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Effect of chemical fertilizer urea and vermicompost on bio chemical parameters of *Capsicum annum* L

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Abstract
A fertilizer is any material of natural or synthetic origin that is applied to soil to plant tissues to supply one or more plant nutrients essential to the growth of plants. Many sources of fertilizer exist, both natural and industrially produced. The present study is carried out the Effect of chemical fertilizer Urea and Vermicompost on Biochemical parameters of Capsicum annum L.

Keywords: Bio chemical activities, Crop plants, Chemical fertilizer, Vermicompost

Introduction

Urea is the most important nitrogenous fertilizer in the market with the highest content (about 46 percent). It is white crystalline organic chemical compound. Urea is neutral P^H and can adapt to almost all kinds of soils. It is a waste product formed naturally by metabolizing protein in humans as well as other mammals, amphibians and some fish. Urea is widely used in the agricultural sector both as a fertilizer and animal feed additive. The main function of Urea is to provide the plants with nitrogen to promote green leafy growth and make the plants look lush. Urea also aids the photosynthesis process of plants. Since urea fertilizer can provide only nitrogen can provide only nitrogen and phosphorus or potassium, it's primarily used for bloom growth.

Vermicompost is the remnants of the earthworms which feed voraciously on organic matter. Earthworms are beneficial organic creatures which man has not explored. They eat voraciously and feed day and night all garbage if it is shredded to fine pieces. The earthworms are called intestines of the earth and are bio-refineries purifying all waste into useful compost. Every house can adapt this simple process of converting garbage waste into wealth (Sultan A Ismail 1997). The compost contains approximately 0.5 percent Nitrogen, 0.2 per cent phosphorus and potash in soluble form. It also contains sufficient quantities of micronutrients. The earthworms also release enzymes that lead to growth of microbes and bacteria.

Study Plant: *Capsicum annum L.* Chillies,
Family: Solanaceae

This species is the most common and extensively cultivated of the five domesticated capsicums. The species encompasses a wide variety of shapes and sizes of peppers, both mild and hot, such as bell peppers, jalapenos, New Mexico chilli and cayenne peppers. Cultivars descended from the wild American bird pepper are still found in warmer regions of the Americas. In the past, some woody forms of this species have been called C.frutescens, but the features that were used to distinguish those forms appear in many populations of C.annuum and are not consistently recognizable features in C. frutescens species. Moreover, Crosses between C.annuum and C.frutescens aren't likely because seeds obtained from pollination between those two species (if the embryo survives) will not germinate.

Experimental method

The seeds of Chilli were obtained from the Agriculture University, Madurai. The seeds were sown in separate pots and allowed to germinate. Four pots were selected for each crop. The pots were labeled for crop. The parameters were calculated in triplicates for the purpose of statistical evaluation. The following labels were pasted for each crop.

- Control
- Urea
- Vermicompost
- Urea + Vermicompost

The vermicompost were collected from the research center of the college. The Urea was collected from fertilizer shop near Nelpettai in Madurai.

After three months the fertilizers were applied in Chilli. The yield and Biochemical parameters were assessed.

Estimation of Chlorophyll content

Leaf material (200mg) was ground in a pre-chilled pestle and mortar in diffuse light with 80 per cent cold acetone and the homogenate was centrifuged at 3000 × g for 2 minutes. Aliquots of 10 ml of 80 percent cold acetone were added to the pellet and centrifuged till it was non-green. The supernatants were pooled and protected from light prior to

the estimation of chlorophyll content.
The concentration of chlorophyll was calculated using the formula of Arnon (1949) [3].
Chlorophyll a: 0.0127 × A663-0.00269 × A 665(mg/ml)
Chlorophyll b: 0.0229 × A 645-0.00488 × A 663(mg/ml)
Total Chlorophyll: 0.0202 × A 645+0.00802 × A 663 (mg/ml).

Estimation of Soluble Starch
The leaves were homogenized in 80 per cent acetone and centrifuged at 3000 × g for 10 minutes. The residue was used for the estimation of soluble starch. Known volume of distilled water was added to the residue and it was boiled for a few minutes. Then it was centrifuged and the supernatant was collected and used to estimate the total starch. 0.1 ml of iodine reagent (3gm of iodine and 1.5gm of potassium iodide in 100 ml of distilled water) was added to 0.4 ml of the sample and the volume was made up to 5ml with distilled water. It was mixed thoroughly and absorbance was measured at 600 nm (Mc Cready *et al.* 1950) [24]. Potato starch was used as standard.

Estimation of Glucose
200mg of leaf material was ground in 80 percent methanol. It was filtered through muslin cloth and centrifuged. The supernatant was saved and the pellet was collected and washed again with 80 percent methanol and centrifuged. The pooled supernatant was taken for study. To 1 ml of 0.5 percent phenol and 5ml of Conc. Sulphuric acid were added. Then the whole solution was made up to 12 ml with distilled water. The absorbance was read at 490 nm (Dubois *et al.* 1956) [14]. The total glucose was estimated with glucose standard graph.

Estimation of Soluble Protein
The leaves were homogenized in 80 percent acetone and centrifuged at 10,000 × g for 10 minutes. To the pellet 2ml of 0.N NaoH solutions was added and centrifuged again. Soluble protein content of the centrifuged homogenate was determined by the method of Bradford (1976). The absorbance was calculated from calibration graph plotted using known amount of bovine serum albumen as protein standard.

Estimation of Nitrate Reeducates activity
200mg of leaf material was cut in to small bits and incubated in glass vials containing 5 ml of incubation medium with the following reagents (Jaworski 1971).
100Mm KH_2 Po_4 KOH buffer pH 7.5
100MmKNO_3
1% N-Propanol
1% triton × 100

Incubation was carried out in the dark for 1h at room temperature giving occasional shaking. Aliquots of 0.5 ml of the incubation mixtures were analyzed for nitrite after 1hr of incubation. To 0.5 ml of incubation medium 1.5ml of distilled water was added, to which 1ml of 3 percent Sulphanilamide in 3N Hcl and 1 ml of 0.02 percent N-Napthyl ethylene diamine hydrochloride (N-1-N) were added in quick succession. 15 minutes was allowed for color development and absorbance was read at 540nm (Muthuchelian 1989) [25].

Result and discussion
Chlorophyll content ranged from 0.17mg/g/F.wt-0.34mg/g/F.wt. Protein content ranged from 0.06mg/g/F.wt-0.37mg/g/F.wt. Starch content ranged from 0.10mg/g/F.wt-0.30mg/g/F.wt. Glucose content ranged from 0.06mg/gF.wt-0.27mg/g/F.wt. Nitrate reeducates activity ranged from 0.13mg/g/F.wt-0.33mg/g/F.wt

Table 1: Bio-Chemical Parameters of Capsicum annum L. by treating Urea and Vermicompost

Chilli	Control	Urea	Vermicompost	Urea+ Vermicompost
Chlorophyll content	0.17±0.009	0.24±0.012	0.22±0.007	0.34±0.040
Protein content	0.06±0.006	0.23±0.019	0.17±0.007	0.37±0.009
Starch content	0.10±0.006	0.20±0.029	0.16±0.006	0.30±0.03
Glucose content	0.06±0.007	0.18±0.003	0.17±0.015	0.27±0.006
Nitrate reductase activity	0.13±0.007	0.24±0.02	0.22±0.01	0.34±0.04

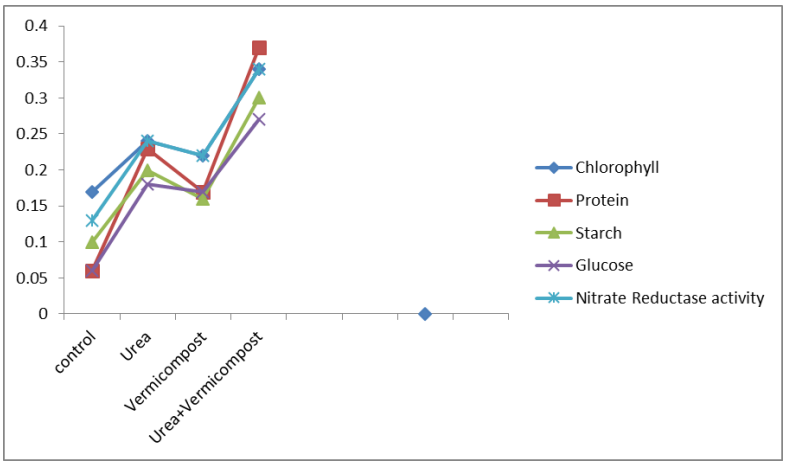

Fig 1: Bio-chemical parameters of Capsicum annum L. by treating Urea and Vermicompost

Discussion

Chemical fertilizers are easily available to enhance the Growth of Crop plants but it has some side effect to the soil fertility when compared to Organic fertilizers. Both of these are available in markets in different commercial brands. Application of Chemical fertilizers Urea and Vermicompost used to treat some crop plants which enhance the yield and Bio chemical parameters. In the present study, urea is found to have comparatively higher influence in Chlorophyll content, Starch content, Glucose content, Protein content and Nitrate reductase activity in single fertilizer treatment. Application of urea was studied in Paddy (Singh *et al.* 2005), Wheat (Saxena *et al.* 2004), Potato (Arindam das *et al.* 2005) to have better yield and growing properties.In double fertilizer treatment application it was found that Vermicompost and Urea combination shows better growth properties. Similar findings in potato were reported by Arindam Das *et al.* (2004) [4].

Conclusion

This study clearly indicates that application of synthetic fertilizer and Bio fertilizer have the potential to increase the Biochemical content of Chilli. It is also concluded that selected crop chilli shows considerable increase in Biochemical content by using single fertilizer treatment (Urea) and double fertilizer treatment (Urea and Vermicompost).

References

1. Alan R, Padem H. The influence of some foliar fertilizer on growth and chemical composition of Tomatoes under green house conditions ACTA horticulture. 1993; 366:397-404.
2. Alam AY. Response of some Barley cultivars to nitrogen fertilization in sandy calcareous soil, Assault Journal of agricultural sciences. 1997; 28(1):89-98.
3. Arnon DL. Copper enzymes in isolated chloroplasts; Polyphenol oxidase in beta vulgaris plant physiol. 1949; 24:1-15.
4. Arindam Das, Barik AK, Chattopadhyay GN, Mandal P. Effect of integrated nitrogen management through vermicompost and urea on growth and productivity of Potato in red and lateritic Soil Indian Agric. 2004; 48(3 & 4):171-174.
5. Atiyeh RM *et al.* Biores technol. 2000; 75:175-180.
6. Balachandar D, Kumar K, Arulmozhiselvan, Kannaiyan S. Influence of combined nitrogen on nitrogen transfer efficacy of immobilized cyanobacteria to rice seedlings, Indian Journal of Microbiology. 2005; 45(4):257-260.
7. Bawa JN. Studies on the effect of organic manure and chemical fertilizers on growth yield and quality of rabi-hot weather Cluster bean (*Cyamopsis tetragonaloba* L) under lateric soils of kongan region, 1995.
8. Bongale UD, Magadi AP, Bharathi SG. Proc. National Symp On algal systems society of biotechnology, 1980, 59-61.
9. Bradar AP *et al.* Adv Forestry Res India. 1998; 18:84-89.
10. Bradford MM. A rapid sensitive method for quantitation of microgram quantities of protein utilizing the principles of protein–dry method Anal Biochem. 1976; 72:248-254.
11. Bongale UD, Magadi AP, Bharathi SG. Proc National Symp. On algal systems society of Biotechnology, 1980, 59-61.
12. Bongale UD, Singh RPR. Proc. Current Status of Biological nitrogen fixation Research, HAU, Hissar, 1986, 228.
13. Chang C, Sommer Feldt T. Barley performance under heavy application of cattle manure, Agron J. 1993; 85:1013-1018.
14. Dubois GKA, Hamilton J KHobars, P.A, Smith T. Colorimetric determination of sugar and related substances *Anal Chem*. 1956; 28:351-356.
15. Gupta AB, Gupta KK. Effect of phormidium extract on growth and yield of Vigna catjang T 5269 Hydrobiologia 1973; 41(1):127-132.
16. Haroun SA, Hussein MH. The promotive effect of algal biofertilizers on growth, Protein pattern and some metabolic activities of Lupinus term is and plants grown in siliceous. Soil, Asian Journal of Plant sciences. 2003; 2(13):944-951.
17. Hellebust JA. Algal physiology and biochemistry (Stewart, WDP Ed) Blackwell Sci. Pub Oxford, 1974, 838.
18. Jha MN, Prasad AN, Mishra SK. Effect of micronutrients on diastrophic Cyanobacteria and yield of Paddy, Indian Journal of microbiology, 2004, 171-174.
19. Joworski EG. Nitrate reductase in intact plant tissue, Bio chem Biophys Res Common. 1971; 43:1274-1279.
20. Kale. Soil Bio Biochem. 1995; 24:1317-1320.
21. Kannaiyan S. Nitrogen Conservation in Rice soils by blue green algal bio fertilizer In: Transfer training programme seminar, the international Rice Research Instituite, Los Banos, Manila, the Philippines, 1981, 17.
22. Nguyen van Quyen, Sharma S.N. Relative effect of organic acid conventional farming on growth, yield and grain of scented rice and soil fertility, Archives of Agronomy and Soil Science. 2003; 49:623-629.
23. Li, SX Li, ZH Wang BA, *et al*. Stewart Responses of crop plants to ammonium to nitrate N adv. Argon. 2013; 118:205-397.
24. Mccready FM, Guggolz J, Silvera V, Owen HS. Determination of starch and amylase in vegetables *Anal Chem.* 1950; 52:1156.
25. Muthuchelian K, Paliwal K, Gnanam A. Influence of shading on nit photosynthetic and transpiration rates, stomatal diffuse resistance, nitrate reductase and Biomass productivity of wood legume tree species (Erythrina varigata Lam) Proc Ind Aca Sci Plant Sci. 1989; 99:539-596.
26. Lokanath R, Shivashankar K. Indian J Seric. 1986; 25(1):1-5.
27. Ordog V. Beneficial effects of micro algae and Cyanobacterial in Plant/Soil-systems, with special regard to their auxinm and cytokinin like activity. International work shop and training course on micro algal biology and biotechnology Moson Magyarovar, Hungary, 1999, 13-26.
28. Nanda B, Tripathy SK, Padhi S. Effect of legalization on seed germination of vegetable crops, World Journal

of Microbiology and Biotechnology. 1991; 7:622-623.
29. Pachpande RR. Algal bio fertilizer for Banana and other plantation crops. National symposium on Cyanobacteria nitrogen fixation (Abstracts) IARI New Delhi, 1990, 28.
30. Sun, L Sun, Y Lu, F Yu, Kronzucker HJ, Shi W. Biological nitrification inhibition by rice root exudates and its relationship with nitrogen, Use efficiency New Phytol. 2016; 212:646-656.
31. Subbiah K, Sundararajan S. Influence of organic fertilizers on the yield and nutrients uptake in Bhindi: Mdu-I Madras Agri J, 1993, 25-27.
32. Than Tun. Effect of fertilizers on the blue green algae of the soils of the paddy fields of Mandalay agricultural Station, Union Burma Journal life sciences. 1969; 2:257-258.
33. Ushakumari K. South Indian Hort. 1997; 46:176-179.
34. Venkatraman GS. Blue green algae for Rice Production FAO Soils Bulletin. 1981; 16:33-42.
35. Yanni YG, Shaalan SN, Mahrous FM. A evaluation of two methods of algalization by soil based inoculum of blue green algae according to their effects on growth and yield attributes of transplanted Rice. Proceedings of the second conference of the agricultural development research, Ain-Shams University Cairo, Egypt. 1998; 2:191-203.
36. Zaccaro MC, Cans MM, Stella AM. Lead toxicity in with a high molecular height extract from a marine *Cyanobacterial Porphyrin* metabolism Environ Cyan bacterium Plant cell reports 2001; 11:62-65.
37. Zeenat Rizvi, Sharma VK. Algae as Bio fertilizer for tomato plants. Recent advances in Phycology, 1999, 221-223.
38. Sudhakar G, Christopher Lourdu A, Rangasamy A, Subbian. Velayutham, Effect of vermicompost application on the soil properties nutrient availability, uptake and yield of Rice Agric Res. 2002; 23(2):127-133.