INTERNATIONAL JOURNAL OF RESEARCHES IN BIOSCIENCES, AGRICULTURE AND TECHNOLOGY
© VISHWASHANTI MULTIPURPOSE SOCIETY (Global Peace Multipurpose Society) R. No. MH-659/13(N)
www.ijrbat.in

UTILIZATION OF VERMICOMPOST POTENTIAL ON THE GROWTH AND DEVELOPMENT OF TOMATO PLANTS

Sayyad N. R.
Department of Zoology, Jijamata College, Bhende
Dist – Ahmednagar, Maharashtra 414605
E.mail- nabizoology@gmail.com

ABSTRACTS:
Vermicompost is the organic fertilizer obtained from units of vermiculture. The term vermicomposting means the use of earthworms for composting organic residues into good quality of bio-fertilizer (Vermicompost). Our study examines the effect of vermicompost and Cattle dung on the growth and development of tomato plant. When treatment of vermicompost and Cattle dung was given to the tomato plants, it showed a significant growth of plants. Vermicompost when mixed with cow dung increased the shoot length to 22.45 cm as compared to control 18.54 cm. When treatment of vermicompost and Cattle dung was given to the tomato plants, it was observed thatnumber of leaves more than the control. It can be concluded that Vermicompost is a nutritive 'organic fertilizer which contributes the growth and development of tomato plants.

Keywords:- *Eudrilus eugeniae*, Vermicompost, Dung, Biofertilizer.

INTRODUCTION:

The rapidly use of Chemical fertilizers and pesticides increased the 'quantity' of the food produced but decreased its 'nutritional quality' and also destroyed the 'physical, chemical and the biological properties' of soil. Organic Wastes that are "biodegradable and can be vermicomposted into a highly "nutritive bio-fertilizer" 4-5 fold more powerful than conventional composts and even superior to chemical fertilizers for better crop growth and safe food production. Vermicompost is an ecofriendly natural fertilizer prepared from biodegradable organic wastes and is free from chemical inputs (Rajiv K. Sinha, et al., 2010 andSingh et, al., 2013).

Vermicomposting is a decomposition process involving the combine action of earthworms and microorganisms. Although microorganisms are responsible for the biochemical degradation of organic matter, earthworms are crucial drivers of the process, by fragmenting and conditioning the substrate and dramatically altering its biological activity. Earthworms act as mechanical blenders and by comminuting the organic matter they modify its physical and chemical status, gradually reducing its C: N ratio, increasing the surface area exposed to micro-organisms and making it much more favorable for microbial activity and further decomposition(Pandit, et al.2012). The vermicompost is a mixture of excreatory products and mucus secretion of earthworms containing enzymes which stimulate the growth and yield of crops (Sayyad, 2017). The use of vermicompost reduce use of water for irrigation, reduce pest attack, reduce 'termite attack, and reduce weed growth. Due to use vermicompost and earthworms faster rate of 'seed germination' and rapid seed-lings growth and development; greater numbers of fruits per plant.

Vermicompost does not have any adverse effect on soil, plant and environment and improves soil aeration and texture and also promotes better root growth and nutrient absorption. Thus present investigation was under taken to study the influence of vermicompost in growth and development of tomato plants

MATERIAL AND METHODS:

Collection of Earthworm:-

The collection of organic wastes, Cattle dung from cow shelters and earthworm culture (*Eudrilus eugeniae*) from the Agricultural Experimental Farm. *Eudrilus eugeniae* speies of earthworm used for the preparation of vermicompost. The process of vemicomposting was done in large scale recommended method Reynolds, 1977. The vermicompost was collected from beds of vermiculture.

Fig: Earthworm: *Eudriluseugeniae*

Experimental Plant Material:

The experimental plant material was used in the present investigation is potted tomato (*Lycopersicon esculentum* L) Var. Vaishali. Tomato crop were raised in the experimental fields employing conventional cultural practices.

Treatment materials:

Four different treatments including control were given to the pottedtomato plants.These are T_1 =1 kg dung+ Soil+ 1 kg Vermicompost, T_2 =Soil+1 kg Vermicompost,T3=Soil+1 kg dung and T_4=Soil (Control). The experiment was repeated three times and the data should be collected

RESULT AND DISCUSSION:

After the treatment of the tomato plants the length of shoot and number of leaves was significantly increased than the control group and results are given in Table 1 and illustrated in figure 1.

Effect of different treatments on the shoot length in tomato plants:

Treatment 1: Treatment 1 was showed a significant increase in the length of shoot. Initially the length of shoot was recorded to be 7cm on 1st day of the experiment. After first week interval, the length was again measured and recorded to be 9.74 cm. Again an increase was observed in the length of shoot i.e. 16.45 cm, 21.65 cm, 22.45 cm as on second week, third week and fourth week (28 days) of the experiment. The length of shoot was recorded to be 22.45 cm at the end of the experiment that was significantly higher than the control group 18.54cm.

Treatment 2: The length of shoot was recorded 9.54 cm, 15.34 cm, 19.54 cm and 20.00 cm as on first, second, third and fourth weeks after treatment 2. The length of shoot was significantly higher than the control group.

Treatment 3: The length of shoot was recorded as on first, second, third and fourth weeks after treatment 3 was 9.00 cm, 14.33 cm, 18.14 cm and 19.34cm was observed. These value of length of shoot was significantly higher than the control group.

Effect of different treatments on the number of leaves in the tomato plants:

Treatment 1: The number of leaves in the plantswas found to be 15 on 1st day of the experiment. The total number of leaves was found to be 21.45, 38.67, 57.33 and 67.34 on first, second, third and fourth weeks after treatment.

Treatment 2: The number of leaves in the plantswas found to be 14 on 1st day of the experiment.After first week interval, the number of leaves was counted and recorded as 20.47. Further increase was recorded in the number 34.23 of leaves on 14th day of the experiment. At the end of the experiment, the total number of leaves was found to be 66.55.

Treatment 3: The number of leaves in the plantswas found to be 16 on 1st day of the experiment.After first week interval, the number of leaves was counted and recorded as 18.19. Further increase was recorded in the number 28.34 and 50.00 of leaves on 14th day and 21th day of the experiment. At the end of the experiment, the total number of leaves was found to be 66.55.

Due to increases in the human population, indiscriminate growth of urban cities, agricultural practices and industrializationhave led to an increased accumulation of solid organic waste materials in the environment. Recycling of organic wastes through vermicomposting biotechnology is an emerging trend as an environmentally sustainable, economically viable and socially acceptable technology all over the world. Vermicomposting biotechnology, earthworm processed material 'casts' contain several soil nutrients in forms which are easily available to plants (Taylor et al., 2003). Earthworm species rapidly convert the organic waste into humus-like substances with finer structure than thermophilic composts but possessing a greater and more diversity of micro organism and plant growth-promoting substances (Ansari and Kumar, 2010 and Pandit, et al., 2012).

Vermicompost significantly increased the weight, height andnumber of leaves per plant *Of Amashito pepper*. In this study, *Amashito pepper* seeds germi-nated after seven weeks and those that germinated in vermicompost grew into productive plants that produced more fruits. Both earthworms and its vermicast& body liquid (vermiwash) are scientifically proving as both 'growth promoters & protectors' for crop plants(Esperanza Huerta et al., 2010)

The effect of vermicompost with corn & wheat crops, tomato and egg-plants it displayed excellent growth performances in terms of height

of plants, color & texture of leaves, appearance of flowers & fruits, seed ears etc. as compared to chemical fertilizers and the conventional compost. In soil Presence of live earthworms significantly makes difference in flower and fruit formation in vegetable crops(Rajiv K. Sinha, et al., 2010).

CONCLUSION:

In the present study, the effect of vermicompost was observed on the plants of tomato and it was found that several economic and environmental advantages of the use of vermiclture over the chemical agriculture in the farm production. Besides increasing yield, it produces chemical free organic foods and restore the natural fertility of soil. However some deviations were observed in the number of leaves

but that can be due to the interference of other climatic factors. However it can be conclude from the study that the vermicompost proves to be an effective good bio fertilizer which contributes the growth of plants. It was also observed that the plants treated with vermicopost were disease resistant and free from insect pest attack. Thus vermicompost can be used as a substituent of chemical fertilizers.

Table 1: Effect of vermicompost (in different ratios) on shoot length and number of leaves of tomato plants in a period of one month

Treatments	Shoot length in cm				Number of leaves			
	Week 1	Week 1I	Week 1II	Week IV	Week 1	Week 1I	Week 1II	Week 1V
T_1 = D+S+VC	9.74	16.45	21.65	22.45	21.45	38.67	57.33	67.34
T_2 = S+VC	9.54	15.34	19.54	20.00	20.47	34.23	56.34	66.95
T_3 = D+S	9.00	14.33	18.14	19.34	18.19	28.34	50.00	65.46
T_4 = S(Control)	8.67	13.54	17.14	18.54	16.47	25.43	48.28	60.42

S= Soil, **D**= Dung, **VC**= Vermicompost

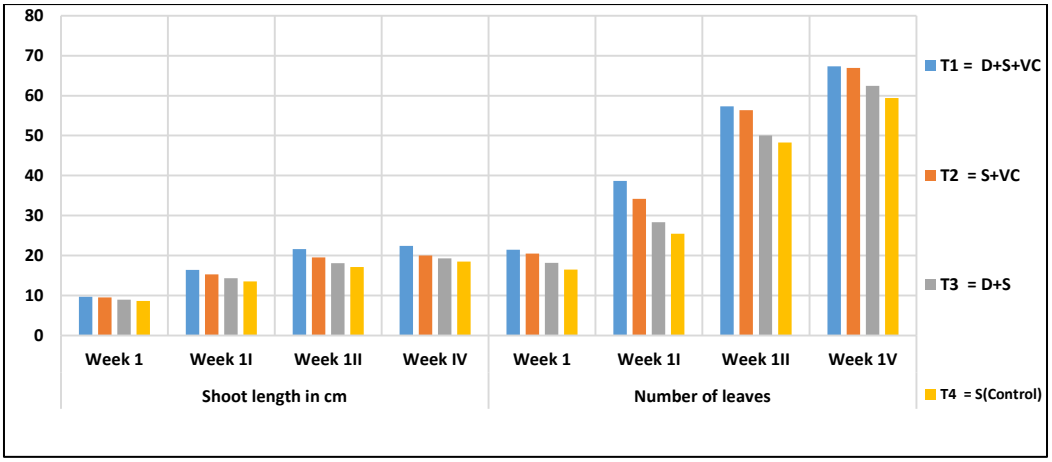

Fig. 1: Week wise shoot length and number of leaves in tomato plants

REFERENCES:

Aira M,, Monroy F,, Dominguez J. 2006. Changes in microbial biomass and microbial activity of pig slurry after the transit through the gut of the earthworm, Eudrilus eugeniae (Kinberg, 1867). Soil Biol. and Biochem. 42: 371-376

Ansari, A. & Kumar, S. 2010. Effect of Vermiwash and Vermicompost on Soil parameters and productivity of okra (Abelmoschus esculentus) in Guyana. African journal of agricultural Research, 5(14): 1794-1798.

Esperanza Huerta, Olivia Vidal, Aaron Jarquin, Violette Geissen and Regino Gomez 2010. Effect of Vermicompost on the Growth and Production Of *Amashito Pepper*, Interactions with Earthworms and Compost Science & Utilization, Vol. 18, No. 4, 282-288.

Hemant Samadhiya, Puneeta Dandotiya, Jaya chaturvedi & Agrawal, O. P. 2013. Effect of vermiwash on the growth and development of leaves and stem of tomato plants. International Journal of Current Research Vol. 5, Issue, 10, pp.3020-3023.

Mishra R. K., Singh B. K., Upadhyay R. K., Singh S. 2009. Technology for vermicompost production. Indian Farming.

Nitin Prakash Pandit, Nabeel Ahmad and Sanjiv Kumar Maheshwari 2012. Vermicomposting Biotechnology: An Eco- for sustainable agriculture by vermiculture biotechnology using earthworms. Journal of

Reynolds J. W. 1977. The earthworms (Lumbricidae&Sperganaphliide) of Ontario Royal Onatario Museum, Tononto, pp, 1-42.

Sayyad Nabilal 2017.Recycling Solid Organic Wastes into Bio-fertilizers by the Earthworm, *Eisenia fetida*. J. exp. Zool.India Vol. 20 (1) pp.329-331.

Singh P. & Singhvi R. 2013. Vermiculture: Eco-Friendly measure to reduce household pollution .

Loving Approach for RecyclingofSolid Organic Wastes into Valuable Biofertilizers. Biofertil. Biopestici. vol3(1)pp 1-8.

Rajiv K. Sinha, Dalsukh V., Krunal C. & Sunita A. 2010. Embarking on a second green revolution

agricultural biotechnology and sustainable devolpement. vol.2(7), pp.113-128.

through standard method of garbage disposal. Res. J. Of family, Community and Consumer sciences. Vol.1 (2), 18-21.

Taylor, M., Clarke, W. P., Greenfield, P .F. 2003. The treatment of domestic waste water using small-scale vermicompost filter beds. Ecol. Eng. 21 (2–3), 197–203.