| 5 | Seaweed extract @ 1.0% | 20.67 | 20.25 | 20.46 | 56.10 | 61.20 | 58.70 | 53.50 | 52.20 | 52.85 | 82.60 | 85.70 | 84.15 |
| 6 | Humic acid @ 1.0% | 21.47 | 20.72 | 21.10 | 55.70 | 61.50 | 58.60 | 51.50 | 52.70 | 52.10 | 86.10 | 85.30 | 85.70 |
| 7 | Panchagavya @ 5.0% | 20.53 | 21.05 | 20.79 | 55.60 | 64.70 | 60.20 | 56.70 | 54.20 | 55.45 | 89.60 | 91.20 | 90.40 |
| 8 | Vermiwash @ 5.0% | 21.53 | 20.94 | 21.24 | 57.70 | 65.30 | 61.50 | 51.10 | 52.80 | 51.95 | 91.40 | 90.70 | 91.05 |
| 9 | Control (Water spray) | 20.93 | 19.86 | 20.40 | 59.50 | 68.00 | 63.80 | 48.50 | 49.30 | 48.90 | 85.20 | 84.90 | 85.05 |
| | Total | 185.53 | 180.50 | 183.02 | 522.67 | 568.40 | 547.20 | 471.60 | 468.20 | 469.90 | 791.90 | 792.90 | 792.40 |
| | Mean | 20.61 | 20.06 | 20.34 | 58.10 | 63.15 | 60.80 | 52.40 | 52.02 | 52.21 | 87.99 | 88.10 | 88.04 |
| | S Ed | 0.60 | 0.49 | | 1.99 | 1.13 | | 1.68 | 1.51 | | 0.89 | 0.60 | |
| | CD (5.0%) | 1.25 | 1.02 | | 4.16 | 2.37 | | 3.52 | 3.51 | | 1.85 | 1.25 | |

**Table 4:** Effect of foliar spray of growth regulators and organics on fruit yield per plant (g), fruit yield per hectare (t $ha^{-1}$), ascorbic acid (mg $g^{-1}$) and total phenol (mg $g^{-1}$) of VRM-1 brinjal

| S. No | Treatments | Fruit yield per plant (g) | | | Fruit yield per ha (t $ha^{-1}$) | | | Ascorbic acid (mg $g^{-1}$) | | | Total phenol (mg $g^{-1}$) | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | First crop | Second crop | Pooled mean | First crop | Second crop | Pooled mean | First crop | Second crop | Pooled mean | First crop | Second crop | Pooled mean |
| 1 | Salicylic acid @ 200ppm | 2367.00 | 2256.00 | 2311.50 | 52.07 | 49.63 | 50.85 | 14.80 | 14.30 | 14.55 | 2.20 | 2.30 | 2.30 |
| 2 | Brassinosteroids @ 0.1 ppm | 2225.00 | 2305.00 | 2265.00 | 48.95 | 50.71 | 49.83 | 13.10 | 13.90 | 13.50 | 1.90 | 1.70 | 1.80 |
| 3 | Triacontanol @ 1.0 ppm | 2377.00 | 2412.00 | 2394.00 | 52.29 | 53.06 | 52.68 | 11.70 | 12.80 | 12.25 | 2.30 | 2.60 | 2.50 |
| 4 | NAA @ 40 ppm | 2552.00 | 2498.00 | 2525.00 | 56.14 | 54.95 | 55.55 | 12.50 | 13.10 | 12.80 | 2.00 | 2.20 | 2.10 |
| 5 | Seaweed extract @ 1.0% | 2456.00 | 2486.00 | 2471.00 | 54.03 | 54.69 | 54.36 | 15.80 | 16.30 | 16.05 | 1.80 | 1.40 | 1.60 |
| 6 | Humic acid @ 1.0% | 2434.00 | 2395.00 | 2414.50 | 53.55 | 52.69 | 53.12 | 13.80 | 14.70 | 14.25 | 1.30 | 1.50 | 1.40 |
| 7 | Panchagavya @ 5.0% | 2915.00 | 2916.00 | 2915.50 | 64.13 | 64.15 | 64.14 | 14.40 | 15.20 | 14.80 | 1.30 | 1.60 | 1.50 |
| 8 | Vermiwash @ 5.0% | 2797.00 | 2808.00 | 2802.50 | 61.53 | 61.78 | 61.66 | 15.70 | 16.10 | 15.90 | 1.40 | 1.70 | 1.60 |
| 9 | Control (Water spray) | 2247.00 | 2351.00 | 2299.00 | 49.43 | 51.72 | 50.58 | 13.80 | 13.20 | 13.50 | 1.60 | 1.50 | 1.60 |
| | Total | 22370.00 | 22427.0 | 22398.5 | 492.12 | 493.38 | 492.75 | 125.60 | 129.60 | 127.60 | 15.80 | 16.50 | 16.20 |
| | Mean | 2485.00 | 2492.80 | 2488.70 | 54.66 | 54.82 | 54.66 | 13.95 | 14.40 | 14.18 | 1.80 | 1.80 | 1.80 |
| | S Ed | 81.60 | 112.80 | | 1.8 | 2.08 | | 0.60 | 0.75 | | 0.20 | 0.20 | |
| | CD (5.0%) | 170.50 | 235.80 | | 3.75 | 4.35 | | 1.25 | 1.56 | | 0.40 | 0.40 | |

**Table 5:** Effect of foliar spray of growth regulators and organics on TSS ($^0$ brix) of VRM-1 brinjal

| S. No | Treatments | First crop | Second crop | Pooled mean |
|---|---|---|---|---|
| 1 | Salicylic acid @ 200 ppm | 4.50 | 4.60 | 4.55 |
| 2 | Brassinosteroids @ 0.1 ppm | 4.30 | 4.50 | 4.40 |
| 3 | Triacontanol @ 1.0 ppm | 4.10 | 4.40 | 4.25 |
| 4 | NAA @ 40 ppm | 4.80 | 4.70 | 4.75 |
| 5 | Seaweed extract @ 1.0% | 4.90 | 4.90 | 4.90 |
| 6 | Humic acid @ 1.0% | 5.10 | 4.90 | 5.00 |
| 7 | Panchagavya @ 5.0% | 5.00 | 4.80 | 4.90 |
| 8 | Vermiwash @ 5.0% | 4.40 | 4.50 | 4.45 |
| 9 | Control (Water spray) | 4.60 | 4.80 | 4.70 |
| | Total | 41.70 | 42.10 | 41.90 |
| | Mean | 4.63 | 4.68 | 4.66 |

| | | | | |
|---|---|---|---|---|
| | S Ed | 0.22 | 0.27 | |
| | CD (5.0%) | 0.45 | NS | |

**Conclusion**

Results showed that foliar spray of plant growth regulators and organics on VRM-1 brinjal plants to understand their effects on growth characters, yield attributes and quality parameters. On the basis of the experimental result, it is concluded that Panchagavya treatment produced maximum values in number of leaves, number of flowers per plant and fruit yield per plant. Seaweed extract effected maximum plant height and NAA was effectively increasing leaf area, leaf area index and Individual fruit weight. With regard to quality parameters, seaweed extract spray was found good in increasing ascorbic acid content in brinjal fruits. Apart from ascorbic acid, total phenols content also is considered as an important quality parameter which was high in Triacontanol treatment. The next quality parameter, total soluble solids (TSS) was estimated at maximum level in Humic acid treatment.

**Reference**


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