

## Organic Nutrient Management in Capsicum (*Capsicum annuum* L.var. *grossum*) for growth under Protected Condition

Ningthoujam Mira Devi<sup>1</sup>, Arwankie Shadap<sup>2\*</sup>, A.S. Mailappa<sup>3</sup>, Barun Singh<sup>4</sup>, Siddhartha Singh<sup>5</sup>, Chandra Deo<sup>6</sup>, Joyshree Kharibam<sup>7</sup>, Khruzho Sakhamo<sup>1</sup> and Aitorma Debbarma<sup>1</sup>

<sup>1</sup>PG Scholar, Department of Vegetable Science, College of Horticulture and Forestry, Central Agricultural University, Pasighat (Arunachal Pradesh), India.

<sup>2</sup>Assistant Professor, Department of Vegetable Science, College of Horticulture and Forestry, Central Agricultural University, Pasighat (Arunachal Pradesh), India.

<sup>3</sup>Associate Professor, Department of Natural Resource Management, College of Horticulture and Forestry, Central Agricultural University, Pasighat (Arunachal Pradesh), India.

<sup>4</sup>Assistant Professor, Department of Fruit Science, College of Horticulture and Forestry, Central Agricultural University, Pasighat (Arunachal Pradesh), India.

<sup>5</sup>Assistant Professor, Department of Basic Science and Humanities, College of Horticulture and Forestry, Central Agricultural University, Pasighat (Arunachal Pradesh), India.

<sup>6</sup>Professor, Department of Vegetable Science, College of Horticulture and Forestry, Central Agricultural University, Pasighat (Arunachal Pradesh), India.

<sup>7</sup>PG Scholar, Department of Fruit Science, College of Horticulture and Forestry, Central Agricultural University, Pasighat (Arunachal Pradesh), India.

(Corresponding author: Arwankie Shadap\*)

(Received: 15 October 2023; Revised: 04 November 2023; Accepted: 20 November 2023; Published: 15 December 2023)

(Published by Research Trend)

**ABSTRACT:** A field study was conducted to evaluate the effect of organic manures on growth of capsicum at the Department of Vegetable Science, College of Horticulture and Forestry, Pasighat, Arunachal Pradesh, India, in two factor factorial Randomized Block Design with 12 treatments and three replications. The investigation consisted of two factors viz. soil application of organic manures which includes vermicompost and FYM as Factor-1 and foliar application of organic manures which includes Panchagavya, Jeevamruth and vermiwash as Factor-2. In this experiment, the highest plant height was observed in the treatment combination T<sub>2</sub>(S<sub>1</sub>F<sub>2</sub>)-Vermicompost+Jeevamruth at both 30 and 60 days after transplanting (24.92 cm and 63.40 cm respectively). Similarly, stem girth (8.92mm), no. of leaves per plant at 60 days after transplanting (39.35), were recorded highest in T<sub>2</sub>(S<sub>1</sub>F<sub>2</sub>)-Vermicompost+Jeevamruth. The lowest node for first flower to appear was recorded in T<sub>3</sub>(S<sub>1</sub>F<sub>3</sub>)-Vermicompost+Vermiwash (4.20) and maximum leaf area (93.35 cm<sup>2</sup>) was recorded in T<sub>2</sub>(S<sub>1</sub>F<sub>2</sub>)-Vermicompost+Jeevamruth. Lowest was recorded in control for plant growth parameters.

**Keywords:** Capsicum, Vermicompost, Panchagavya, Jeevamruth, Vermiwash.

### INTRODUCTION

Organic agriculture is one of the most ancient methods of crop cultivation which dates back to the 1940s where cultivation practices are eco-friendly, sustainable and budget friendly. It can be considered as the alternative agricultural system to reclaim the farming land which was destroyed due to excessive use of chemical based inputs during green revolution in order to produce high yield (Behera *et al.*, 2012).

Panchagavya and Jeevamruth are the organic mixtures derived from cow products including dung, urine, milk, curd, and ghee, which are budget friendly and sustainable to the environment. Panchagavya is an efficient stimulator of plant growth that raises crop's biological productivity. It is employed to stimulate soil and protect against disease in plants. It also aids in

enhancing the nutritional value of fruits and vegetables. In addition, it is applied to leaves, treated seeds or seedlings, and occasionally mixed into the soil.

Jeevamruth encouraged intense biological activity in the soil by making the nutrients available to the crop. Vermicompost is made from biodegradable waste. It is one of the most cost-effective and appealing ways to address issues like organic waste disposal and its application to the soil improve the organic matter content of soil.

Inorganic fertilisers are becoming prohibitively expensive, making them unaffordable for small and marginal farmers. With the increased use of inorganic fertilisers and insecticides, the population of beneficial organisms declines and natural regeneration of nourishment in the soil is harshly affected. Additionally, the soil becomes barren and loses fertility

when they are applied to the soil for an extended length of time. Therefore, using fermented liquid manures in such a case is practically an effective suggestion. Beneficial organisms linked to liquid fertilisers contribute in nitrogen fixation, phosphate solubilization, and other processes. The application of these organic liquid formulations will significantly increase the population and activity of soil microbes. The growth and yield of crops are subsequently positively impacted by this (Chaoui *et al.* 2003).

Also known as bell pepper or sweet pepper, capsicum (*Capsicum annuum* L. var. *grossum*) is a cool-season vegetable. It belongs to the Solanaceae family. It features three to four lobed, big, blocky fruits with thick flesh and a basal depression that come in a variety of colours. The idea that pepper originated in tropical South America, especially Brazil, is widely accepted. Currently, it is widely grown in Central and South America, Peru, Bolivia, Costa Rica, Mexico, in almost all the European countries, Hong Kong and India (Bukasov, 1930). In India, it is cultivated for commercial purpose in Tamil Nadu, Karnataka and Himachal Pradesh and in some parts of Uttar Pradesh. It is a popular, high-value crop because of its aroma, flavour, colour, etc. It is abundant in minerals and vitamins A and C. Its commercial cultivation practises have been started in various regions of North-East India as well. Since it has a high market demand, it is thought that growing this crop will offer an incredible opportunity for farmers in North-East India to increase their income.

## MATERIALS AND METHODS

The experiment was conducted in a two factors factorial randomised block design with 12 treatment combinations at Vegetable Research Farm, College of Horticulture and Forestry, CAU, Pasighat, Arunachal Pradesh. Seeds were sown in pro-trays. The land was turned properly using spade and the beds of 1m width and 2m length were prepared. The treatment combinations of the present investigation were T<sub>1</sub>(S<sub>1</sub>F<sub>1</sub>)-Vermicompost (2.5 t/ha) + Panchagavya (3%), T<sub>2</sub>(S<sub>1</sub>F<sub>2</sub>)-Vermicompost (2.5 t/ha) + Jeevamruth (3%), T<sub>3</sub>(S<sub>1</sub>F<sub>3</sub>)-Vermicompost (2.5 t/ha) + Vermiwash (3%), T<sub>4</sub>(S<sub>1</sub>F<sub>0</sub>)-Vermicompost (2.5 t/ha), T<sub>5</sub>(S<sub>2</sub>F<sub>1</sub>)-FYM (20 t/ha) + Panchagavya (3%), T<sub>6</sub>(S<sub>2</sub>F<sub>2</sub>)-FYM (20 t/ha) + Jeevamruth (3%), T<sub>7</sub>(S<sub>2</sub>F<sub>3</sub>)-FYM (20 t/ha) + Vermiwash (3%), T<sub>8</sub>(S<sub>2</sub>F<sub>0</sub>)-FYM (20 t/ha), T<sub>9</sub>(S<sub>0</sub>F<sub>1</sub>)-Panchagavya (3%), T<sub>10</sub>(S<sub>0</sub>F<sub>2</sub>)-Jeevamruth (3%), T<sub>11</sub>(S<sub>0</sub>F<sub>3</sub>)-Vermiwash (3%) and T<sub>12</sub>(S<sub>0</sub>F<sub>0</sub>)-Control. Transplanting of the seedlings were done at 45 DAS. Other cultivation practices were done properly from time to time.

## RESULTS AND DISCUSSIONS

One of the key elements affecting production and the duration of harvest is plant height, particularly for plants with an indeterminate growth habit. Taller plants

are regarded as being more desirable since they result in more branches, which in turn bear more fruits and boost production. The different organic manures as soil application as well as foliar application significantly influenced the plant height. The highest plant height was observed in the treatment combination T<sub>2</sub>(S<sub>1</sub>F<sub>2</sub>)-Vermicompost+Jeevamruth at both 30 and 60 days after transplanting (24.92 cm and 63.40 cm respectively). A gradual increase in the plant height was observed from 30 days after transplanting to the 60 days after transplanting. The soil and foliar application of organic manures had a significant effect for individual as well as interaction effect on plant height of the capsicum crop. Plants treated with vermicompost + Jeevamruth received nitrogen more quickly than plants treated with other organic fertilisers. Therefore, it was recorded that plants treated with Jeevamruth and combinations containing Jeevamruth will grow longer than plants grown in other organic fertiliser combinations. Joshi and Pal Vig (2010); Ramesh *et al.* (2015); Huerta *et al.* (2010) all reported findings of a similar nature.

The highest stem girth was observed in the treatment combination T<sub>2</sub>(S<sub>1</sub>F<sub>2</sub>)-Vermicompost+Jeevamruth (8.92mm). Application of vermicompost and Jeevamruth significantly improve soil health, root penetration, microbial activity, water holding capacity, effective drainage, and nutritional status, resulting in bigger stem girth. In earlier studies on pea, Singh *et al.* (2011); Gupta *et al.* (2017) reported the advantages of an adequate supply of plant nutrients from organic sources and their effects on plant growth like stem girth.

The maximum number of leaves per plant was observed in the treatment T<sub>2</sub>(S<sub>1</sub>F<sub>2</sub>)-Vermicompost+Jeevamruth at 60 days after transplanting (39.35). There was significant increase in the total number of leaves per plant because it is more effective at fixing nitrogen than other combinations of organic fertilisers and is more readily available to the plant. The previously stated outcome is comparable to that reported by Singh *et al.* (2018), who found that using Jeevamruth considerably enhanced the total number of lettuce leaves per plant.

The lowest node for first flower to appear was recorded in T<sub>3</sub>(S<sub>1</sub>F<sub>3</sub>)-Vermicompost+Vermiwash (4.20). Early flowering is caused by the greater nutrient absorption and availability to the emerging bud, according to studies by Gupta *et al.* (2017); Mishra *et al.* (2014).

The highest leaf area can be linked to the positive impacts of organic manure, which significantly increased the assimilatory surface area and aided in greater photosynthesis, glucose production, and distribution in plant sections. The maximum leaf area was recorded in T<sub>2</sub>(S<sub>1</sub>F<sub>2</sub>)-Vermicompost+Jeevamruth (93.35cm<sup>2</sup>). The application of vermicompost to bell pepper also resulted in an increase in leaf area, as observed by Arancon *et al.* (2003); Arancon *et al.* (2005).

**Table 1: Effect of organic fertilizers on plant growth parameters of sweet pepper.**

Sr. No.	Treatment Combinations	Plant Height (cm)		Stem girth (mm)	No. of leaves/plants	Node at which 1st flower appear	Leaf area (cm <sup>2</sup> )
		30 DAT	60 DAT				
1.	T <sub>1</sub> (S <sub>1</sub> F <sub>1</sub> )	23.76	58.33	8.45	37.24	4.54	87.42
2.	T <sub>2</sub> (S <sub>1</sub> F <sub>2</sub> )	24.92	63.40	8.92	39.35	4.70	93.35
3.	T <sub>3</sub> (S <sub>1</sub> F <sub>3</sub> )	21.40	57.73	8.37	35.68	4.20	85.34
4.	T <sub>4</sub> (S <sub>1</sub> F <sub>0</sub> )	18.14	52.86	7.13	33.62	5.22	74.67
5.	T <sub>5</sub> (S <sub>2</sub> F <sub>1</sub> )	19.88	55.02	7.97	34.28	5.60	80.85
6.	T <sub>6</sub> (S <sub>2</sub> F <sub>2</sub> )	20.20	55.93	8.02	34.59	5.20	82.76
7.	T <sub>7</sub> (S <sub>2</sub> F <sub>3</sub> )	19.88	54.45	7.84	34.08	5.60	78.45
8.	T <sub>8</sub> (S <sub>2</sub> F <sub>0</sub> )	17.60	51.68	6.80	30.52	5.00	63.37
9.	T <sub>9</sub> (S <sub>0</sub> F <sub>1</sub> )	16.68	49.06	5.90	26.53	5.53	65.36
10.	T <sub>10</sub> (S <sub>0</sub> F <sub>2</sub> )	17.60	50.64	6.50	28.48	5.27	71.84
11.	T <sub>11</sub> (S <sub>0</sub> F <sub>3</sub> )	15.66	48.59	5.60	26.04	5.70	52.67
12.	T <sub>12</sub> (S <sub>0</sub> F <sub>0</sub> )	14.22	48.02	5.04	24.47	6.25	49.46

## CONCLUSIONS

In summary, the results of this investigation revealed the influence of different organic manures, used as soil as well as foliar application on the growth and yield of sweet pepper. Based on the findings of the investigation, it may be concluded that treatment combination of vermicompost (2.5 t/ha) as soil application and Jeevamruth (3%) as foliar application gave better plant growth, yield and quality of capsicum variety Solan Bharpur under protected cultivation in Pasighat condition. It is eco-friendly in nature and influenced soil health. Thus, combined application of organic manures as both soil as well as foliar spray may be recommended to increase the growth, yield and quality of capsicum, also known as sweet pepper.

## REFERENCES

- Arancon, N. Q., Edwards, C. A., Bierman, P., James, D. M., Stephen, L. and Christie W. (2003). Effects of vermicompost on growth and marketable fruits of field-grown tomatoes, peppers and strawberries. *Pedobiologia*, 47, 731-735
- Arancon, N. Q., Edwards, C. A., Bierman, P., Metzger, J. D., & Lucht, C. (2005). Effects of vermicompost produced from cattle manure, food waste and paper waste on the growth and yield of peppers in the field. *Pedobiologia*, 49(4), 297-306.
- Behera, K. K., Alam, A., Vats, S., Sharma, H. P., & Sharma, V. (2012). Organic farming history and techniques. *Agroecol. Strategies Clim. Change*, 287-328.
- Bukasov, S. M. (1930). The cultivated plants of Mexico, Guatemala and Colombia. *Bull. Appl. Bot. Genet. and Plant Breed.*, (Suppl.).
- Chaoui, H. I., Zibilske, L. M., & Ohno, T. (2003). Effects of earthworm casts and compost on soil microbial activity and plant nutrient availability. *Soil Biol. and Biochem.*, 35(2), 295-302.
- Gupta, S., Singh, D. P., Kasera, S., & Maurya, S. K. (2017). Effect of integrated nutrient management on growth and yield attributes of table pea (*Pisum sativum* L.) cv. AP-3. *International journal of chemical studies*, 5(6), 906-908.
- Huerta, E., Vidal, O., Jarquin, A., Geissen, V., & Gomez, R. (2010). Effect of vermicompost on the growth and production of amashito pepper, interactions with earthworms and rhizobacteria. *Compost Sci. Util.*, 18(4), 282-288.
- Joshi, R., & Vig, A. P. (2010). Effect of vermicompost on growth, yield and quality of tomato (*Lycopersicon esculentum* L.). *African Journal of Basic & Applied Sciences*, 2(3-4), 117-123.
- Kumar, B. M. (2016). Effect of vermicompost on germination, growth and yield of vegetable plants. *Scrutiny International Research Journal of Agriculture, Plant Biotechnology and Bio Products*, 3(1), 07-13.
- Mishra, N., Mahapatra, P., Mohanty, S., & Pradhan, M. (2014). Effect of soil amelioration, inorganic, organic and bio-fertilizer application on yield, quality and economics of snow pea (*Pisum sativum* L. var. *macrocarpon*). *Journal of Crop and Weed*, 10(1), 48-52.
- Ramesh, G., Ajithkumar, K., Savitha, A. S., & Patil, S. G. (2015). Integrated influence of organic manures in addition to inorganic fertilizers on growth, yield parameters and early blight disease of tomato (*Lycopersicon esculentum* L.). *International Journal of Biological and Pharmaceutical Research*, 6(6), 478-483.
- Sharma, U., & Chauhan, J. K. (2011). Influence of integrated use of inorganic and organic sources of nutrients on growth and production of pea. *International Journal of Farm Sciences*, 1(1), 14-18.
- Singh, B. K., Pathak, K. A., Verma, A. K., Verma, V. K., & Deka, B. C. (2011). Effects of vermicompost, fertilizer and mulch on plant growth, nodulation and pod yield of French bean (*Phaseolus vulgaris* L.). *Vegetable crops Research Bulletin*, 74.
- Singh, V., Prasad, V. M., Kasera, S., Singh, B. P., & Mishra, S. (2017). Influence of different organic and inorganic fertilizer combinations on growth, yield and quality of cucumber (*Cucumis sativus* L.) under protected cultivation. *Journal of Pharmacognosy and Phytochemistry*, 6(4), 1079-1082.
- Vasanthkumar, H. H. A. (2006). Jeevamruth slurry preparation. *Siri Samruddhi*, 4-5.

**How to cite this article:** Ningthoujam Mira Devi, Arwankie Shadap, A.S. Mailappa, Barun Singh, Siddhartha Singh, Chandra Deo, Joyshree Kharibam, Khruzho Sakhamo and Aitorma Debbarma (2023). Organic Nutrient Management in Capsicum (*Capsicum annuum* L.var. *grossum*) for growth under Protected Condition. *Biological Forum – An International Journal*, 15(12): 174-176.