ISSN: 0976-3031

Available Online at http://www.recentscientific.com

CODEN: IJRSFP (USA)

International Journal of Recent Scientific Research
Vol. 8, Issue, 12, pp. 22643-22645, December, 2017

International Journal of Recent Scientific Research

DOI: 10.24327/IJRSR

Research Article

EFFECT OF VERMICOMPOST ON BIOCHEMICAL PARAMETERS OF CHILLI PLANT, *CAPSICUM ANNUUML.*

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DOI: http://dx.doi.org/10.24327/ijrsr.2017.0812.1307

ARTICLE INFO

Article History:

Received 16th September, 2017
Received in revised form 25th October, 2017
Accepted 23rd November, 2017
Published online 28th December, 2017

Key Words:

Carbohydrate, Chilli Plant, Chlorophyll, protein, vermicompost

ABSTRACT

Earthworms play an important role in agriculture. Vermicompost contains various plant nutrients that help soil in maintaining the productivity. The present study is to evaluate the biochemical constituents such as chlorophyll, protein and carbohydrate at different stages of growth of chilli plant (*Capsicum annuum* L.) on application of different doses of vermicompost. 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 agriculture is one of the best method that supports the environment and gives a productive yield. Organic manures are excellent source of plant-available nutrients and their addition to soil could maintain high microbial populations (Sundararasu, 2016).Among the various sources of organic matter, vermicompost have been recognized as having considerable potential as soil amendments (Arancon *et al*., 2005). 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). The use of organic elements has long been considered as an effective means of improving the structure and fertility of soil (Haj SeyyedHadi *et al*., 2011). Application of vermicompost produced by biodegradable waste could be one of the most economical and attractive methods to solve the problems of waste disposal and thereby increase the organic matter content of soil (Narkhede*et al.,* 2011). In the present study, various biochemical parameters were analyzed at different stages of growth of chilliplant on application of different doses of vermicompost.

MATERIALS AND METHODS

Pot culture experiments were conducted with chilli 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. The doses administered were T_1-15g, T_2-17g, T_3 -19g and T_4 -21g and the control pot was maintained without 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)

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Estimation of Carbohydrate Content

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

RESULTS AND DISCUSSION

The results on the effect of various doses of vermicompost fertilizer on the biochemical studies of chilli are as follows: the chlorophyll a content was found to be significantly higher in T_3 on 30th day (Table 1) and 45th day (Table 2) and on 60th day, it was higher in T_4(Table 3). The values were 0.48 ± 0.01 (30th d), 1.81 ± 0.03 (45th d) and 0.637±0.006 (60th d). Minimum values were observed in control plants on all the three days tested. The chlorophyll b was more in T_4(Table 1) on 30th day (0.50 ± 0.01). On 45th and 60th day, the chlorophyll b content was found to be higher in T_3(Table 2&3).

Table 1 Chlorophyll a, Chlorophyll b and Total Chloropyll Content of Chilliplant, *Capsicum annuum* L. on 30th day

S. No.	Treatment	Chlorophyll – a	Chlorophyll – b	Total chlorophyll
1	T_0	0.19 ± 0.00	0.26 ± 0.00	0.45 ± 0.01
2	T_1	0.27 ± 0.00	0.25 ± 0.01	0.52 ± 0.03
3	T_2	0.38 ± 0.00	0.20 ± 0.01	0.57 ± 0.01
4	T_3	0.48 ± 0.01	0.47 ± 0.02	0.93 ± 0.02
5	T_4	0.33 ± 0.01	0.50 ± 0.01	0.81 ± 0.01
SEd		0.0047	0.0093	0.0123
CD (p<0.05)		0.0104	0.0207	0.0275
Cd (p<0.01)		0.0148	0.0295	0.0391

Values are mean ± SD of three samples in each group

The total chlorophyll content was estimated to be 0.93 ± 0.02 (30th d) , 4.95 ± 0.09 (45th d) and 1.683±0.076 (60th d) in T_3 (Table 1,2&3). Berova and Karanatsidis(2008) observed increased chlorophyll content in red chilli (*Capsicum annuum*) due to application of vermicompost. The earthworms also enhance the nitrogen levels of the substrate by adding their excretory products, mucus, body fluid, enzymes and even through decaying tissues of dead worms in vermicomposting subsystem (Suthar, 2007).

Table 2 Chlorophyll a, Chlorophyll b and Total Chloropyll Content of Chilliplant, *Capsicum annuum* L. on 45th day

S. No.	Treatment	Chlorophyll – a	Chlorophyll – b	Total chlorophyll
1	T_0	1.62 ± 0.02	2.36 ± 0.02	4.05 ± 0.05
2	T_1	1.71 ± 0.01	2.53 ± 0.02	4.24 ± 0.05
3	T_2	1.74 ± 0.04	2.85 ± 0.04	4.49 ± 0.04
4	T_3	1.81 ± 0.03	3.14 ± 0.07	4.95 ± 0.09
5	T_4	1.75 ± 0.01	2.86 ± 0.06	4.60 ± 0.05
SEd		0.0189	0.0357	0.0476
CD (p<0.05)		0.0420	0.0794	0.1061
Cd (p<0.01)		0.0598	0.1130	0.1509

Values are mean ± SD of three samples in each group

Table 3 Chlorophyll a, Chlorophyll b and Total Chloropyll Content of Chilliplant, *Capsicum annuum* L. on 60th day

S. No.	Treatment	Chlorophyll – a	Chlorophyll – b	Total chlorophyll
1	T_0	0.55±0.05	0.897±0.0061	1.48±0.02
2	T_1	0.596±0.013	0.915±0.005	1.52±0.03
3	T_2	0.618±0.033	0.9247±0.005	1.56±0.0458
4	T_3	0.636±0.031	1.012±0.0072	1.683±0.076
5	T_4	0.637±0.006	0.965±0.030	1.603±0.015
SEd		0.0252	0.0118	0.0355
CD (p<0.05)		0.0561	0.0263	0.0792
Cd (p<0.01)		0.0798	0.0374	0.1126

Values are mean ± SD of three samples in each group

Similarly, in case of protein, significant increase in content was observed in T_3 (3.25 ± 0.08 & 7.14 ± 0.03) on 30th day and 60th day respectively (Table 4). On the 45th day, the protein content was higher in T_4 and it was found to be 15.97 ± 0.06 (Table 4). Significant results were observed in total organic carbon, potassium, calcium and magnesium and also in the growth and yield pattern of chilli plant by the application of vermiwash (Sundararasu, 2016).Protein is one of the reserve food material utilized by plants for the growth of their seedling.

Table 4 Protein Content of Chilliplant, *Capsicum annuum* L. on 30th , 45th and 60th day

Treatment	30th day	45th day	60th day
T_0	2.62 ± 0.03	13.43 ± 0.03	5.63 ± 0.03
T_1	2.82 ± 0.02	13.84 ± 0.04	5.82 ± 0.03
T_2	2.85 ± 0.05	14.46 ± 0.06	6.24 ± 0.04
T_3	3.25 ± 0.08	15.17 ± 0.15	7.14 ± 0.03
T_4	2.74 ± 0.03	15.97 ± 0.06	5.22 ± 0.02
SEd	0.0249	0.1344	0.0325
CD(P<0.05)	0.0729	0.1794	0.1021
CD(P<0.01)	0.1543	0.1930	0.1509

Values are mean ± SD of three samples in each group

Table 5 Carbohydrate Content of Chilliplant, *Capsicum annuum* L. on 30th, 45thand 60th day

Treatment	30th day	45th day	60th day
T_0	14.18 ± 0.18	50.10 ± 0.10	62.27 ± 0.25
T_1	28.12 ± 0.14	54.22 ± 0.20	62.99 ± 0.09
T_2	32.92 ± 0.08	55.16 ± 0.14	65.10 ± 0.10
T_3	37.80 ± 0.20	56.25 ± 0.22	66.12 ± 0.11
T_4	35.12 ± 0.10	51.23 ± 0.25	64.18 ± 0.17
SEd	0.0187	0.0179	0.3936
CD(P<0.05)	0.1296	0.1102	0.4970
CD(P<0.01)	0.1695	0.1145	1.5455

Values are mean ± SD of three samples in each group

The carbohydrate content of the chilli plant was significantly higher in T_3 plants on all the tested days. The values were found to be 37.80 ± 0.20 (30th d), 56.25 ± 0.22 (45th d) and 66.12 ± 0.11 (60th d). Earlier, Mathivanan *et al*. (2012) have studied the effect of various doses of vermicompost fertilizers on the biochemical parameters of groundnut. Their studies revealed higher protein, amino acid and sugar content at a significant dosage and lower content when the plants were not supplied with vermicompost. The long term use of inorganic fertilizers without organic supplement damages the physical, chemical and biological properties of soil and causes environmental pollution (Mathivanan *et al*., 2012). With the whole world moving towards organic food production, organic waste material processed by naturally occurring earthworm *Eiseniafoetida* may be used to produce vermicompost and thereby increase the soil fertility which later result in increased plant growth.

Acknowledgement

The authors wish to express their heartfelt gratitude to Avinashilingam Institute for Home Science & Higher Education for Women (Deemed to be University) for providing funds to carry out the research work.

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How to cite this article:

Vijayalakshmi A and Gayathri V.2017, Effect of Vermicompost on Biochemical Parameters of Chilli Plant, Capsicum Annuuml.. *Int J Recent Sci Res.* 8(12), pp. 22643-22645. DOI: http://dx.doi.org/10.24327/ijrsr.2017.0812.1307

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