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Effect of Vermicompost and Chemical Fertilizer on Growth Parameters of *Beta vulgaris L*

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ABSTRACT

Beta vulgaris L is an important vegetable and a medicinal plant. Common people generally use chemical fertilizers and pesticides for its better growth and development of beet plant. Chemical fertilizer drastically hamper the yield, and also help in insisting diseases. Besides the low level of pesticide residues through foods also causes fatal diseases of human beings. Both chemical fertilizer and pesticides decrease the quality of the foods and vegetables. Considering these point an effort had taken to use organic compost 'Vermicompost' for growth and development. Vermicompost produced from *Eisenia foetida* is using a finely divided peat-like material with excellent structure, porosity, aeration, drainage and moisture holding capacity. The experiment was conducted considering the parameters like a) diameter of storage root, b) Nos. of leaf, c) length of leaf and d) vitality and stability of the leaf. Result of the vermicompost experiment indicated that application of vermicompost has positive effects on beet root and showed that the highest and quality growth, and yield were obtained in highest level.

Keywords: Beta vulgaris, vermicompost, chemical fertilizer, vegetative growth.

I. INTRODUCTION

Beta vulgaris L (Chenopodiaceae) is widely cultivated vegetable and medicinal plant. It is widely cultivated for the production of commercial sugars, forage plants, natural dye, and for human consumption. The anti-oxidant capacity due to presence of phenolic compounds allow nutraceutical benefits in the promotion of human health and prevention degenerative disease and cancer. It also stimulate liver's detoxification process and also affects bowel function therapy preventing constipation and helps to lower cholesterol levels too (vali et al 2007). It is excellent source folic acid, good source of fiber, manganese, sodium, potassium, protein, carbohydrate, phosphorus, calcium, iron, vit.C (Bavec etal 2010). To increase quantitative production throughout the globe use of chemical fertilizers and pesticide was a best practice since 1960s. The fate of this practice results today of the soil, great loss of holding capacity and productivity of the soil and also increasing hazards and outbreak of pest, disease and weeds. The chemical fertilizer not only hampering the soil health but also acts as pollutant causing environmental pollution and dreaded disease of plants, animals including human beings. To overcome the dangerous effects from chemical fertilizer modern day science has tried to develop eco-friendly technology – organic farming (vermicompost). The aim of present study was an attempt to apply the vermicompost and chemical fertilizer on *Beta vulgaris Linn.* to observe the comparative growth efficiency.

II. METHODS AND MATERIAL

To study the comparative growth analysis of *Beta vulgaris L.* using vermicompost and chemical fertilizer three replica of each set were taken at seedling stage i.e two leaved stage with 9-10 cm plant's height. Soil in polythene pots were prepared with 4 kg. of soil collected from geographical co-ordinate - latitude $21^0\,54'\,0''$ N and longitude $87^0\,32'\,0''$E area without any fertilizer. After planting three replica of each set fertilizers were applied in six phases. Vermicompost was procured from IIT Khagragpur and 45gms was given per pot and mixed fertilizer 10:26:26 was applied at 5gms with 15 days after planting. Prior to this experimental study nutrient status of vermicompost and soil characteristics of studied area were estimated

Table 1. Physiochemical characteristics of vermicompost & soil.

Vermicompost	Soil
PH – 7.2 C (Carbon) – 15.2 N (%) – 1.5 P - .92 (ppm) K – 1.2 (ppm) Mg – 700 (mg/kg) Fe – 1160 (mg/kg) Mg – 8.0 (mg/kg) Zn – 138 (mg/kg)	PH – 6.2 C (Carbon) – .68 (mg/kg) N (%) – .047 (mg/kg) P - .0014 (mg/kg) K – .053 (mg/kg) S – 14.81 (ppm) Zn – 1.17 (ppm) B – .29 (ppm) Mn – 14 (ppm)

Irrigation and plant protection measures were taken as per need observation on a) Diameter of storage root, b) Nos. of leaf, c) size of leaf, and d) vitality and stability of leaf were observed and recorded at every 15 days intervals.

III. RESULTS AND DISCUSSION

Results

Table-2. Size of storage organ (in cm)

Sl. No.	Date of Observation	Plant Age	Chemical Fertilizer	Vermi Compost	Remark
1.	08.01.16	0	3.4	3.4	v>c
2.	23.01.16	15	4.1	4.1	
3.	07.02.16	30	6.2	6.5	
4.	22.02.16	45	7.7	8.6	
5.	08.03.16	60	8.3	9.6	
6.	23.03.16	75	9.1	10	

Table-3. No. of leaves

Sl. No.	Date of Observation	Plant Age	Chemical Fertilizer	Vermi Compost	Remark
1.	08.01.16	0	6	6	v>c
2.	23.01.16	15	7.8	9	
3.	07.02.16	30	11.2	13.3	
4.	22.02.16	45	13	14	
5.	08.03.16	60	16.1	17	
6.	23.03.16	75	23	25	

Table-4. Longevity and Vitality of leaves

Sl No.	Date of Observation	Plant Age	Chemical Fertilizer		Vermicompost		Remark
			Living	Dead	Living	Dead	
1.	08.01.16	0	6	Nil	6	Nil	v>c
2.	23.01.16	15	9	Nil	10	Nil	
3.	07.02.16	30	11	Nil	13	Nil	
4.	22.02.16	45	12	1	13	1	
5.	08.03.16	60	13	3	14	3	
6.	23.03.16	75	13	10	17	9	

Table-5. Size of leaves (cm in length)

Sl. No.	Date of observation	Plant age	Chemical Fertilizer			Vermicompost			Remark
			12^{th}	14^{th}	17^{th}	12^{th}	14^{th}	17^{th}	
1.	08.01.16	0	Nil	Nil	Nil	Nil	Nil	Nil	
2.	23.01.16	15	Nil	Nil	Nil	Nil	Nil	Nil	
3.	07.02.16	30	Nil	Nil	Nil	Nil	Nil	Nil	v>c
4.	22.02.16	45	18	16	14	22	19	21	
5.	08.03.16	60	20	18	16	25	20	23	
6.	23.03.16	75	25	22.5	20	29	25	27	

Discussion:

Size of storage roots: Growth rate in vermicompost shows the higher growth rate than chemical fertilizer.
Nos. of Leaves: The Nos. of leaves in vermicompost show better result than chemical fertilizer i.e 25 in vermicompost and 23 chemical fertilizer.
Size of leaves: Size of leaves in vermicompost show better result than chemical fertilizer.
Longevity and vitality of leaves: Vermicompost shows better result than chemical fertilizer i.e living (13), dead (10) in chemical fertilizer & vermicompost respectively.

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