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INFLUENCE OF VERMICOMPOST ON GROWTH AND BIOCHEMICAL PARAMETERS OF *ALLIUM CEPA* L.VAR N-53

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ABSTRACT

The present paper deals with effect of vermicompost on onion. Vermicompost was purchased from the Shirgaon Agriculture Centre, Shirgaon. Vermicompost is a well known biofertilizer with less cost (4-Rs/kg), consists of P^H -6.8, and with more porous nature. Its effect was assessed on growth characteristics, chlorophyll and carbohydrate content in the leaves of onion var. N.53. after 90 days. Height of plant, root number, fresh weight, dry weight of single plant was 15cm, 39, 51gm and 4 gm for control plants while it was 21cm, 69, 64gm and 5.41gm for the plants raised on red soil mixed with vermicompost (1kg:1kg). Chlorophyll a, Chlorophyll b, total chlorophyll and carbohydrate for control was 48.49 mg, 44.71 mg, 93.38 mg and 1.98 gm per 100 gm fr.wt. for the control that is plants raised on only red soil. It was 59.40 mg, 55.10 mg, 104 mg and 2.24 gm per 100gm fr.wt. in the plants grown on mixture of red soil and vermicompost. Protein and ascorbic acid for control was 19.8 mg and 71.62 mg per 100 gm fr.wt. for the control that is plants raised on only red soil while it was 28.4 mg and 90.11 mg per 100gm fr.wt. in the plants grown on mixture of red soil and vermicompost. Use of vermicompost was beneficial for growth of onion plants..

Key words: *Alliums cepa* L.var N-53, vermicompost, growth characteristics, Chlorophyll, carbohydrate, protein, ascorbic acid etc.

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INTRODUCTION

Onion belongs to family liliaceae ,genus *Allium* and species *cepa* .Onion is used as a vegetable and a spice. It is a winter season crop .It is used with other medicine in treatment of Jaundice,dyspepsia,malaria,piles(Chauhan,1965).B ulb juice is used as smelling salt in headache and fits . Its hot juice is used to relieve earache .The area under onion cultivation in India is about 2,98,000 hectares producing more than 3 million tons of bulbs annually which forms about one tenths of the worlds onion (Phirke 1993,Mital and Shrivastava,1975).Onion leaves are used as a vegetable while bulbs of the onion are used as a salad ,cooked in various ways in curries ,fried ,boiled,baked used in soups making ,in pickles.The pungency of onion is due to presence of volatile oil allyl –propyl disulphide.

MATERIAL AND METHOD

Plant Material -Seeds of onion var.N-53 were purchased from Shatkari Beej Bhandar, Shahupuri, Kolhapur. Healthy and uniform seeds were used for the futher process.

Vermicompost- It was purchased from Agricultural center of Shirgoan(4 Rs/Kg).

Method-Seeds were washed with distilled water and then treated with 0.1%Mercuric chloride for sterilization andto remove all the trace of disinfectants.Seeds were sown in plastic pots to raise the plants.In the control plants were raised only on red soil while mixture of red soil and vermicompost (50:50)was utilized for the another treatment. Growth parameters like height of plants, root number,fresh weight,dry weight of plant were recorded after 90 days.Chlorophyll was estimated by Arnon Method(1949), Carbohydrate were estimated by Nelson Method(1944)Protein were estimated by Gornall *et al.*,method(1949) and ascorbic acid by by Sadasivam and Manickam(1992)

Estimation of Chlorophyll -

Chlorophyll was estimated by Arnon Method(1949). Fresh plant material of leaves (0.5 Available online on www.ijprd.com

g) was crushed in 80% acetone containing 4 ml ammonia per liter.A pinch of MgCO₃ was added to enhance the extraction.The extract was filtered through Buchner’s funnel using Whatman No.1 filter paper.The volume of filtrate was adjusted to 50 ml with 80% acetone and transferred to a conical flask wrapped with a black paper to prevent photooxidation of pigments.The absorbance was measured at 663 nm and 645 nm on Shimadzu spectrophotometer.

Chlorophylls (mg/100 gm fresh tissue) were calculated using formulae-

Chl.a. $X=12.7 \times A_{663} - 2.69 \times A_{645}$

Chl.b. $Y=22.9 \times A_{645} - 4.68 \times A_{663}$

Chl.(a+b). $Z=8.0 \times A_{663} - 20.2 \times A_{645}$

Chl.a/ Chl.b/ Chl.(a+b) (mg) = X or Y or Z x Volume of extract

1000 x weight of plant material (g)

Estimation of Carbohydrate -

Carbohydrate were estimated by Nelson,(1944). Extract was prepared by grinding 1 g fresh leaves in 80% alcohol.The extract was filtered through Buchner’s funnel using Whatman No.1 filterpaper and condensed on a water bath to about 2-3 ml.A mixture (about 2 g) of lead acetate and potassium oxalate (1:1)was added with constant stirring.The contents were mixed with sufficient amount of water(20 ml) and filtered through Buchner’s funnel Whatman No.1 filterpaper.The volume of the filtrate was adjusted to 25 ml with distilled water.

A known amount of filterate was transferred to a conical flask containing 2 ml conc.HCl.The flask was closed with a cotton plug and autoclaved for 30 minutes under 15 lbs pressure.After cooling to room temperature the contents were neutralized with unhydrous Na₂CO₃ and filtered again.The volume of the filtrate was recorded.This filterate was used for the estimation of total sugars.

The residue on the filter paper during alcoholic extraction was transferred along with the

filter paper to the conical flask containing 5 ml conc. HCL and 15 ml distilled water. It was hydrolysed at 15 lbs pressure for half an hour and then cooled to room temperature. The contents were neutralized with anhydrous Na_2CO_3 and filtrate was used for the estimation of starch. Estimation of sugars was carried out colorimetrically using Arsenomolybdate to determine cuprous oxide formed in the oxidation of sugars by alkaline copper tartarate reagent. The sample (0.1ml) was heated with alkaline copper tartarate on a boiling water bath for 10 minutes. One ml of Arsenomolybdate reagent was added to each tube after cooling. The volume was adjusted to 10 ml with distilled water. Absorbance was read after 10 minutes at 560 nm on Shimadzu spectrophotometer. Simultaneously a set of standard glucose was (0.1mg/ml) was prepared in the same manner along with blank and used to obtain the standard curve. The amount of total sugar and starch was calculated using the calibration curve.

Estimation of Proteins-

Proteins were estimated by Gornall *et al.*, method (1949).

Extraction- Fresh plant material (1g) was homogenized in 0.14 M cold saline (NaCl) solution. The extract was filtered and centrifuged for 15 minutes. The supernatant was used as a source of proteins.

Estimation- When proteins are treated with an alkaline solution of copper sulphate the peptide linkages are broken down giving a characteristic violet colour to the solution. This reaction is termed as 'Biuret' reaction and was first demonstrated on Biuret which is the product of pyrogenic decomposition of urea. One ml plant extract was mixed with eight ml Biuret reagent and it was incubated at 37° for 30 min. The absorbance of violet and colour developed, was measured at 540 nm. Simultaneously a set of reaction mixtures containing different concentrations of Casein (20 mg/ml) was prepared to obtain a standard curve of proteins. This curve was used to determine the amount of proteins.

Estimation of Ascorbic acid:

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Estimation of ascorbic acid was done by a titrimetric method described by Sadasivam and Manickam (1992). Fresh plant material of leaves (0.5g) was extracted in 4% oxalic acid. The extract was centrifuged for 15 minutes and the supernatant was used as the source of ascorbic acid.

Estimation- Ascorbic acid is oxidized to dehydroxyascorbic acid by reducing 2,6-dichlorophenolindophenol (a blue dye) to a pink coloured solution. Oxalic acid is used as a titrant. The capacity of plant extract to reduce the dye (V2 ml) is directly proportional to ascorbic acid content. Standard ascorbic acid (100 $\mu\text{g}/\text{ml}$) is titrated against the dye till the appearance of persistent pink colour. The amount of the dye consumed (V1 ml) is equivalent to the amount of ascorbic acid taken for the titration. The amount of ascorbic acid is calculated as follows:

$$\text{Ascorbic acid (mg/100g)} = \frac{0.5 \text{ mg}}{\text{V1ml}} \times \frac{\text{V2 ml}}{5} \times \frac{100}{\text{Wt. of the sample}} \times 100$$

Preparation Of Reagents

- 1) Somogyi's alkaline copper tartarate Reagent (Carbohydrates)
4 g $\text{CuSO}_4 \cdot 5\text{H}_2\text{O}$; 24 g anhydrous Na_2CO_3 ; 16 gm Na -k tartarate and 180 gm Na_2SO_4 were dissolved in one litre distilled water
- 2) Arsenomolybdate reagent (Carbohydrates)
25 gm of ammonium molybdate were dissolved in 450 ml distilled water to which 21 ml concentrated H_2SO_4 were added. 3 g of sodium arsenate ($\text{Na}_2\text{HASO}_4 \cdot 7\text{H}_2\text{O}$) were dissolved in 25 ml distilled water. The solutions were mixed well and kept in an incubator at 37°C for 48 hours before use.
- 3) Biuret Reagent
0.5 g $\text{CuSO}_4 \cdot 5\text{H}_2\text{O}$ and 6g Na -k tartarate were dissolved in 500 ml distilled water 300

ml of 10% NaOH were added to this solution with swirling . The volume was adjusted to 100 ml distilled water.

4) DCPIP Solution (Ascorbic acid)

45 mg of Na_2CO_3 were dissolved into a small volume of distilled water. 52 mg 2,6 – dichlorophenolindophenol(a blue dye) were dissolved in it . . The volume was adjusted to 200 ml distilled water.

PHOTOPLATE - 1



RESULT AND DISCUSSION –

An increase in growth characteristics like height of plant, root number, fresh weight, dry weight was noticed in the plants raised on red soil and vermicompost containing plastic pots (Photoplate 1). Chlorophyll and carbohydrates were increased in the plants raised on mixture of vermicompost and red soil. Maximum height of plant, root number, fresh weight. For single plant was 21 cm, 69.64 gm and 5.42 gm . Maximum chlorophyll, carbohydrate, protein and ascorbic acid in the plants raised on vermicompost containing soil was 104 mg, 2.24 gm, 28.4 gm and 90.11 mg per 100 gm of fresh weight (Table 1). Srivastava *et al* .(2011) observed vermicompost combined with NPK fertilizer enhanced growth and biochemical parameters in th *Allium cepa* L. Arancon *et al.*,(2005) recorded that Petunias flower growth and weight of Pepper fruits were increased in the plants raised on the vermicompost and soil.

Use of vermicompost was beneficial for the growth of plants. Vermicompost is the option for chemical fertilizer. It is cheap, easily available, without side effects, porous in nature, with maximum water holding capacity, proper pH . Success of green revolution depends upon the availability and maximum use of biofertilizer . Considering immense value of biofertilizer , we are expecting an improved agronomic practice for the crop yield and maintenance of soil fertility.

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A- Onion plant raised on red soil
B- Onion plant raised on red soil and vermicompost

**Table No.1-Effect of of vermicompost on growth and biochemical parameters in the leaves
Allium cepa L.var N-53.**

Sr.No.	Biochemical Parameters (after 90 days)	Treatment	
		Red soil	Red Soil and vermicompost
1	Length of plant(cm)	15	21
2	Root number	39	69
3	Fresh weight of plant(gm)	51	64
4	Dry weight(gm)	4	5.41
5	Chlorophyll a mg/100 gm fr.wt.	48.49	59.40
6	Chlorophyll b mg/100 gm fr.wt.	44.71	55.10
7	Total chlorophyll mg/100 gm fr.wt.	93.38	104
8	Total Carbohydrate gm/100 gm fr.wt.	1.98	2.24
9	Protein mg/100 gm fr.wt.	19.8	28.4
10	Ascorbic acid mg/100 gm fr.wt.	71.62	90.11

Values represents average of three readings.

REFERENCES

1. Chauhan D.V.S.(1965)Vegetable crop production in India,Ram Prasad and sons,Agra.3 pp 223-242.
- 2) Mital S.P.and Srivastava G.1975 Onion is a cash crop financing Agric 7(2):18-20.
- 3) Phirike P.V.1993-Planning of Kharif onion crop,Shetkari:23-26.
- 4) Arnon D.I.1949-Copper enzymes in isolated chloroplasts polyphenol oxidase in Beta vulgaris Plant physiol,24,1-15.
- 5) Nelson N.1944-A Photometric adaptation of smogyi's method for the determination of glucose,J.Biol.Chem-153,375-380.
- 6) Gornall A. G. Bardawill C. J. and David M. M. (1949) J. Biol. Chem., Cited by Chaykin S. In: Biochemistry laboratory techniques.Wiley Eastern Private Ltd . New Delhi . 177,751
- 7) Sadasivum S. and Manickam A. (1992) In: Biochemical Methods for Agricultural Sciences . Wiley Eastern Private Ltd . New Delhi ,178-179.
- 8) Srivastava P. K. ,Gupta M., Upadhyay R. K. ,Sharma S. ,Shikha ,Singh N. ,Tewari S. Singh B.(2011) Effect of combined application of vermicompost and mineral fertilizer on the growth of *Allium cepa* L.and soil fertility .Journal of plant nutrition and soil science.
- 9) Arancon N. Q. ,Edwards C. A. (2005) Effect of vermicompost on the plant growth. Soil ecology Laboratory, The Ohio state University,Columbus,USA.International symposium on vermi technologies for developing countries (ISWVT),Los Banos ,Philippines.,.
