



STUDY OF DIFFERENT ORGANIC MANURE COMBINATION ON GROWTH AND YIELD OF CHILLI (*CAPSICUM ANNUUM* L.)

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Abstract

Increase in application of inorganic fertilizers in agriculture has deteriorated the soil quality. Vermicompost as a soil conditioner has been emerging as a potential end use for maintaining soil productivity. The paper examines the effect of vermicompost, cowdung and different organic manures combination on the growth and yield characteristics of chilli (*Capsicum annuum* L.). After investigation, it was found that the application of vermicompost and farmyard manure recorded significantly higher growth and yield characters than other treatments. In overall investigations, the obtained results specified that the application of vermicompost show promising results in the cultivation of chilli and better for obtaining the higher growth and yields of chilli and further the cow dung and leaf manure shows good growth and high yield of chilli crop.

Key words : Vermicompost, chilli, organic manures, yield.

Introduction

Organic agriculture is one among the longest spectrum in production methods that are supportive of the environment. Application of inorganic fertilizer to agriculture is now common practice, using composts derived from various green wastes in agriculture is tardily coming back. Compost contains variable amounts of N, P and K and it is a valuable source of plant nutrients. Cost of inorganic fertilizers is very high and sometimes it is not available in the market right time it leads to the farmers fail to apply the inorganic fertilizers to the crop field in optimum time. On the other hand, the organic manure is easily available to the farmers and its cost is low compared to that of inorganic fertilizers. Most often this new type of technology (organic agriculture) is defined as a system for maintenance of the natural fertility of the soil, biological diversity of the species and the ecological balance of the environment. Application of vermicompost produced by biodegradable waste could be one of the most economical and attractive methods of solving the problems like waste disposal and the requirement to

increase the organic matter content of soil. In the present study soil analysis was done prior to the experiment to determine the availability of nutrients in the soil and also to calculate the equivalent amount of organic or chemical fertilizer requirement of soil nutrients.

Chilli is an important crop used as both green vegetable and spices. It's rich source of vitamin A, C and E. The pungency in chilli is due to an alkaloid capsaicin. This has high medicinal value specially anti-cancerous and instant pain relief. In India major chilli growing states are Andhra Pradesh, Karnataka, Maharashtra, West Bengal, Rajasthan, etc. With the indiscriminate use of fertilizers and chemicals there is increased risk of health hazards. Since, vegetables are mostly consumed fresh or partially cooked they should be devoid of residues of chemical fertilizers. Besides, continuous use of chemical fertilizers has resulted in the depletion of soil health. For all these reasons, now much importance is being given to Integrated Nutrient Management (INM). Chilli crop respond well to the application of both organic manures and inorganic fertilizers. Organic manures supply the major nutrients minerals and improve many soil properties and soil health

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that maintain crop productivity. Most small-scale farmers still rely on crude inputs, land and human labour with less use of chemical fertilizers and improved varieties of crops. The use of fertilizer is reported to be responsible for over 50 percent yield increase in crops. It has been widely accepted that organic farming alone could serve as a holistic approach towards achieving sustainable agriculture as it is nature based, environment friendly and ensures the conservation of resources for the future. These chillis are potentially valuable niche crops for small-scale and medium farmers (Patil *et al.*, 2014).

Materials and Methods

Field experiments were conducted at the Division of Vegetable Crops, Block No. VIII of ICAR-Indian Institute of Horticultural Research (ICAR-IIHR), Bangalore during *Kharif* season 2015-16. The experimental field is located at an altitude of 890 meter above mean Sea level and latitude $12^{\circ} 58'$ north latitude, $78^{\circ} 45'$ east longitudes, respectively. The experiments were conducted in a Randomized Block Design replicated twice, in the newly initiated organic farming trial. There were nine treatments involving different organic manures along with no manure control. The different organic manure treatments tried were :

T₁ : Control @ (no manure)

T₂ : Vermicompost @ 2.5 t ha⁻¹

T₃ : Cow dung @ 10 t ha⁻¹

T₄ : Leaf manure @5tha⁻¹ + cow dung 10 t ha⁻¹

T₅ : Leaf manure @5 t ha⁻¹

T₆ : Neemcake @ 1 t ha⁻¹

T₇ : Vermicompost @ 2.5 t ha⁻¹+FYM @ 12.5 t ha⁻¹

T₈ : Poultry manure @ 1.5 t ha⁻¹

T₉ : Night soil @5 t ha⁻¹

The experimental plots were of size 2.5 × 2.5 m and each plot consisted of size ridges with 20 cm spacing. The soil of the experimental field was clayey loam in texture with pH 7.2. The biometric observations, on plant height, number of leaves, number of braches per plant, number of fruits per plant, weight of fruit (g), wet red fruit yield, were recorded. The data of record were subjected to statistical analysis.

Results and Discussion

Growth parameters

The results presented in table 1 clearly revealed that the vermicompost as well as other organic manures in various combinations had a significant influence on growth

parameters of chilli in the presence of different doses of organic fertilizers. Furthermore, the results indicated that plant height, number of leaves, number of primary branches increased significantly with all these treatments. In the treatment of combination of Vermicompost at 2.5 t ha⁻¹ and FYM at 12.5 t ha⁻¹ shows the maximum plant height (42.23 cm), higher number of leaves (84.22), number of primary branches/plant (12.75), compared to the untreated control (the height of plant 46.27 cm, the number of leaves 45.31, primary branches 4.78. Organic fertilizers influence both yield and plant micronutrients contents and thus help sustain crop productivity (Mottaghian *et al.*, 2008). The good plant growth, number of leaves and higher number branches may be due to higher level of vermicompost and FYM which might have

Table 1 : The effect of organics on growth parameters on plant height (cm) number of leaves and number of branches of chilli (*Capsicum annum* L).

Treatment	Plant height (cm)	Number of leaves	Number of branches
T ₁	27.22	45.31	4.78
T ₂	36.12	58.34	9.96
T ₃	35.36	57.44	7.70
T ₄	33.25	58.23	9.63
T ₅	29.15	52.25	7.86
T ₆	31.51	56.26	8.93
T ₇	42.23	84.22	12.75
T ₈	34.58	57.21	8.26
T ₉	32.45	53.58	7.67
S.Em±	1.31	1.56	0.34
C.D. at 5%	3.92	4.67	1.02

Table 2 : The effect of organics on yield parameters on number of fruit, fresh weight of fruit per plant (g) dry weight of fruit for plant (g) of chilli (*capsicum annum* L.).

Treatment	Number of fruit	Fresh weight (g) of fruit	Dry weight (g) of fruit
T ₁	9.23	19.52	9.32
T ₂	14.53	26.35	14.52
T ₃	12.56	25.34	13.57
T ₄	14.25	23.56	12.32
T ₅	12.84	24.85	11.84
T ₆	11.36	24.85	11.84
T ₇	16.57	32.86	16.12
T ₈	13.85	25.84	14.23
T ₉	13.14	23.95	12.53
S.Em±	0.16	0.29	0.13
C.D. at 5%	0.49	0.88	0.40

acted as a source of additional nutrients and moisture supply. The earlier study made by Vimala *et al.* (2007), Patil *et al.* (2014), Singh *et al.* (2014), Omogoye and Mubo (2015) also reported application vermicompost, FYM and other organic manures significantly influence the growth and development of chilli.

Yield parameters

The yield parameters such as number of fruit/plant, green fruit weight and dry fruit weight (g) increased significantly by all the treatments. The treatments of combined application of Vermicompost and FYM recorded higher number of h fruit/plant (16.57) green fruit weight (32.86g) and dry fruit weight (16.12 g). These parameters were found highest in this treatment compared to control. The increase in yield parameters may be due to better root proliferation, more uptake of nutrients and water, higher plant growth, more photosynthesis and enhanced food accumulation. These findings are in conformity with those of Wange and Kale (2003) in okra.

Organic manures thereby increasing the availability of nutrients, especially protein synthesis further it was suggested that significantly increase in number of fruits and fresh, dry weight of fruit weight might have accelerated the mobility of photosynthetic from source to the sink which was influenced by the growth hormones which released from Vermicompost, the organic sources. Similar findings were reported by Dileep and Sasikala (2009), Deshpande *et al.* (2010), Singh *et al.* (2014), Jayanti *et al.* (2014) and Mudiganti *et al.* (2015) in chilli crop.

Conclusion

Application of nutrients like Vermicompost, neem cake, leaf manure and combinations has a significant and vital effect on yield and quality attributes of chilli. The supply of various plant nutrients at an optimum level sustains the desired crop productivity by optimizing the benefit from all sources in an integrated manner. The inference drawn from the present investigation clearly stated that organics are effective alternatives as a source of macro- and micronutrients and have a potential to improve yield, and thus avoid costly chemical fertilizers. The bio-organic technology is based on eco-biotechnological approaches utilizing the bio-

transformation of energy rich and complex organic substances into bio-stabilized composed products.

References

- Deshpande, R. P., T. Soniya, Anita Deshmukh and Sujata Deshmukh (2010). Effect of organic and inorganic manures on growth and yield of chilli. *Int. J. Forestry and Crop Imp.*, **1(2)**: 146-148.
- Dileep, S. N. and Sasikala (2009). Studies on the effect of different organic and inorganic fertilizers on growth, fruit characters, yield and quality of chilli (*Capsicum annum L.*) cv.K-1. *Int. J. of Agri. Sciences*, **5(1)**: 229-232.
- Jayanthi, L., J. Sekara, B. S. Ameer and K. Parthasarathi (2014). Influence of vermifertilizer on soil quality, yield and quality of chilli (*Capsicum annum L.*). *Int. Interdisciplinary Res. J.*, **4(4)**: 2249-9598.
- Mottaghian, A., H. Pirdashti, M. A. Bahmanyar and A. Abbasian (2008). Leaf and seed micronutrient accumulation in soybean cultivars in response to integrated organic and inorganic fertilizers application. *Pakistan J. of Biological Sci.*, **11**: 1227-1233.
- Mudiganti, R. K. R., K. M. Sathish and K. J. Neema (2015). Comparative yield analysis of chilli (*Capsicum annum L.*) by application of vermicompost and Panchagavya. *Journal of Chemical and Pharmaceutical Research*, **7(9)**: 319-323.
- Omogoya and M. Adewale (2015). Efficacy of NPK and cow dung combinations on performance of chilli pepper (*Capsicum annum L.*) and their influence on soil properties. *IOSR Journal of Agriculture and Veterinary Science*, **8(7)**: 31-35.
- Patil, I. D., H. B. Babalad and R. K. Patil (2014). Effect of organic nutrient and Biological pest management practices on insect pest and disease dynamics in organic chilli production system. *Int. J. of Recent Scient. Res.*, **5(9)**: 1524-1528.
- Singh, C. K. A., J. Suchit and J. Devansu (2014). Effect of organics on growth, yield and biochemical parameters of chilli (*Capsicum annum L.*). *IOSR Journal of Agriculture and Veterinary Science*, **7(1)**: 2319-2372.
- Vimala, P., R. Melor, S. O. Ahmad and Balasubramaniam (2007). Effect of organic and inorganic fertilizers on growth, yield and nutrient content of brid chilli (*Capsicum frutescence L.*). *J. Trop. Agric.*, **35(1)**: 29-40.
- Wange, S. S. and R. H. Kale (2003). Response of okra and bitterguard to diazotrophs and graded level of nitrogen. *Journal of Soils and Crops*, **13**: 271-274.