



ISSN (E): 2277-7695
 ISSN (P): 2349-8242
 NAAS Rating: 5.23
 TPI 2022; 11(8): 707-710
 © 2022 TPI
www.thepharmajournal.com
 Received: 15-05-2022
 Accepted: 19-06-2022

Vignesh S
 Department of Agronomy,
 Tamil Nadu Agricultural
 University, Coimbatore,
 Tamil Nadu, India

Somasundaram E
 Department of Agronomy,
 Tamil Nadu Agricultural
 University, Coimbatore,
 Tamil Nadu, India

Sangeetha SP
 Department of Agronomy,
 Tamil Nadu Agricultural
 University, Coimbatore,
 Tamil Nadu, India

Manoranjitham SK
 Department of Fruit Science,
 Tamil Nadu Agricultural
 University, Coimbatore,
 Tamil Nadu, India

Corresponding Author:
Vignesh S
 Department of Agronomy,
 Tamil Nadu Agricultural
 University, Coimbatore,
 Tamil Nadu, India

Influence of organic nutrient sources on growth and yield of green chilli (*Capsicum annuum* L.)

Vignesh S, Somasundaram E, Sangeetha SP and Manoranjitham SK

DOI: <https://doi.org/10.22271/tpi.2022.v11.i8i.14748>

Abstract

To validate the effect of organic manures on growth and yield of green chilli (*Capsicum annuum* L.) a field experiment was conducted at Tamil Nadu Agricultural University, Coimbatore during December 2021- June 2022. The experiment was laid out in randomized block design with thirteen treatments and replicated thrice. The treatments include basal application of organic inputs viz. FYM (25 t ha⁻¹), Vermicompost (5 t ha⁻¹), Ganajeevamrutha (200 kg ha⁻¹), Humic acid (25 kg ha⁻¹), Ganajeevamrutha (200 kg ha⁻¹) + Jeevamrutha (500 l ha⁻¹) along with standard check (recommended dose of NPK fertilizers with micronutrient spray). Foliar spray of Panchagavya (3%) and banana pseudostem sap (2%) at 45, 60 and 75 days after transplanting was done in all the treatments as separate sets. Growth and yield parameters were observed in randomly selected 5 plants from each treatment plot. Application of recommended dose of NPK fertilizers + Panchagavya @ 3% foliar spray (T₁₁) recorded highest plant height (34.33 cm, 55.33 cm, 61.00 cm), number of branches plant⁻¹ (6.53, 9.50, 11.00) on 30, 60, 90 DAT respectively. Number of flowers plant⁻¹ (59.33, 80.00, 76.33) on 60, 75 and 90 DAT. Fruit length (8.41cm), fruit weight (3.82 g), number of fruit plant⁻¹ (158.8) and yield plant⁻¹ (511.3 g) than all other approaches. Followed by organic treatment viz. application of FYM @ 25 t ha⁻¹ + Panchagavya @ 3% FS (T₁) recorded highest plant height (27.67 cm, 46.67 cm, 51.50 cm), number of branches plant⁻¹ (5.53, 7.10, 8.97) on 30, 60, 90 DAT respectively. Number of flowers plant⁻¹ (49.00, 71.27, 65.60) on 60, 75 and 90 DAT. Fruit length (7.66 cm), fruit weight (3.50 g), number of fruit plant⁻¹ (133.0) and yield plant⁻¹ (419.9 g plant⁻¹) than control (T₁₃). Hence these organic strategies can be adopted in organic chilli cultivation.

Keywords: Green chilli, organic, growth, yield

Introduction

Chilli (*Capsicum annuum* L.) is a vegetable cum spice crop as well as an annual herb, profusely branching bushy plant belongs to the family Solanaceae, genus *Capsicum*. It is used for culinary purpose an essential ingredient of Indian curry, as it provides energy, protein, carbohydrate and fat. It is one of the commercial high value crops called as "Universal spice" of India and rich source of vitamins A, C, E, flavonoids (Anon. 2001) ^[1] also excellent source of minerals like molybdenum, magnesium, potassium and copper. Predominantly popular for its green pungent fruits. Pungency is due to the presence of active principle capsaicin (Gokul *et al.*, 2020) ^[5]. India is one of the largest producer, consumer and exporter of chilli in the world has the area of 411.0 ha with a production of 4363.0 metric tonnes and productivity of 10.6 metric tonnes ha⁻¹ (Indiastat, 2020) ^[7]. Major chilli producing states in India are Andhra Pradesh, Telangana, Madhya Pradesh, Karnataka, Maharashtra, Odisha and Tamil Nadu. These accounts for more than 75 per cent of an area and production.

Though chilli is grown successfully by using commercial fertilizers to increase the yield. Continuous use of commercial fertilizers affects the quality of crop, soil properties, environment and increases cost of cultivation. Although the organic manures contain lower amount of plant nutrients, the presence of growth promoting principles like enzymes and hormones, will increase crop growth, productivity, produce quality and the soil fertility. In addition, it reduces the cost of cultivation and organic products are gaining more importance in national and international level market. Hence, it is essential to know the effects of organic source of nutrients on crop growth and development. Keeping this in view, the present study was planned to raise healthy crop of chilli by using various organic inputs of biological origin.

Materials and Methods

A field experiment was conducted at Eastern Block farm, Department of Agronomy, TNAU, Coimbatore during 2021-2022 to evaluate the organic nutrient sources for green chilli production. The experiment was laid out in randomized block design with 13 treatments and were replicated thrice. Treatment details are as follows: T₁: FYM @ 25 t ha⁻¹ + Panchagavya @ 3% FS on 45, 60 & 75 days after transplanting (DAT), T₂: Vermicompost @ 5 t ha⁻¹ + Panchagavya @ 3% foliar spray (FS) on 45, 60 & 75 DAT, T₃: Ganajeevamrutha @ 200 kg ha⁻¹ + Panchagavya @ 3% FS on 45, 60 & 75 DAT, T₄: Humic acid @ 25 kg ha⁻¹ + Panchagavya @ 3% FS on 45, 60 & 75 DAT, T₅: FYM @ 25 t ha⁻¹ + Banana pseudostem sap @ 2% FS on 45, 60 & 75 DAT, T₆: Vermicompost @ 5 t ha⁻¹ + Banana pseudostem sap @ 2% FS on 45, 60 & 75 DAT, T₇: Ganajeevamrutha @ 200 kg ha⁻¹ + Banana pseudostem sap @ 2% FS on 45, 60 & 75 DAT, T₈: Humic acid @ 25 kg ha⁻¹ + Banana pseudostem sap @ 2% FS on 45, 60 & 75 DAT, T₉: Organic farmers practice (Ganajeevamrutha @ 200 kg ha⁻¹ + Jeevamrutha @ 500 lit ha⁻¹ as basal + Panchagavya @ 3% FS on 45, 60 & 75 DAT), T₁₀: Recommended dose of NPK fertilizers + Recommended foliar spray of micronutrient (Zinc sulphate @ 0.5% thrice at 10 days interval from 45 DAT + Manganese sulphate @ 1% at 60 DAT + Borax @ 0.25% at 45 and 65 DAT), T₁₁: Recommended dose of NPK fertilizers + Panchagavya @ 3% FS on 45, 60 & 75 DAT, T₁₂: Recommended dose of NPK fertilizers + Banana pseudostem sap @ 2% FS on 45, 60 & 75 DAT, T₁₃: Control. FYM, Vermicompost, Ganajeevamrutha, Jeevamrutha and Humic acid were applied as basal whereas Panchagavya and Banana pseudostem sap were applied as foliar spray. Field was ploughed with cultivator and rotavator to get fine tilth. Plots were formed with a gross size of 5m x 4m. TNAU chilli hybrid CO 1 seedlings were planted on one side of ridge with spacing of 75 cm × 60 cm. Observations were recorded from randomly selected 5 plants of each plot on growth parameters such as plant height (cm), number of branches plant⁻¹ and yield parameters includes number of flowers plant⁻¹, number of fruits plant⁻¹, fruit length (cm) and fruit weight (g) and yield (g plant⁻¹) of chilli. Data collected from the experiment were analysed statistically using "Analysis of variance test" as a single factor analysis. The critical difference at 5% level of significance of different treatment over each other (Gomez and Gomez, 1984)^[6].

Result and Discussion

Application of organic nutrients as foliar spray in combination with recommended dose of NPK fertilizers and organic manures significantly increased the plant height, number of branches plant⁻¹, number of flowers plant⁻¹, number of fruits plant⁻¹, chilli fruit length, weight and yield plant⁻¹. Application of recommended dose of NPK fertilizers + Panchagavya @ 3% FS (T₁₁) registered significantly higher plant height (34.33 cm, 55.33 cm, 61.00 cm) on 30, 60 and 90 DAT which was on par with recommended dose of NPK fertilizers + banana pseudostem sap foliar spray @ 2% (T₁₂) on 30 DAT and recommended dose of NPK fertilizers + recommended foliar spray of micronutrient (T₁₀) on 30 and 90 DAT. With regards to complete organic combination, FYM @ 25 t ha⁻¹ + Panchagavya @ 3% FS (T₁) recorded plant height of 27.67 cm, 46.67 cm, 51.50 cm on 30, 60 and 90 DAT which was on par with application of FYM @ 25 t ha⁻¹ + Banana pseudostem sap @ 2% FS (T₅). The lowest plant height

(17.00 cm, 34.33 cm and 41.33 cm on 30, 60 and 90 DAT respectively) was observed in T₁₃ (Control). Higher plant height obtained might be due to increase in protein synthesis, cell growth and assimilation of readily available nutrients especially nitrogen. In addition, the essential macro nutrients such as N, P, K and beneficial micro nutrients present in Panchagavya may increases the biosynthesis of growth promoting hormones and formation of chlorophyll which may lead to better photosynthesis and increased plant height. This result coincides with the observation recorded by Sreenivasa *et al.* (2010)^[11] in chilli and Loganathan *et al.* (2014)^[9] in baby corn.

The more number of branches plant⁻¹ (6.53, 9.50, 11.00 on 30, 60 and 90 DAT respectively) was observed in application of recommended dose of NPK fertilizers + Panchagavya @ 3% FS (T₁₁) which was on par with treatment (T₁₀) on 30 and 90 DAT and with treatment (T₁₁) at 30 DAT followed by organic treatment with application of FYM @ 25 t ha⁻¹ + Panchagavya @ 3% FS (T₁) recorded increased number of branches (5.53, 7.10, 8.97 on 30, 60 and 90 DAT, respectively). The less number of branches (2.73, 4.00 and 6.03) were observed in control (T₁₃) on 30, 60 and 90 DAT. Higher number of branches might be due to the activity of growth promoting substances like Gibberellic Acid, IAA present in the Panchagavya which might stimulated plant metabolites that help to build up the plant tissues. These results were in accordance with (Rao *et al.*, 2015)^[10] in chilli.

Application of recommended dose of NPK fertilizers + Panchagavya @ 3% (T₁₁) recorded highest number of flowers plant⁻¹ (59.33, 80.50, 76.33 on 60, 75 and 90 DAT, respectively) which was on par with treatment (T₁₀) on 75 DAT. Among the complete organic nutrient sources, application of FYM @ 25 t ha⁻¹ + Panchagavya @ 3% FS (T₁) recorded more number of flowers plant⁻¹ (49.00, 71.27, 65.60 on 60, 75 and 90 DAT, respectively) which was on par with treatment (T₅). The less number of flowers plant⁻¹ (25.00, 45.50, 40.83) were observed in control (T₁₃) on 60, 75 and 90 DAT, respectively. The higher fruit length (8.41cm) and weight (3.82 g) was observed with recommended dose of NPK fertilizers and Panchagavya @ 3% foliar spray (T₁₁) which was on par with treatment (T₁₀) and (T₁₂). The lower fruit length (6.31cm) and fruit weight (2.90 g) was recorded in control (T₁₃). Similar results were observed by Bijjula Sruthi and Somasundaram, (2019)^[8] in onion.

More number of fruits plant⁻¹ (158.8) were recorded with recommended dose of NPK fertilizers and Panchagavya @ 3% foliar spray (T₁₁) which was on par with treatment (T₁₀). Among organic, application of FYM @ 25 t ha⁻¹ + Panchagavya @ 3% FS (T₁) recorded higher more number of fruit plant⁻¹ (133.0) The number of fruits plant⁻¹ was lesser (84.0) in control (T₁₃). The significant improvement in number of flowers and fruits could be due to better source sink relationship which might have resulted in the development of more number of reproductive parts and there by increased the sink size. This might be due to enhanced production of growth promoting substances like gibberellic acid, indole acetic acid and plant growth substances. These results are in agreement with the findings of Bindiya *et al.* (2006)^[4]

Application of fertilizers, manures and organic foliar nutrients had shown significant difference in green chilli yield. The higher fruit yield (511.3 g plant⁻¹) was obtained in recommended dose of NPK fertilizers + Panchagavya @ 3%

FS (T₁₁), with regard to complete organic combination, application of FYM @ 25 t ha⁻¹ + Panchagavya @ 3% FS (T₁) recorded higher yield (419.9 g plant⁻¹) which was on par with treatment (T₅). Whereas control (T₁₃) recorded lower yield of 252.3 g plant⁻¹. The application of readily available nutrients might play a vital role in growth and translocation of photosynthates in plant by supplying macronutrients, whereas the organic nutrient sources *viz.* Panchagavya supply

micronutrients and growth promoting hormones enhances the vegetable chilli yield. These results were in coordination with the results observed by Basavaraj *et al.* (2015)^[2] in french bean and Kumar *et al.* (2019)^[8] in clusterbean. Similarly, Gokul *et al.* (2020)^[5] observed that combined application of inorganic fertilizers, organic manures and biofertilizers resulted in higher growth and nutrient content of chilli.

Table 1: Effect of organic nutrients on growth parameters of chilli

Treatments	Plant height (cm)			No. of branches Plant ⁻¹		
	30 DAT	60 DAT	90 DAT	30 DAT	60 DAT	90 DAT
T ₁	27.67	46.67	51.50	5.53	7.10	8.97
T ₂	23.00	42.67	47.67	5.10	6.30	8.11
T ₃	21.00	41.00	45.00	4.37	5.73	6.78
T ₄	20.67	40.00	44.33	4.07	5.40	6.48
T ₅	26.67	46.67	49.50	5.37	6.80	8.56
T ₆	22.67	42.00	46.33	4.83	6.00	7.45
T ₇	20.00	38.33	43.33	3.77	5.23	6.32
T ₈	19.00	36.67	43.00	3.73	5.00	6.14
T ₉	22.00	41.33	46.00	4.50	5.87	7.26
T ₁₀	33.17	51.00	58.00	6.23	8.40	10.00
T ₁₁	34.33	55.33	61.00	6.53	9.50	11.00
T ₁₂	31.58	50.67	56.33	5.93	7.67	9.00
T ₁₃	17.00	34.33	41.33	2.73	4.00	6.03
SEd	1.42	1.92	2.25	0.48	0.50	0.51
CD (p=0.05)	2.92	3.97	4.64	0.99	1.03	1.05

Table 2: Effect of organic nutrients on yield parameters and yield of chilli

Treatments	No. of flowers plant ⁻¹			No. of fruits plant ⁻¹	Fruit length (cm)	Fruit Weight (g)	Yield plant ⁻¹ (g)
	60 DAT	75 DAT	90 DAT				
T ₁	49.00	71.27	65.60	133.0	7.66	3.50	419.9
T ₂	41.83	67.50	60.50	117.7	7.51	3.45	378.5
T ₃	33.83	60.00	55.17	105.3	7.39	3.30	324.4
T ₄	30.17	57.33	52.17	103.4	7.23	3.24	309.1
T ₅	46.33	69.50	63.50	127.0	7.61	3.48	400.1
T ₆	38.33	66.33	58.00	114.1	7.48	3.40	357.4
T ₇	29.67	55.50	50.83	97.1	7.09	3.16	295.3
T ₈	28.60	51.33	46.00	94.0	6.99	3.11	285.7
T ₉	34.50	64.67	57.00	110.3	7.40	3.36	341.4
T ₁₀	55.00	78.53	71.00	150.8	8.10	3.68	477.5
T ₁₁	59.33	80.50	76.33	158.8	8.41	3.82	511.3
T ₁₂	53.83	73.57	69.17	141.4	8.07	3.58	453.8
T ₁₃	25.00	45.50	40.83	84.0	6.31	2.90	252.3
SEd	1.70	2.19	2.45	8.29	0.32	0.24	15.12
CD (p=0.05)	3.52	4.53	5.05	17.10	0.66	NS	31.21

Conclusion

From the study it is inferred that application of recommended dose of NPK fertilizers and foliar spray of Panchagavya @ 3% on 45, 60 & 75 DAT (T₁₁) was found to be best in obtaining higher crop growth and yield of vegetable chilli in the Coimbatore region of Tamil Nadu. Among the complete organic nutrient sources, application of FYM @ 25 t ha⁻¹ and foliar spray of Panchagavya @ 3% on 45, 60 & 75 DAT (T₁), showed better results on growth and yield of green chilli.

Reference

1. Anonymous. Chilli research and development in India: A Status Report, Indian Institute of Spices Research, Calicut, 2001, 1-6.
2. Basavaraj K, Devakumar N, Latha B, Somanatha AC. Effect of organic liquid manure, jeevamrut and panchagavya on yield of frenchbean (*Phaseolus vulgaris* L.). Proceedings of National Symposium on Organic Agriculture. 2015, 111p.
3. Bijjula Sruthi, Somasundaram E. Influence of organic manures on yield, quality and economics of aggregatum onion (*Allium cepa* L. var. *aggregatum*). J Pharmacogn Phytochem. 2019;8(3):1768-1770
4. Bindiya Y, Reddy IP, Srihari D, Reddy RS, Narayanamma M. Effect of different sources of nutrition on soil health, bacterial population and yield of cucumber. Journal of Research. 2006;34:12-17
5. Gokul D, Poonkodi P, Angayarkanni A. Effect of integrated nutrient management on the growth and nutrient content of chilli (*Capsicum annum* L.). IJCS. 2020;8(4):2647-2651.
6. Gomez, Kwanchai A, Arturo A. Gomez: Statistical procedures for agricultural research. John Wiley & sons, 1984.

7. <https://www.indiastat.com/table/agriculture/area-production-yield-green-chillies-india-2013-20/963095>
8. Kumar AT, Somasundaram E, Thavaprakash N. Influence of organic manures on growth and yield of vegetable clusterbean (*Cyamopsis tetragonoloba* (L.) Taub.). *Journal of Pharmacognosy and Phytochemistry*. 2019;8(3):3331-3334.
9. Loganathan V, Wahab K. Influence of Panchagavya foliar spray on the growth attributes and yield of baby corn (*Zea mays*) cv. COBC 1. *Journal of Applied and Natural Science*. 2014;6(2):397-401.
10. Rao MRK, Kumar MS, Jha NK., Comparative yield analysis of chilli (*Capsicum annum* L.) by application of vermicompost and panchagavya. *Journal of Chemical and Pharmaceutical Research*. 2015;7(9):319-323.
11. Sreenivasa MN, Nagaraj MN, Bhat SN. Beejamrut: A source for beneficial bacteria. *Karnataka Journal of Agriculture Science*. 2010;17:72-77.