



## **Influence of Different Concentrations of Jeevamrutha on Growth, Yield and Quality Parameters of Chilli (*Capsicum annum* L.)**

**Swetha Vedagiri<sup>a\*‡</sup>, Deepanshu<sup>a#</sup>, V. M. Prasad<sup>a‡</sup> and Vijay Bahadur<sup>a†</sup>**

<sup>a</sup> Department of Horticulture, NAI, SHUATS, Prayagraj, Uttar Pradesh, India.

### **Authors' contributions**

*This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.*

### **Article Information**

DOI: 10.9734/IJECC/2022/v12i1131146

### **Open Peer Review History:**

This journal follows the Advanced Open Peer Review policy. Identity of the Reviewers, Editor(s) and additional Reviewers, peer review comments, different versions of the manuscript, comments of the editors, etc are available here: <https://www.sdiarticle5.com/review-history/91009>

**Original Research Article**

**Received 22 June 2022**  
**Accepted 16 August 2022**  
**Published 18 August 2022**

## **ABSTRACT**

An experiment on the "Influence of Different Concentrations of Jeevamrutha on Growth, Yield and Quality Parameters of Chilli (*Capsicum annum* L.)" was conducted in Kharif season adapting Factorial randomized block design (FRBD) consisting of 10 treatments and replicated thrice during July to November 2021, in Horticulture research Farm, Department of Horticulture, Naini Agricultural Institute, Sam Higginbottom University of Agriculture, Technology and Sciences, Prayagraj (U.P) India. Results regarding the present investigation shows that cultivation of chilli with different concentrations of Jeevamrutha found as the best option for higher productivity whereas the treatment with concentration of 10% Spray of Jeevamrutha in variety TMPH-443 that is T<sub>5</sub> (TMPH-443 + 10% Spray of Jeevamrutha) showed the best results in terms of Plant height at 30 DAT (39.59 cm) and at last harvest (59.65 cm), Days to 50% Flowering (35.92 days), Days to First Harvest (56.03 days), Fruit Length (7.21cm), Fruit Weight (5.80 g), Fruit Girth (3.27 cm), Number of Fruits Plant<sup>-1</sup> (78.67 fruits), Average Fruit Yield Plant<sup>-1</sup> (0.46 kg), Fruit Yield ha<sup>-1</sup> (5.07t), TSS (8.10°B), were observed is dark green/green in colour (133). At level T<sub>10</sub> with same concentration in different variety (TMPH-449) showed the nearest results. Hence the T<sub>5</sub> (TMPH-443 + 10% Spray of Jeevamrutha) is best suited for the farmers in terms of growth, yield, quality and net returns.

\* M.Sc., Research Scholar;

# Assistant Professor;

‡ Professor;

† Associate Professor & Head;

\*Corresponding author: E-mail: swetha.vedagiri1819@gmail.com;

**Keywords:** Chilli; jeevamrutha; hybrid varieties; growth; yield and quality.

## 1. INTRODUCTION

“Chilli (*Capsicum annum* L.) is one of the most important commercial crops of India. It belongs to the green Capsicum under the family Solanaceae. Chilli is growing for its pungent fruits, which are used both as green and ripe or dry form. It is becoming an important crop worldwide due to its wide diversity and high quality, flavor, concentration of vitamins and other antioxidants” (Bahurup et al., 2013). The pungency in chilli is due to alkaloid capsaicin. The genus Capsicum consists of approximately 22 wild and 5 cultivated species, which includes *C. annum*, *C. baccatum*, *C. chinense*, *C. frutescens* and *C. pubescens*. Chilli has been classified under often cross-pollinated crops and the extent of natural out crossing has also reported up to 66.4 per cent [1]. A wide range of variability in chilli is available which provide a great scope for improving fruit yield through a systemic and planned selection programme. In India, it is grown throughout the country but principal chilli growing states are Andhra Pradesh, Maharashtra, Karnataka, Tamil Nadu, Orissa, Madhya Pradesh, Rajasthan, West Bengal and Uttar Pradesh. Andhra Pradesh, Maharashtra, Karnataka and Tamil Nadu constitute 75% of the total area of its cultivation and production.

“Farmers Now-a-days keep on applying inorganic fertilizer for their crop as it can provide rapid nutrition, but it will increase cost of production. Hence, this study intends to provide an alternative method by using different concentrations of Jeevamrutha for enhancing growth, yield and quality of Chilli hybrids and best of concentrations can be determined for optimum growth, yield and quality of Chilli. The best of organic treatment can be determined for optimum growth, quality and NPK content of Chilli. Farmers may use those treatments as an alternative way in order to avoid excessive application of chemical fertilizer to the soil. Besides, farmers will have a proper management toward nutrients required for growth and completion of life cycle of the Chilli crop. Organic fertilizers may help farmer to increase soil structure, provide food source for soil micro-organisms, provides cation exchange capacity, increases water holding capacity, decrease toxicity at low pH and act as reservoir of plant nutrients” [2,3,4]. Therefore, present study was conducted to study the Influence of Different

Concentrations of Jeevamrutha on Growth, Yield, Quality Parameters of Chilli (*Capsicum annum* L.).

To find out the effect of different concentrations of Jeevamrutha on different varieties of Chilli hybrids and to find out the Interaction effect between chilli hybrids and different concentrations of Jeevamrutha.

## 2. MATERIALS AND METHODS

A field experiment was conducted during July to November 2021. At Horticulture Research Farm, Department of Horticulture, Naini Agricultural Institute, Sam Higginbottom University of Agriculture, Technology and Sciences, Prayagraj (U.P). The University is about 7 km away from Prayagraj city and it is geographically situated at 25.50 N latitude, 81.080 E longitudes. The altitude of this location is about 98 meter above the mean sea level. The soil of the experimental field was sandy loam with pH of 6.8. The experiment entitled “Influence of different concentrations of Jeevamrutha on growth, yield and quality parameters of Chilli (*Capsicum annum* L.)” was conducted in Kharif season adapting Factorial randomized block design (FRBD) consisting of 10 treatments and three replications. Transplanting of seedlings were done with spacing 60×45 cm in July 2021. Plot size is 2×2 m<sup>2</sup>. The treatments are T<sub>1</sub>: (V<sub>1+</sub> J<sub>0</sub>) TMPH- 443 Control (Water spray), T<sub>2</sub>: (V<sub>1+</sub> J<sub>1</sub>) TMPH- 443 + 2.5% (Spray of Jeevamrutha), T<sub>3</sub>: (V<sub>1+</sub> J<sub>2</sub>) TMPH - 443 + 5% (Spray of Jeevamrutha), T<sub>4</sub>: (V<sub>1+</sub> J<sub>3</sub>) TMPH- 443 + 7.5% (Spray of Jeevamrutha), T<sub>5</sub>: (V<sub>1+</sub> J<sub>4</sub>) TMPH- 443 + 10% (Spray of Jeevamrutha), T<sub>6</sub>: (V<sub>2+</sub> J<sub>0</sub>) TMPH- 449 Control (Water spray), T<sub>7</sub>: (V<sub>2+</sub> J<sub>1</sub>) TMPH- 449 + 2.5% (Spray of Jeevamrutha), T<sub>8</sub>: (V<sub>2+</sub> J<sub>2</sub>) TMPH- 449 + 5% (Spray of Jeevamrutha), T<sub>9</sub>: (V<sub>2+</sub> J<sub>3</sub>) TMPH- 449 + 7.5% (Spray of Jeevamrutha), T<sub>10</sub>: (V<sub>2+</sub> J<sub>4</sub>) TMPH- 449 + 10% (Spray of Jeevamrutha). Chilli cv. TMPH-443 (Trimurti plant science Pvt. Ltd.), TMPH-449 (Trimurti plant science Pvt. Ltd.) these two varieties were used for the experiment. The experimental field has an even topography with a gentle slope and good drainage. The sample were drawn from each replication of experimental plot at 0-15 cm depth before sowing of the crop and a composite sample was made to determine the physical and chemical properties of soil. Cultural practices and plant protection measures were followed during the cultivation process.

Irrigation, weeding and hoeing measures were employed as per the need of the crop. For each treatment of a replication five plants were selected and observations were recorded on various parameters of growth and yield of the crop as per the planned schedule.

## 2.1 Preparation of Jeevamrutha

“Jeevamrutha was prepared by mixing 10 kg cow dung, 10 litre cow urine, 2 kg jaggery, 2 kg pigeon pea flour and hand full of soil collected from farm. All these were put in 200 litres plastic drum and mixed thoroughly and volume was made up to 200 litres by adding water. The mixture was stirred well in clockwise direction thrice a day plastic drum was kept shade covered with wet jute bag. Jeevamrutha was fermented for 10 days and applied to the root zone of Chilli plants manually at of 20, 40 and 60 days after transplanting (DAT) as per treatments” [5,6]. Experimental data collected was subjected to statistical analysis by adopting Fisher's method of analysis of variance (ANOVA) as outlined in Gomez and Gomez [7]. Critical difference (C.D) values were calculated whenever the “F” test was significant at 5 per cent level.

## 3. RESULTS AND DISCUSSION

The results revealed that Chilli Varieties had the following performance mentioned below.

### 3.1 Germination Parameters

Days to germination was observed in Variety TMPH-443,  $T_1$  (7.44) and in Variety TMPH-449,  $T_6$  (10.45) from days after sowing.

### 3.2 Effect of Jeevamrutha on Growth Parameters of Chilli

Application of Jeevamrutha showed significant effect on plant height, this might have helped in higher growth parameters due the supply of micronutrients, vitamins, essential amino acids and growth promoting substances like Indole Acetic Acid (IAA), Gibberlic Acid (GA3) and beneficial micro-organisms. It is said to enhance microbial activity and ultimately ensuring the availability and uptake of nutrients by the chilli crop. The similar results was observed in Jeevamrutha [6,8,9].

The plant height (cm) at last harvest was observed in Variety TMPH-443 with interaction of Jeevamrutha 10% concentration i.e.,  $T_5$

(59.65cm), and in Variety TMPH-449  $T_{10}$  (57.52 cm) and Leaf Area in Variety TMPH-449 with interaction of Jeevamrutha 10% concentration i.e., treatment  $T_{10}$  (42.47cm), and in Variety TMPH-443 in treatment  $T_5$  (19.40cm). The application of Jeevamrutha might have helped in greater availability of nutrients which enhance the uptake of nitrogen, total phosphorus and total potassium. This might have shown higher foliage with dark green coloured leaves indicating rich chlorophyll content might be responsible for production of more photosynthates and translocation to the vegetative buds, fruits and increased the leaves in chilli plant.

### 3.3 Effect of Jeevamrutha on Yield Parameters of Chilli

The appropriate integration of Jeevamrutha with Cow urine is capable of providing an optimal level of nutrients triggering early blooming in the treatment of chilli crop. This similar observation was recorded by Boraiah et al., [10]. Application of Jeevamrutha increased fruit length, fruit weight, fruit girth and yield of chilli. Significantly higher number of growth components and yield components in jeevamrutha was due to higher amount of nutrient content like nitrogen, phosphorus and potassium (1.96%, 0.280% and 0.170% respectively) and also contains Mg (46 ppm) and Cu (51 ppm) and maximum microbial population (Maximum CFU of bacteria (855), Fungi (29), Actinomycetes (8), N-fixers (69) and P-solubilizer (80) was observed in Jeevamrutha [5,11,12].

Days to 50 percent flowering was observed in Variety TMPH-443 with interaction of Jeevamrutha 10% concentration i.e., treatment  $T_5$  (35.92 days), and in Variety TMPH-449 with concentration of 10% Jeevamrutha i.e., in treatment  $T_{10}$  (37.14 days), Days to first harvest was observed in Variety TMPH-443  $T_5$  (56.03 days), and in Variety TMPH-449  $T_{10}$  (57.25 days), Fruit length in Variety TMPH-443  $T_5$  (7.21cm), and in Variety TMPH-449  $T_{10}$  (6.54 cm), Fruit weight in Variety TMPH-443  $T_5$  (5.80 g), and in Variety TMPH-449  $T_{10}$ (5.23g), Fruit girth in Variety TMPH-443  $T_5$  (3.27 cm), and in Variety TMPH-449  $T_{10}$  (3.07cm), No. of fruits Plant<sup>-1</sup> in Variety TMPH-443  $T_5$  (78.67 fruits), and in Variety TMPH-449  $T_{10}$  (73.66 fruits), Average fruit yield kg Plant<sup>-1</sup> in Variety TMPH-443  $T_5$  (0.46 kg), and in Variety TMPH-449  $T_{10}$  (0.39 kg), Fruit yield tonnes ha<sup>-1</sup> in Variety TMPH-443  $T_5$  (5.07 t), and in Variety TMPH-449  $T_{10}$  (4.30 t). As compared to application of

Table 1. Effect of two varieties on growth, yield and quality of chilli

Variety (V)	Plant Height at Harvest (cm)	Leaf Area (cm <sup>2</sup> )	Days to 50% flowering	Days to First Harvest	Fruit Length (cm)	Fruit Weight (g)	Fruit Girth (cm)	Number of Fruits Plant <sup>-1</sup>	Fruit Yield kg plant <sup>-1</sup>	Fruit Yield Tonnes Hactare <sup>-1</sup>	TSS (°Brix)	Fruit Colour
V <sub>1</sub>	55.16	15.7	39.5	61.6	5.8	4.4	2.9	67.3	0.3	3.3	7.82	133
V <sub>2</sub>	53.71	37.5	40.2	62.8	5.4	4.1	2.7	64.6	0.3	3	7.75	142
C.D <sub>(0.05)</sub>	0.68	0.67	0.66	0.61	0.37	0.17	0.17	0.87	0.02	0.17	0.1	1.056
S.Ed (±)	0.32	0.32	0.31	0.29	0.18	0.1	0.08	0.41	0.01	0.08	0.08	0.499

Table 2. Effect of jeevamrutha on growth, yield and quality of chilli

Treatments (J)	Plant Height at Harvest (cm)	Leaf Area (cm <sup>2</sup> )	Days to 50% flowering	Days to First Harvest	Fruit Length (cm)	Fruit Weight (g)	Fruit Girth (cm)	Number of Fruits Plant <sup>-1</sup>	Fruit Yield kg plant <sup>-1</sup>	Fruit Yield Tonnes Hactare <sup>-1</sup>	TSS (°Brix)	Fruit Colour
J <sub>0</sub>	49.7	22.62	42.7	67.9	4.5	3.5	2.5	54.8	0.2	2.2	7.4	137
J <sub>1</sub>	52.49	24.37	42	64.2	4.9	3.8	2.7	61	0.2	2.6	7.72	138
J <sub>2</sub>	55	26.72	39.5	61.8	5.4	4.1	2.8	67.6	0.3	3.1	7.83	137
J <sub>3</sub>	56.39	28.37	38.6	60.7	6.2	4.4	2.9	70.2	0.3	3.4	7.92	138
J <sub>4</sub>	58.59	30.93	36.5	56.6	6.9	5.5	3.2	76.2	0.4	4.7	8.07	139
C.D <sub>(0.05)</sub>	1.07	1.07	1.04	0.96	0.58	0.27	0.27	1.37	0.02	0.27	0.16	1.67
S.Ed (±)	0.51	0.51	0.5	0.46	0.28	0.16	0.13	0.65	0.01	0.13	0.12	0.789

Table 3. Interaction effect of jeevamrutha on growth, yield and quality in two varieties of chilli

Interaction (V×J)	Plant Height at Harvest (cm)	Leaf Area (cm <sup>2</sup> )	Days to 50% flowering	Days to First Harvest	Fruit Length (cm)	Fruit Weight (g)	Fruit Girth (cm)	Number of Fruits Plant <sup>-1</sup>	Fruit Yield kg plant <sup>-1</sup>	Fruit Yield Tonnes Hactare <sup>-1</sup>	TSS (°Brix)	Fruit Colour
V1 × J0	50.81	12.33	42.5	67	4.6	3.6	2.6	56.1	0.2	2.3	7.47	132
V1 × J1	53.36	13.4	41.6	63.5	5	3.8	2.7	63.5	0.2	2.7	7.73	134
V1 × J2	55.45	15.97	39.3	61.4	5.8	4.2	2.9	67.5	0.3	3.1	7.87	132
V1 × J3	56.51	17.4	38.1	60.2	6.2	4.5	3	70.8	0.3	3.5	7.93	134
V1 × J4	59.65	19.4	35.9	56	7.2	5.8	3.3	78.7	0.5	5.1	8.1	134
V2 × J0	48.6	32.9	42.8	68.7	4.3	3.4	2.3	53.5	0.2	2	7.33	141
V2 × J1	51.62	35.33	42.4	64.9	4.8	3.7	2.6	58.6	0.2	2.4	7.7	143
V2 × J2	54.55	37.47	39.8	62.1	5.1	4.1	2.7	67.7	0.3	3.1	7.8	141
V2 × J3	56.27	39.33	39	61.1	6.2	4.2	2.9	69.7	0.3	3.3	7.9	142
V2 × J4	57.52	42.47	37.1	57.3	6.5	5.2	3.1	73.7	0.4	4.3	8.03	143
C.D <sub>(0.05)</sub>	1.51	1.51	1.47	1.36	0.82	0.38	0.38	1.94	0.02	0.38	0.23	2.26
S.Ed (±)	0.72	0.72	0.7	0.65	0.39	0.23	0.19	0.92	0.02	0.19	0.17	1.116

CD at 5%, V- Variety, J- Jeevamrutha, V<sub>1</sub>-Variety1(TMPH-443), V<sub>2</sub>- Variety 2(TMPH-449), J<sub>0</sub>- Water spray, J<sub>1</sub>- 2.5% Jeevamrutha, J<sub>2</sub>- 5% Jeevamrutha, J<sub>3</sub>- 7.5% Jeevamrutha, J<sub>4</sub>- 10% Jeevamrutha

different concentration of Jeevamrutha, the higher concentration showed the better results on growth and development attributes of chilli plant. It was noted that highest fruit yield was obtained with V1 of Variety (TMPH-443) + J4 of Jeevamrutha, followed by V2 of Variety (TMPH-449) + J4 of Jeevamrutha. It depicts that highest yield can be achieved with 10% Jeevamrutha on chilli plant because higher concentration of bio-manures contains ample amount of nutrients and essential supplements required for the growth and development of plants. Early flowering maybe due to integration effect of Jeevamrutha which contains soil microbes, cyanobacteria, PSB and growth hormones such as auxin, gibberellin and cytokinin's all of which influence and enhance nitrogen, phosphorus, potassium and essential nutrients efficiency a way that chemical fertilizers do not [13-16].

### 3.4 Effect of Jeevamrutha on Quality Parameters of Chilli

The term quality implies the degree of excellence of a product or its suitability for a particular use. Quality of produce encompasses appearance, texture, nutritive values, chemical constituents, mechanical properties, functional properties and defects. In present investigation application of Jeevamrutha improved the quality parameters viz., TSS content, and fruit colour of Chilli as compared to different concentration sources of Jeevamrutha application. In this present investigation the results showed that the maximum TSS (°Brix) was observed in Variety TMPH-443 with interaction of Jeevamrutha 10% concentration i.e., treatment **T<sub>5</sub> of (8.10°B)** and in Variety TMPH-449 in treatment **T<sub>10</sub> (8.03°B)**. The increase in TSS might be due to synthesis of auxin which in turn increased synthesis of metabolites and their rapid translocation from other parts of plants to developing fruits. However, fruits acted as a strong sink for drawing metabolites from the leaves [17-19].

In case of Fruit colour of chilli. Variety TMPH-443 with T<sub>1</sub> (Water spray), T<sub>2</sub> (2.5% concentration of Jeevamrutha), T<sub>3</sub> (5% concentration of Jeevamrutha), T<sub>4</sub> (7.5% concentration of Jeevamrutha) and T<sub>5</sub> (10% concentration of Jeevamrutha) were observed in Dark green colour **(133)**, While the Variety TMPH-449 T<sub>6</sub> (Water spray), T<sub>7</sub> (2.5% concentration of Jeevamrutha), T<sub>8</sub> (5% concentration of Jeevamrutha), T<sub>9</sub> (7.5% concentration of Jeevamrutha) and T<sub>10</sub> (10% concentration of Jeevamrutha) were observed in Light green

colour **(142)**. The colour of the fruit was determined with the help of colour chart from Royal Horticultural Society Colour Charts, Jeevamrutha application might have shown higher foliage with dark green coloured leaves indicating rich chlorophyll content might be responsible for production of more photosynthates and translocation to the vegetative buds and fruits which showed the variation of colour in the chilli fruits.

## 4. CONCLUSION

Based on the results of the present investigation entitled "Influence of Different Concentrations of Jeevamrutha on Growth, Yield, Quality Parameters of Chilli. (*Capsicum annum* L.)" it is concluded that cultivation of chilli with different concentrations of Jeevamrutha found as the best option for higher productivity whereas the treatment with concentration of 10% Spray of Jeevamrutha in variety TMPH-443 that is T<sub>5</sub> (TMPH-443 + 10% Spray of Jeevamrutha) showed the best results in terms of vegetative growth, yield and quality. At level T<sub>10</sub> with same concentration in different variety (TMPH-449) showed the nearest results. Hence the T<sub>5</sub> (TMPH-443 + 10% Spray of Jeevamrutha) is best suited for the farmers in terms of growth, yield and quality.

## COMPETING INTERESTS

Authors have declared that no competing interests exist.

## REFERENCES

1. Singh SN, Shrivastava JP, Ram S. Natural out crossing in chilli. *Vegetable Science*. 1994;21(2):166-168.
2. Zaccheo P, Cabassi G, Ricca G, Crippa L. Decomposition of organic residues in soil: Experimental technique and spectroscopic approach, *Organic Geochem*. 2002;33: 327-345.
3. Evanylo G, Sherony C, Spargo J, Starner D, Brosius, M, Haering K, Soil and water environmental effects of fertilizer, manure, and compost-based fertility practices in an organic vegetable cropping system. *Agric. Ecosyst. Environ*. 2008;127:50-58.
4. Mitchell AE, Hong Y, Koh E, Barrett DM, Bryant DE, Denison F, Kaffka S. Ten-year comparison of the influence of organic and conventional crop management practices on the content of flavonoids in tomatoes. *J*

- Agric. Food. Che. 2006;54(21):8244-8252.
5. Devakumar N, Rao GGE, Shubha S, Imrankhan Nagaraj, Gowda SB. Activities of Organic Farming Research Centre, Navile, Shimoga, University Agriculture Science, Bengaluru, Karnataka, India; 2008.
  6. Palekar S. Textbook on Shoonya Bandovalada Naisargika Krushi, published by Swamy Anand, Agri Prakashana, Bangalore; 2006.
  7. Gomez K, Gomez AA. Statistical procedures agricultural research, an international rice research institute book, A Willey Inter Science Publication, John Willey and Sons, New York; 1984.
  8. Gore NS, Sreenivasa MN. Influence of liquid organic manures on growth, nutrient content and yield of tomato (*Lycopersicon esculentum* Mill.) in the sterilized soil. *Karnataka Journal of Agricultural Science*. 2011;24(2):153-157.
  9. Nileema S Gorem, Sreenivasa MN. Influence of liquid organic manures on growth, nutrient content and yield of tomato (*Lycopersicon esculentum* Mill.) in the sterilized soil. *Karnataka Journal of Agricultural Science*. 2011;24 (2):153-157.
  10. Boraiah B, Devakumar N, Shubha S, Palanna KB. Effect of Panchagavya, Jeevamrutha and Cow Urine on Beneficial Microorganisms and Yield of Capsicum (*Capsicum annum* L. var. grossum). *International Journal of Current Microbiology and Applied Sciences*. 2017; 6(9):3226-3234.
  11. Devakumar N, Shubha S, Gouder SB, Rao GGE. Microbial analytical studies of traditional organic preparations beejamrutha and jeevamrutha, Proceedings of the 4th ISOFAR scientific conference. Building Organic Bridges, at the Organic World Congress 2014, 13-15 Oct., Istanbul, Turkey; 2014.
  12. Boraiah B, Devakumar N, Palanna KB. Yield and Quality Parameters of Capsicum (*Capsicum annum* L. var. grossum) as Influenced by Organic Liquid Formulations. *International Journal of Pure and Applied Biosciences*. 2018;6(1):333-338.
  13. Basavaraj Kumbar, Devakumar N. Effect of Jeevamrutha and Panchagavya on Growth, Yield and Microbial Population of French bean (*Phaseolus vulgaris* L.) *Advances in Life Sciences*. 2016;5(9): 3619-3623. Print: ISSN 2278-3849.
  14. Devakumar N, Rao GGE, Shuba S. Evaluation of locally available media for the growth and development of nitrogen fixing micro-organisms. Proceedings of the 3rd scientific conference of ISOFAR Organic are life-knowledge for tomorrow, held on 28th September-01 October 2011, Korea. 2011;504-509.
  15. Devakumar N, Shubha S, Gouder SB, Rao GGE. Microbial analytical studies of traditional organic preparations beejamrutha and jeevamrutha; 2014.
  16. Karale Gangadhar N, Devakumar Vishwajith, Lavanya G. Growth, yield and quality parameters of chilli (*Capsicum annum* L.) as influenced by application of different organic manure. *International Journal of Chemical Studies*. 2020;8(1): 473- 482.
  17. Karale Gangadhar, Devakumar N, Vishwajith L, Lavanya G. Influence of Different Sources of Organic Manures on Enzymatic Activity and Microbial Dynamics of Rhizosphere Soil of Chilli (*Capsicum annum* L.). *International Journal of Current Microbiology and Applied Sciences*. 2020;9(1):542-555.
  18. Ravi GK, Kulapati H, Mastiholi A, Prasanna SM, Rudresh DL. Effect of jeevamrutha on soil Physico-chemical parameters of mango var. Alphonso.
  19. Rijal RO, Kumar AD, Maity PR, Bisoyi SK, Chattarjee SU, Nelli RA. Effect of bio-manures on growth and development of tomato (*Solanum lycopersicum* L.): A review. *Plant Cell Biotechnology Mol. Biol*. 2021 Mar 4;22:119-35.

© 2022 Vedagiri et al.; This is an Open Access article distributed under the terms of the Creative Commons Attribution License (<http://creativecommons.org/licenses/by/4.0>), which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.

Peer-review history:

The peer review history for this paper can be accessed here:

<https://www.sdiarticle5.com/review-history/91009>