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A Comparative Study on the Vegetative Growth of *Brassia oleracea* Linn. var. *gongylodes* Linn. (Brassicaceae) using Eco-friendly Fertilizers and Chemical Fertilizer.

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Abstract

The increasing human population, indiscriminate growth of cities and immense industrialization have led to the vanishing of fertile lands which used to produce food and raw materials for the existing population. In Agriculture use of Chemical fertilizer was a best practice since past. To increase the quantitative production of food for increasing high rate of population throughout globe the new concept was adopted which includes the excessive use of chemical fertilizers and pesticides. The fate of this best practice today result in the increase of toxicity, salinity, sodicity and erosion of the soil, great loss of water holding capacity and productivity of the soil and also increasing the hazards and outbreak of pests, diseases and weeds. To overcome the dangerous affects from chemical fertilizers modern day since has tried to develop ecofriendly technology organic farming. The non-chemical fertilizers are used today fastly by the developing countries in all the fields of agriculture in lieu of chemical fertilizer. We have an attempt to apply the Farm Yard Manure (FYM), vermicompost and chemical fertilizer to observe the comparative growth efficiency in the field of vegetable crops. Experimentally FYM vermicompost and chemical fertilizers were applied on the *Brassica oleracea* Linn var. *gongylodes* Linn (Brassicaceae) a popular vegetable in India. In the Experimental Garden many sets for FYM vermicompost and chemical fertilizers were prepared for cultivation. Different parameters eg. Number of leaf development, diameter of the storage organ, vitality and stability of the plant as a whole etc. were considered for the observation of the growth pattern in the cases of FYM, vermicompost and chemical fertilizer. The experimental results were recorded every fifteen days interval upto sixty days. The experimental finding reflect the hopeful results from which a meaningful and justified conclusion come out that vermicompost is a best competent of the chemical fertilizer.

Keywords: Brassica oleracea var gongylodes, ecofriendly fertilizer, chemical fertilizer, vegetative growth

Introduction

The green revolution in India promoted the indiscriminate use of chemical fertilizers and pesticides to obtain a better crop yield. It no doubt tremendously increased the quantity of crops but drastically changed the soil environment, air, water, seed health by adversely affective them. Now to control the alarming situation and to overcome the dangerous effects of modernized agriculture – a new farming system “Organic farming” has been developed which is ecologically sustainable and economically viable. Now we have an attempt to apply FYM, vermicompost as organic manure and chemical fertilizer to observe comparative growth efficiency in the field of agriculture especially on *Brassica oleracea*_Linn. Var *gongylodes* Linn. (Brassicaceae)

Materials and Method

For the comparative growth study three replica of this specimen for each vermicompost, Farm Yard Manure (FYM) and chemical fertilizer were taken. Prior to this experimental study nutrient status of different fertilizers and soil characteristics of study were estimated.

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Parameters	Nutrient Status of Vermicompost	Nutrient status of FYM	Physico-chemical properties of soil site
pH	7.2	7.2	6.5
Organic Carbon (%)	15.4	39.4	.68
Total Kjeldahl N ₂ (%)	1.5-2	1.1	.047
Total Potassium (%)	1.2	2	.053
Total Phosphorus (%)	0.92	0.42	.0014
C/N ratio (%)	11.24	35.82	14.46

The samples were planted on well prepared soil. Before plantation no manuring was done. We had taken the chemical fertilizer as DAP where the N₂ percentage is 18 and in vermicompost 1.5 – 2, and in FYM is 1.1, i.e in vermicompost N₂ percentage is 9times less than chemical fertilizer (DAP). So at the time of manuring balance of N₂ percentage is maintained. Manuring was done at every 15days interval. In this experiment following parameters were taken.

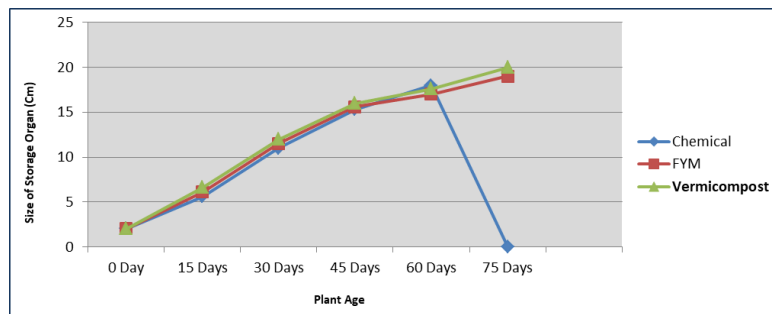
1. Diameter of storage organ
2. Nos. of leaves
3. Longevity and vitality of leaves

Result

The above parameters were observed at every 15 days intervals starting from 8-01-16 to 23-03-16.

Table 1: Growth Analysis in Size of Storage Organ (in diameter)

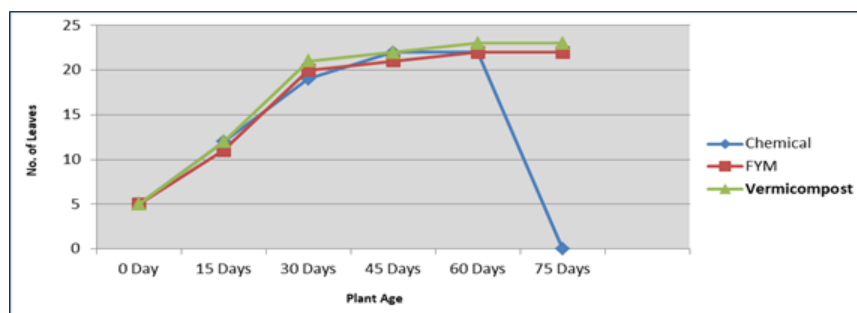
No. of Observation	Date of Observation	Plant Age	Sets for experiments			Remarks
			Chemical Fertilizer (cm)	Farm Yard Manure (FYM)	Vermicompost (cm)	
1	08.01.16	0 days	2	2	2	C<FYM<V
2	23.01.16	15 days	5.6	6.2	6.6	
3	07.02.16	30 Days	11	11.5	12	
4	22.02.16	45 Days	15.3	15.6	15.6	
5	08.03.16	60 Days	18	17	17.6	
6	23.03.16	75 days	Rotten	19 still living but not good colour	20 (Still Living)	



Size of Storage Organ (in Diameter)

Table 2: Growth Analysis in No. of Leaves

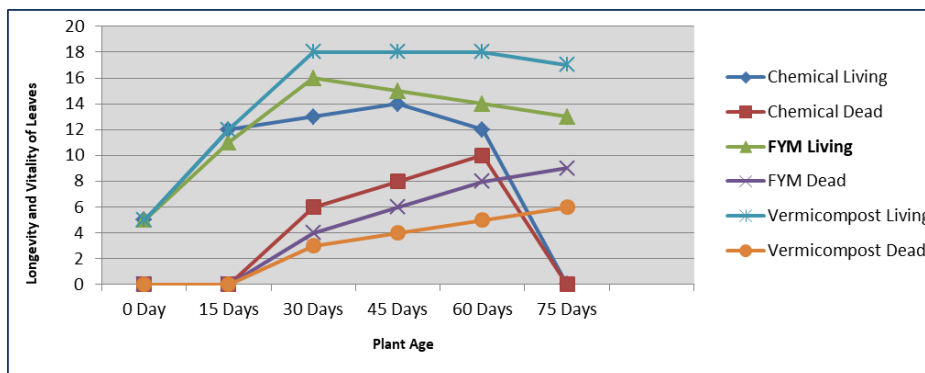
No. of Observation	Date of Observation	Plant Age	Sets for experiments			Remarks
			Chemical Fertilizer (cm)	Farm Yard Manure (FYM)	Vermicompost (cm)	
1	08.01.16	0 days	5	5	5	C<FYM<V
2	23.01.16	15 days	512	11	12	
3	07.02.16	30 Days	19	20	21	
4	22.02.16	45 Days	22	21	22	
5	08.03.16	60 Days	22	22	23	
6	23.03.16	75 days	Dried	22	23 still living and steady	



Growth Analysis in No. of Leaves

Table 3: Longevity & Vitality of Leaves

No. of Obser-vation	Date of Observation	Plant Age	Sets for experiments						Remarks
			Chemical Fertilizer		FYM		Vermicompost		
			Living	Dead	Living	Dead	Living	Dead	
1	08.01.16	0 days	5	0	5	0	5	0	C<FYM<V
2	23.01.16	15 days	12	0	11	0	12	0	
3	07.02.16	30 Days	13	6	16	4	18	3	
4	22.02.16	45 Days	14	8	15	6	18	4	
5	08.03.16	60 Days	12	10	14	8	18	5	
6	23.03.16	75 days	Almost All Dried		13	9	17 still living	6	



Longevity and Vitality of Leaves

Discussion

Plant's response to vermicompost showed much better results than FYM and chemical fertilizer. Vermicompost can also influence a number of physical, biological and chemical processes of soil which have their bearings on plant's growth. Vermicompost treated plants showed the higher diam. (20cm) than FYM (19 cm) and chemically treated plants (Rotten); maximum nos. of leaves 23 (still living) than FYM (22nos.) chemically treated plants (all dried); longevity & vitality i.e. 17 nos. still living, 6 nos. dead in vermicompost, 13 nos. still living and 9 nos. dead in FYM than chemical (almost all dried). It is also reported that N.P.K. of vermicompost takes time for their utilization by plants because of slow releasing of N.P.K. High demand of nutrients are met by chemical fertilizer whereas organic manure initially form conductive environment with regard to physical parameters of soil which promote better root growth & other vegetative growth. It is assured that other factors such as the presence of beneficial microorganisms or biologically active plant growth influencing substances such phytohormone are released by beneficial microorganisms present in the vermicompost rich soil. (Tomati & Galli, 1995; Edwards, 1998)

Conclusion: So after getting the above informations size of storage organs, No. of leaves growth, longevity and vitality of leaves show better result in vermicompost than FYM and chemical fertilizer.

From our experimental records we may conclude that :- 1) The growth rate is speedy and abrupt in chemical, growth rate is initially slow and steady in vermicompost but in next stage shows the higher growth rate than FYM and chemical fertilizer :-

2) The outward manifestation or morphological get up of the plants the chemical fertilizer is more attractive and deep green in colour in comparison to vermicompost and FYM but longevity, steadiness and stiffness of the plant body is better in vermicom. It has been found that the plants are too much. Susceptible under the treatment of

chemical fertilizer for pathogen in comparison to the vermicompost.

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