**International Journal of Current Advanced Research**
ISSN: O: 2319-6475, ISSN: P: 2319 – 6505, Impact Factor: SJIF: 5.995
Available Online at www.journalijcar.org
Volume 6; Issue 9; September 2017; Page No. 5963-5965
DOI: http://dx.doi.org/10.24327/ijcar.2017.5965.0842

**Research Article**

# EFFECT OF VERMICOMPOST ON BIOCHEMICAL CONSTITUENTS OF TOMATO PLANT

**Gayathri V and Vijayalakshmi A***

Department of Botany Avinashilingam Institute for Home Science and Higher Education for Women, Coimbatore

**ARTICLE INFO**

***Article History:***

Received 20th June, 2017
Received in revised form 3rd July, 2017 Accepted 24th August, 2017
Published online 28th September, 2017

***Key words:***

Carbohydrate, Chlorophyll, Protein, Tomato Plant, Vermicompost

**ABSTRACT**

Organic farming is one of the ways to increase the yield and quality of crops. In the present study, biochemical constituents such as chlorophyll, protein and carbohydrate was estimated at different stages of growth. Chlorophyll a, b and total chlorophyll was significantly higher on 30th day in $T_4$, but on 45th and 60th day, the chlorophyll contents were higher in $T_3$. The protein and carbohydrate content tested were found to be significantly higher in $T_3$ on all the days tested.



## INTRODUCTION

Organic manures act not only as a source of nutrients and organic matter, but also increase size, biodiversity and activity of microbial population in soil. Nutrients turnover and changes related to physical, chemical and biological parameters of the soil occur due to organic farming (Mathivanan *et al*., 2012). Several methods have been developed to convert agricultural wastes into organic manure to replace inorganic fertilizers. But recently, interest has been shown in the development of eco-friendly novel processes that are based upon the utilization of biological systems (Hemalatha, 2013). Study by Yourtchi *et al*. (2013) have suggested use of nitrogen fertilizer and vermicompost to avoid environment pollution. Application of different rates of vermicompost and NPK fertilizer in tomato plant significantly affected the growth and development of plants (Kashem *et al*., 2015). Vermicompost can improve tomato growth physiology when used as one part of the substrate in hydroponic culture (Haghighi *et al*., 2016).

## MATERIALS AND METHODS

Pot culture experiments were conducted with tomato plant to study the response of different doses of vermicompost on the biochemical constituents at various stages of growth. The study was conducted in the green house of Avinashilingam Institute for Home Science and Higher Education for Women, Coimbatore, Tamil Nadu. The size of the experimental pot was 30cm x 24cm x 30cm. Experimental pots were filled with different doses of vermicompost. Triplicates were maintained for each treatment. The biochemical parameters studied were chlorophyll, protein and carbohydrate. Standard procedures were used for the study.

### *Estimation of Chlorophyll Content*

Chlorophyll 'a', 'b' and total chlorophyll were analyzed following the method of Arnon (1949).

### *Estimation of Protein*

Protein was estimated according to Lowry *et al.,*(1951)

### *Estimation of Carbohydrate Content*

Carbohydrate was estimated following the method of Hedge and Hofreiter (1962)

## RESULTS AND DISCUSSION

The biochemical parameters such as chlorophyll, protein and carbohydrate was calculated on 30th, 45th and 60th day and tabulated. The chlorophyll a, b and total chlorophyll contents were found to be higher in $T_4$ in tomato on 30th day (Table 1).

**Table 1** Chlorophyll a, Chlorophyll b and Total Chlorophyll Content of Tomato on 30th day (mg chlorophyll / gm tissue)

| S. No. | Treatment | Chlorophyll – a | Chlorophyll – b | Total chlorophyll |
|---|---|---|---|---|
| 1 | $T_0$ | 0.15 ± 0.00 | 0.06 ± 0.00 | 0.21 ± 0.01 |
| 2 | $T_1$ | 0.15 ± 0.00 | 0.17 ± 0.00 | 0.31 ± 0.01 |
| 3 | $T_2$ | 0.11 ± 0.00 | 0.46 ± 0.01 | 0.57 ± 0.01 |
| 4 | $T_3$ | 0.11 ± 0.01 | 0.74 ± 0.01 | 0.83 ± 0.01 |
| 5 | $T_4$ | 0.25 ± 0.00 | 0.79 ± 0.01 | 1.06 ± 0.03 |
| SEd | | 0.0035 | 0.0053 | 0.0145 |
| CD (p<0.05) | | 0.0079 | 0.0117 | 0.0322 |
| Cd (p<0.01) | | 0.0112 | 0.0167 | 0.0458 |

Values are mean ± SD of three samples in each group

**Corresponding author:* **Vijayalakshmi A**
Department of Botany Avinashilingam Institute for Home Science and Higher Education for Women, Coimbatore

It was found to be 0.25 ± 0.00, 0.79 ± 0.01 and 1.06 ± 0.03, but on 45th and 60th day, the chlorophyll contents were found to be higher in $T_3$ (Table 2&3).

**Table 2** Chlorophyll a, Chlorophyll b and Total Chlorophyll Content of Tomato on 45th day (mg chlorophyll / gm tissue)

| S. No. | Treatment | Chlorophyll – a | Chlorophyll – b | Total chlorophyll |
|---|---|---|---|---|
| 1 | $T_0$ | 1.35 ± 0.01 | 2.45 ± 0.05 | 3.80 ± 0.05 |
| 2 | $T_1$ | 1.38 ± 0.01 | 2.91 ± 0.01 | 4.31 ± 0.03 |
| 3 | $T_2$ | 1.45 ± 0.01 | 3.01 ± 0.09 | 4.46 ± 0.07 |
| 4 | $T_3$ | 1.62 ± 0.02 | 4.03 ± 0.07 | 4.91 ± 0.10 |
| 5 | $T_4$ | 1.56 ± 0.01 | 3.11 ± 0.09 | 4.60 ± 0.10 |
| SEd | | 0.0082 | 0.0542 | 0.0604 |
| CD (p<0.05) | | 0.0182 | 0.1208 | 0.1346 |
| Cd (p<0.01) | | 0.0259 | 0.1718 | 0.1915 |

Values are mean ± SD of three samples in each group

**Table 3** Chlorophyll a, Chlorophyll b and Total ChlorophyllContent of Tomatoon 60th day(mg chlorophyll / gm tissue)

| S. No. | Treatment | Chlorophyll – a | Chlorophyll – b | Total chlorophyll |
|---|---|---|---|---|
| 1 | $T_0$ | 0.543±0.006 | 0.975±0.0071 | 1.65±0.05 |
| 2 | $T_1$ | 0.643±0.006 | 1.097±0.0064 | 1.763±0.0777 |
| 3 | $T_2$ | 0.681±0.012 | 1.199±0.0017 | 1.826±0.0404 |
| 4 | $T_3$ | 0.713±0.006 | 1.234±0.0566 | 1.896±0.0252 |
| 5 | $T_4$ | 0.614±0.005 | 1.16±0.0608 | 1.8±0.01 |
| SEd | | 0.0060 | 0.0306 | 0.03 |
| CD (p<0.05) | | 0.0133 | 0.0682 | 0.0849 |
| Cd (p<0.01) | | 0.0189 | 0.0970 | 0.1208 |

Values are mean ± SD of three samples in each group

The values were 1.62 ± 0.02 (chlorophyll a), 4.03 ± 0.07 (chlorophyll b) and 4.91 ± 0.10 (total chlorophyll) on the 45th day. On 60th day, the chlorophyll a, b and total chlorophyll was found to be significantly higher in $T_3$ (0.713±0.006, 1.234±0.0566 and 1.896±0.0252. Research by Lakshmi prabha and Shanmugapriya (2013) has revealed that the uptake of macro and micronutrients by the vegetable plants were faster, higher and their growth related primary metabolites namely total carbohydrates, protein, cellulose and chlorophyll were higher in vermicompost applied plants than other treated plants. The protein and total carbohydrate contents of tomato was found to be significantly higher in $T_3$ on all the days tested (Table 4 & 5).

**Table 4** Protein Content of Tomato on 30th, 45th and 60th day (mg/gm tissue)

| Treatment | 30th day | 45th day | 60th day |
|---|---|---|---|
| $T_0$ | 6.05 ± 0.05 | 13.10 ± 0.10 | 5.23 ± 0.03 |
| $T_1$ | 6.92 ± 0.03 | 13.37 ± 0.06 | 5.93 ± 0.03 |
| $T_2$ | 7.32 ± 0.03 | 13.64 ± 0.03 | 5.62 ± 0.02 |
| $T_3$ | 9.55 ± 0.05 | 13.93 ± 0.04 | 6.52 ± 0.02 |
| $T_4$ | 7.90 ± 0.09 | 14.34 ± 0.20 | 4.79 ± 0.04 |
| SEd | 0.0382 | 0.1597 | 0.0501 |
| CD(P<0.05) | 0.1185 | 0.1298 | 0.1221 |
| CD(P<0.01) | 0.1879 | 0.2734 | 0.1824 |

Values are mean ± SD of three samples in each group

**Table 5** Carbohydrate Content of Tomato on 30th, 45th and 60th day (mg/gm tissue)

| Treatment | 30th day | 45th day | 60th day |
|---|---|---|---|
| $T_0$ | 25.05 ± 0.05 | 40.07 ± 0.06 | 52.83 ± 0.29 |
| $T_1$ | 30.10 ± 0.10 | 48.18 ± 0.16 | 59.05 ± 0.05 |
| $T_2$ | 34.05 ± 0.05 | 50.12 ± 0.13 | 59.67 ± 0.15 |
| $T_3$ | 42.05 ± 0.04 | 53.16 ± 0.21 | 62.10 ± 0.10 |
| $T_4$ | 38.17 ± 0.15 | 51.23 ± 0.21 | 55.09 ± 0.08 |
| SEd | 0.1125 | 0.0077 | 0.2112 |
| CD(P<0.05) | 1.2430 | 0.1267 | 1.2167 |
| CD(P<0.01) | 1.3836 | 0.1620 | 2.5578 |

Values are mean ± SD of three samples in each group

The protein content was 9.55 ± 0.05 on 30th day, 13.93 ± 0.04 on 45ht day and 6.52 ± 0.02 on the 60th day. Similarly, the carbohydrate content was 42.05 ± 0.04 on 30th day, 53.16 ± 0.21 on 45th day and 62.10 ± 0.10 on the 60th day. Experimental data provides a sound basis that vermicomposting is a suitable technology for conversion of organic wastes into value-added material. The biochemical characteristics of Brinjal was found to be higher when vermicompost, vermiwash and vermicompost extract was used (Sivakumar and Karthikeyan, 2016). The application of bio-fertilizers in combination with other fertilizer greatly influence the amount of chlorophyll in *Anethumgraveolens* leaves (Hellal *et al*., 2011). Earlier studies by Dwivedi*et al*. (2014) in Soybean crop have shown a considerable increase in protein content when three different weeds were utilized for vermicomposting.

Vermicompost is a simple biotechnological process of composting in which certain species of earthworms are used to enhance the process of waste conversion and produce a better end product.

**Acknowledgement**

The authors wish to express their heartfelt gratitude to Avinashilingam Institute for Home Science and Higher Education for Women for providing funds to carry out the research work.

## References

Arnon, D.E. (1949). Copper enzymes in isolated chloroplast. *Pl. Physiol*., 24: 1-5.

Dwivedi, H.S., Sharma Kadambari, Dwivedi, P. and Sharma Rajeev. (2014). Effect of vermicompost on protein content of Soybean-*Glycine max*. *Int. J. Innov. Sci. Res.,* 8(2): 124-126

Haghighi, M., Barzegar, M. R. and da Silva, J. A. T. (2016). The effect of municipal solid waste compost, peat, perlite and vermicompost on tomato (*Lycopersicumesculentum* L.) growth and yield in a hydroponic system. *Int. J Recycl. Org. Waste Agricult*., 5: 231-242

Hedge, J.E. and Hofreiter, B.T. (1952) Determination of total carbohydrate by anthronemethod. *In*: Carbohydrate chemistry (Eds.), Whistler, R.L. and Bo Miller, J.N., Academic Press, New York. pp. 17.

Hellal, F.A., Mahfouz, S.A. and Hassan, F.A.S. (2011). Partial substitution of mineral nitrogen fertilizer by biofertilizer on (*Anethumgraveolens* L.) plant. *Agri. Biol. J. North America.* 2(4): 652-660.

Hemalatha, B. (2013). Vermiculture for organic waste. *Int. J. Advan. Engg. Technol*., 4(1): 46-47.

Kashem, M.A., Sarker, A., Hossain, I. and Islam, M.S. (2015). Comparison of the effect of vermicompost and inorganic fertilizers on vegetative growth and fruit production of tomato (*Solanumlycopersicum* L.). *Open J. Soil. Sci*., 5: 53-58

Lakshmi Prabha, M. and ShanmugaPriya, M. (2013). Effect of vermicompost on nutrient uptake and their influence

on biochemical parameters of selected vegetable plants. *Int. J. Adv. Res. Engg. Technol*.4 (5): 147-152

Lowry, O.H., Rosenbrough, N.S., Farr, A.L. and Randall, R.J. (1951). Protein measurement with folin phenol reagent. *J. Biol. Chem*., 193 : 267 - 2

Mathivanan, S., Chidambaram, AL. A., Sundaramoorthy, P. and Kalaikandhan, R. (2012). Effect of vermicompost on germination and biochemical constituents of ground nut (*Arachis hypogea* L.) seedling. *Int, J. Res. Biol*. Sci., 2(2): 54-59

Sivakumar, P. and Karthikeyan, R. (2016). Bioconversion of vermicomposted weed plants waste using *Eudriluseuginiae*Kinberg for promoting the growth of Brinjal*(Solanummelongena*). *Int, J. Devl. Res*., 6(6): 8020-8023

Yourtchi, M.S., Haj SeyyedHadi, M. and TaghiDarzi, M. (2013). Effect of nitrogen fertilizer and vermicompost on vegetative growth, yield and NPK uptake by tuber of potato (Agri CV.). *Int. J. Agri. Crop Sci*., 5(18): 2033-2040

**How to cite this article:**

Gayathri V and Vijayalakshmi A (2017) 'Effect of Vermicompost on Biochemical Constituents of Tomato Plant', *International Journal of Current Advanced Research,* 06(09), pp. 5963-5965.
DOI: http://dx.doi.org/10.24327/ijcar.2017.5965.0842

*******