International Journal for Multidisciplinary Research (IJFMR)
E-ISSN: 2582-2160 ● Website: www.ijfmr.com ● Email: editor@ijfmr.com

Effects of Vermicompost and chemical Fertilizer on growth and yielding of Chilli (*Capsicum annum* L)

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Abstract

The present study was conducted to influence of vermicompost, cow dung and urea on the growth and yield of chilli. Vermicompost is an environmentally and economically friendly process to decompose organic waste. It contains a combination of macro and micro nutrients. The uptake of nutrients has positive effect on plant nutrition, growth and yield. The experiment was conducted in a pot with three treatments viz vermicompost, cow dung and urea along with control in our department of botany. The growth and yield parameters were found to be better due to vermicompost treatment with higher values for plant height(43.50cm), weight of the fruits(10.50gm), number of fruits (26), stem diameter(0.96cm) and dry matter yield (32.50gm).

Keywords: Vermicompost, Cow Dung, Dry matter yield, Chilli

Introduction:

Vermicompost is an aerobic, bio-oxidation, non-thermophilic process of organic waste decomposition that depends upon earthworms to fragment mix and promote to microbial activity. Earthworm can consume practically all types of organic matter and they can eat waste as their own body weight per day. A food passes through their digestive tract and secrete chemicals that break down organic matter into sustainable nutrition. These chemicals excreted with their castings comprise vermicompost which improves soil texture, structure and aeration. Vermicompost accelerates plant growth directly by supplying nutrients and indirectly by enhancing the communities of friendly microbes by supressing soil borne diseases (Canellas et al.,2002;Zandonadi et al.,2007; Lazcano and Dominguez 2011). The castings are rich in nitrate, available forms of P, K, Ca, Mg and also in bacteria and actinomycetes. Application of compost improve physical properties of the soil by decreasing bulk density and increasing the soil water holding capacity (Waber et al.,2007). Vermicompost has positive effects on vegetation growth, shoot and root development in plants (Edwards et al., 2004) leaf area, root branching (Lazcano et al.,2009) and flowering (Arancon et al.,2008). The use of high fertile of chemical fertilizers and medicines has brought along new discoveries with the understanding of the harm caused by long term soil and human health (Bailer-Anderson and Anderson 2000, Anonumous 2001). Vermicompost is stated to be superior to other organic fertilizers (livestock manure, poultry manure etc.) in many respects (Kiyasudeen et al.,2015). Several studies were done on effect of vermicompost and yield in chilli and other plants by (Joshi and

Vig,2010, Arancon et al.,2006). The present study was undertaken to find out the effect of vermicompost and chemical fertilizer on the growth and yield of chilli plants.

Materials and Methods:

The present study was carried out in the pot at the laboratory of Botany department of Kandi Raj College in Murshidabad. Vermicompost were prepared in our botanical garden of our college during 2024-25 by using vegetable wastage, cow dung, banana leaves, decaying leaves ,soil and earth worms *(Eisenia foetida).* The effect of urea (chemical fertilizer), vermicompost and dry cow dung on chilli (*Capsicum annum)* was studied. Four treatments namely urea, vermicompost, cow dung and control were carried out in three replicates for the study. The treatments were application urea 5 gm per pot at initial and final stages of the plant; vermicompost 5 gm/kg soil, cow dung 25 gm/kg soil and control (without fertilizer). One chilli plant was grown in each treatment pot. All necessary intercultural operations were performed as when required. The various growth parameters of height of plants, diameter of the main stem, dry weight of whole plant, number of fruits per plant and the total weight of fruits per plant were measured at 60th DAS (Days After Sowing) using standard laboratory methods. The data were subjected to statistical analysis as described by (Snedecor and Cochran,1994).

Result and Discussion:

The maximum height of Chilli plant was recorded 43.50 cm in vermicompost treated pot in comparison to other treated plants. The minimum height of plant was recorded as 16.40 cm in control treated pot. (Table-1). Weight of the fruits was 10.50 gm.in vermicompost treated pots followed by those treated with cow dung, urea and control. The maximum number of fruits were recorded as 26 due to the application of vermicompost. In the vermicompost treated pot, the stem diameter and dry matter production was found highest as compared with other treated plants. It may be due to application of vermicompost. Similar results were obtained by Gupta et al., (2011), Jaipaul et al., (2011), Dileep and Sasikala,(2009). Vermicompost was thus found to be most effective among all of the treatments. This enhanced growth in the vermicompost treatment might be due to the presence of more available nitrogen (Edwards and Fletcher,1988). In the vermicompost treatment pot, the number of fruits were found highest among all treatments. The increase number of fruits may be due to presence of nitrogen and phosphorus in vermicompost manure. It has also been observed by Cheema et al,.*(*2001). The foliar spray of vermicomposting leachate or water-extract also promote growth of tomato plants (Tejadaet et al,. 2008) and strawberries (Singh et al,.2010) .

Table: 1. Growth characteristics of *Capsicum annum* (Chilli) plants cultivated under the influence of different fertilizers.

Treatments	Plant height(cm)	Weight of fruits(gm)	No.of fruits/plant	Stem diameter(cm)	Dry matter yields(gm)
Vermicompost	43.50	10.50	26.00	0.96	32.50
Cow dung	38.30	5.80	22.00	0.78	28.68
Urea	31.74	3.86	16.00	0.68	27.30
Control	18.60	2.85	11.00	0.54	24.40

C.D(P=0.05)	4.32	3.1	7.6	0.38	1.12

Conclusion:

In the present study all the parameters of treated plants in vermicompost pot showed higher yielding of fruits, weight of fruits, height of plant and stem diameter than other treated plants. Vermicompost products have antibiotic properties due to the biochemical hormones they contain (Edwards and Bohlen,1996). It is concluded that the effect of organics on growth and yield parameters of chilli (*Capsicum annum* L.) in compare to other treatments. If we have implement vermicompost in the chilli cultivation then the yield may be reached optimum position . It has been reported that vermicompost applied with soil humic substances increases the concentration of plant growth hormones (Edwards and Aracon,2004) and positively affected soil structure (Singh et al,.). When vermicompost used in production areas, it provides many benefits directly and indirectly to plant growth and product quality. Therefore, the present study proved that the utilization of vermicompost manure was more useful than chemical fertilizers.

Acknowledgement:

The author is thankful to *Dr. Soma Datta* Principal of Kandi Raj College for providing necessary facilities to complete this research work. I am also thankful to our 6th semester Botany honours students and *Dipanwita Pal* for their support in the various ways.

Biography:

Dr.Chandan Kumar Jana is working as an Assistant Professor at UG-Department of Botany at Kandi Raj College under Kalyani University(West Bengal) with more than having 10 years teaching experience. I have received Ph.D degree from Bhavnagar University,Gujarat with 6 years research experience on Plant Science,Water pollution and Forest ecology. I have published 10 research papers including Book chapter.

REFERENCES:

1.Arancon, N.Q., Edwards, C.A., Babenko, A., Canon, J., Galvis, P., and Metzg, J.D (2008*). Applied Soil Ecology*. **39**: 91

2. Arancon, N. Q., Edwards, C. A., Lee, S., & Byrne, R. (2006). Effects of humic acids from vermicomposts on plant growth. European Journal of Soil Biology, 42, 65–69. https://doi.org/10.1016/j.ejsobi.2006.06.004

3.Cheema, M.A., Malik, M.A., Hussain, S.H., Sah,A. and Basra (2001) *Jr.ofAgron.and Crop.Sc.***186**(2):103

4. Canellas, L. P., Olivares, F. L., Okorokova-Façanha, A. L., &Façanha, A. R. (2002). Humic acids isolated from earthworm compost enhance root elongation, lateral root emergence, and plasma membrane H+-ATPase activity in maize roots. Plant Physiology, 130, 1951– 1957. https://doi.org/10.1104/pp.007088

5. Deshpande, R.P., Soniya Tamgadge, Anita Deshmukh and Sujata Deshmukh (2010). Effect of organic and inorganic manures on growth and yield of Chilli. International Journal Of Forestry And Crop Improvement (December, 2010); 1 (2) : 146-148

6. 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 annuum* L.) cv.K-1. International Journal of Agricultural sciences Vol. 5 issue 1, January to May 2009:229-232

7.Edwards, C.A., Dominguez, J. and Arancon, N.Q. (2004). *Soil Zoology for Sustainable Development in the 21st century*. Cairo.pp397-420.

8.Edwards,C.A., and Fletcher,K.E.(1988).*Agriculture, Ecosystems and Environment.***24**:235

9.Edwards C.A, Bohlen P.J., (1996). Biology of earthworms. In: P.J.Bohlen and C. A. Edwards,Biology and Ecology of earthworms ,3rdedn. Hall,NewYork,s.426. Edwards,C.A. and Burrows,I.,1988.*The potential of earthwormcomposts as plant growth media*, In Netherlands. SPC Academic Publishing,211-219.

10.Gupta,A.K., Ray, B., Singh, M.P., Upadhyaya,V. and Singh, C.K.(2011). *Plant Archives***11**(1):285

11.Jaipaul, S. S, Dixit, A. K. and Sharma, A. K. (2011). Growth and yield of capsicum (*Capsicum annum* L.) and garden pea (Pisum sativum) as influenced by organic fertilizers and biofertilizers. Indian Journal of Agricultural Sciences, 81(7), 637-642

12.Joshi, R., &Vig, A. P. (2010). Effect of vermicompost on growth , yield and quality of tomato (Lycopersicum esculentum L). African Journal of Basic & Applied Sciences, 2(3–4), 117–123.

13.Lazcano, C., Arnold, J., Tato, A., Zaller, J.G. and Dominguez, J. (2009). *Spanish Journal of Agricultureal Research*.**7**:944

14. Singh, R., Gupta, R.K., Patil, R.T., Sharma, R.R., Asrey, R., Kumar, A. Jangra, K.K. (2010). *Scientia Horticulterae*.**124**:34.

15.Snedecor, G.W., and Cochran ,W.G.,(1994). *"Statistical methods"*.8th edition, IOWA State University Press, Ames, IOWA, USA.

16.Tejada, M., Gonzalez, J.L., Hernandez, M.T. and Garcia, C. (2008). *Bioresource Technology. 99:6228*

17.Weber, J.,Karczewska, A., Drozd, J., Licznar, M., Licznar, S., Jamroj, E. and Kocowicz,A

(2007). *Soil Biology and Biochemistry*.**39**:1294.

18.Zandonadi, D. B., Canellas, L. P., &Façanha, A. R. (2007). Indolacetic and humic acids induce lateral root development through a concerted plasmalemma and tonoplast H+ pumps activation. Planta, 225, 1583–1595. https://doi.org/10.1007/s00425- 006-0454-2