



Full Length Research Paper

Status of Bhendi Crop (*Abelmoschus esculentus* L. Moench) by Vermicompost FYM and NPK Fertilizers

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Abstract

Status of organic farming and chemical fertilizers on growth and yield of bhendi was carried out during rabi season (2011-12). RCBD method was followed for sowing of bhendi seeds. Before applying organic manure and chemical fertilizers, soil samples analyzed such as soil pH, electrical conductivity, available nitrogen, phosphorus and potassium, before organic manure plot soil pH was 7.9 and after applying organic manure 7.1 and also nitrogen was 360 and after applying 412. The study reveals that maximum growth and yield was recorded in the organic farming treated plot T5 (26kg) when supplied with vermicompost + Farm yard manure (FYM) and the least growth and yield was recorded in T1 (2.3 kg) when supplied only FYM. On the other hand under chemical fertilizer treatments T5 (17.68 kg) was recorded when supplied with FYM + RDF (Recommended Dose of Fertilizers) Nitrogen, phosphorus and potassium where as minimum growth and yield was recorded in T1 (2.2kg) supplied with only FYM. Thus it was concluded that organics treated fields influenced high growth and yield. Economically which is more than equally important that of chemical fertilizers, and it is environmental friendly.

Keywords: Bhendi, Growth and Yield, Organic manure, RDF, Soil.

Introduction

Organic farming is not a new concept. However, it was marginalized against the large scale chemical based farming practices that have steadily dominated food production over the last fifty years. The difference between organic farming and modern inorganic farming accounts for most of the controversy with claims and counter claims surrounding organic claims surrounding organic agriculture and organic food. Organic agriculture requires scientific management of organic inputs like vermicompost, farm yard manure (FYM) etc. with a systematic approach for their management. Organic farming is an eco-friendly system of farming which can maintain the soil health in terms of soil biological fertility and productivity besides producing quality produce which can fetch high price in the market. Organic manure is an indispensable component of soil and plays an important role in the maintenance of soil productivity and in improving physical conditions of soil for sustaining better plant growth. It is also a store house of plant nutrients. It is applied to soil in bulk quantity for the supply of plant nutrients.

Soil toxicity due to industrial effluents and use of chemical fertilizers and pesticides is affecting adversely both soil health and crop productivity (Paroda, 2001). Use of chemical fertilizers over a long period of time has adversely affected the soil properties but it continues to be one of the main sources of augment pace of agricultural production. Bhendi (*Abelmoschus esculentus* (L.) Moench), commonly known as bhendi in India, is grown for its tender fruits in tropics, subtropics and warmer parts of temperate region. India is the largest producer of bhendi covering an area of 4.3 lakh ha with an annual production of 34.2 lakh tonnes (Anon., 2004). The states Uttar Pradesh, Assam, Bihar, Orissa, Maharashtra, West Bengal and Karnataka are the major producers of bhendi. Karnataka has an area of 8853 ha with an annual production of 0.73 lakh tones (Anon., 2002) in respect of bhendi. It is a potential export earner accounting for thirteen per cent among fresh vegetables (Bose and Ranjan, 1988). The main and direct purposes of applying organic manures and chemical fertilizers to soil are to provide nutrient sources and good soil conditions for the growths of crop.

Bhendi is also a potential oil and protein crop which also has an exporting value. (Karakoltisidis *et. al*; 1975) bhendi is important in neutralizing the acid substance produced in the course of digestion of meats and other foods. It is roughage which promotes digestion and prevents constipation and other gastronomic disorders. (Macquillivary, 1961). Ariyo (1987 and 1988) employed various multivariate techniques to determine their relative contribution of various plant characters in bhendi germ plasma. The beneficial

effect of applied NPK on productivity of bhendi reported by (Hasnabade *et al.*, 1990), Bhendi it's the stability of polygenic nature reported by Paiva *et al.* (1994). For this experiment, the important crop like Bhendi cultivar Mahyco Bhindi No10 were selected.

Materials and Methods

Crop selected for the study:

Experimental study was carried out in Farmers land at Kardiga village, Hosanagar taluk, near 35 kms from Shivamogga district during the year 2010-11. Randomized Complete Block Design (RCBD) method was followed with four replications and five treatments were followed in the study. The bhendi seed material for taking up planting was selected. The variety Mahyco Bhendi No 10 was selected as it is cultivated by large number of farmers in the locality. Treatments were imposed timely and chemical fertilizers were applied in the form of urea, single super phosphate and murate of potash also Farm yard manure (FYM) and vermicompost were applied at the time of sowing. Further observations under each treatment the number of plants from five randomly selected plants was counted and their mean value was taken out expressed in centimeter at different intervals were recorded on plant height (cm), Number of branches per plant, number of leaves per plant and yield at the time of harvest, number of pods per plants at the time of harvest, Number of pods length (cm) per plants at harvest, pods weight (kg) Treatments details are as follows.

Experimental Details:

In order to compare the organic manure (Vermicompost+FYM) and chemical fertilizers (NPK) for growth and yield of bhendi the following experimental set up was followed.

Design = Randomized Block Design, Replications = Four (4), Treatments =Five (5), Total number of plots = Twenty (20), Plot size = 26sqmt, Spacing = 2x1 ft.

Treatments Details:

Plot-I (Organic manure treatment)

T1=Control, T2=Vermicompost100% , T3=FYM 50% + 50% Vermicompost, T4= FYM 75 % + 25 % Vermicompost, T5=Vermicompost 75 % + 25 % FYM (Farm Yard Manure).

Plot-II (Chemical fertilizers treatment)

T1=Control, T2 = 100% of RDF (Nitrogen, Phosphorus and Potassium 484), T3 = 75% of RDF (Nitrogen, Phosphorus and Potassium),T4 = 50% of RDF (Nitrogen, Phosphorus and Potassium 242), T5 = 125% of RDF (Nitrogen, Phosphorus and Potassium).

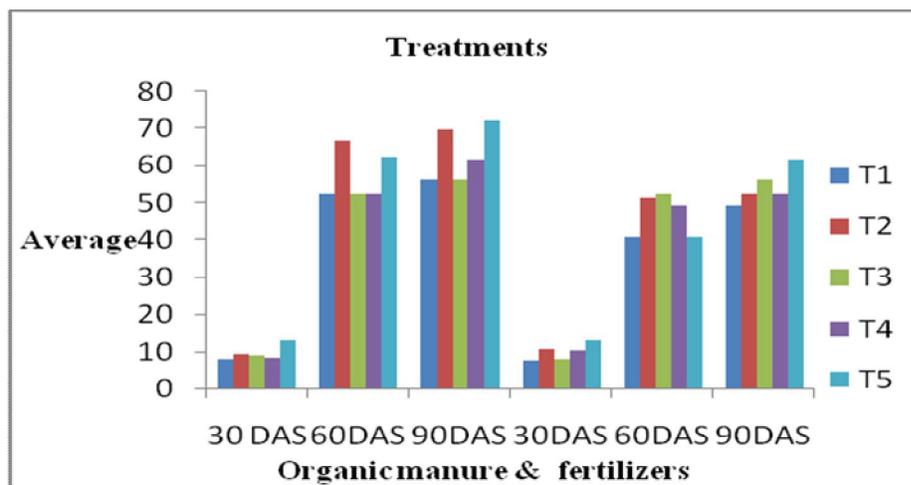
Results and Discussion

The data presented in **Table1** indicated that among the treatments of organic manure and chemical fertilizers levels, T5 showed a maximum plant height (cm) 71.97 under (Organic manure)and it was 61.47 in case of (chemical fertilizer) at 90DAS and minimum plant height in organic manures is 56.05 and chemical fertilizers levels was49.22.

Table: 1 Influence of organic manure and chemical fertilizers on plant height (cm) of bhendi at different intervals.

Treatments	Organic manure (VC+FYM)			Chemical fertilizers (NPK)		
	30 DAS	60DAS	90DAS	30DAS	60DAS	90DAS
T1	7.70	52.32	56.05	7.36	40.73	49.22
T2	9.31	66.54	69.76	10.51	51.17	52.32
T3	8.80	52.32	56.05	7.70	52.32	56.05
T4	8.32	52.32	61.47	10.33	49.22	52.32
T5	13.04	62.14	71.97	13.04	40.73	61.47

1. VC- Vermicompost 2. FYM- Farm yard manure 3. NPK- Nitrogen, Phosphorous, Potassium.



The number of branches is presented in **Table 2** Among the treatments, T5 recorded maximum number of branches (13.73) and the minimum with organic manure, number of branches was recorded in T1(2.73). In chemical fertilizer T5 recorded maximum number of branches (7.06)

Table: 2 Influence of organic manure and chemical fertilizers on plant branches of bhendi at different intervals.

Treatments	Organic manure (VC+FYM)			Chemical fertilizers (NPK)		
	30 DAS	60DAS	90DAS	30DAS	60DAS	90DAS
T1	2.73	3.26	3.46	2.42	2.73	3.26
T2	5.73	11.6	12.6	3.3	5.73	7.46
T3	3.26	4.24	7.06	2.53	4.24	6.53
T4	3.43	5.82	6.53	2.33	3.26	5.82
T5	7.06	12.13	13.73	3.2	5.73	7.06

1. VC- Vermicompost 2. FYM- Farm yard manure 3. NPK- Nitrogen, Phosphorous, Potassium.

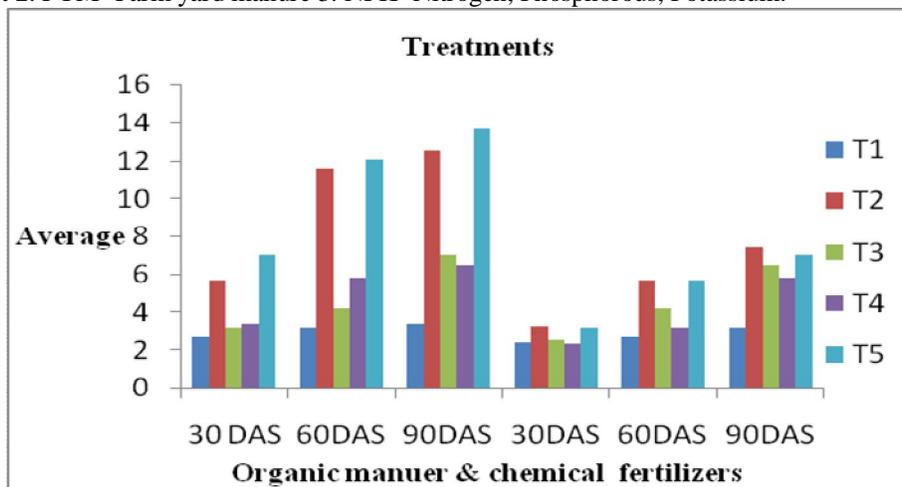
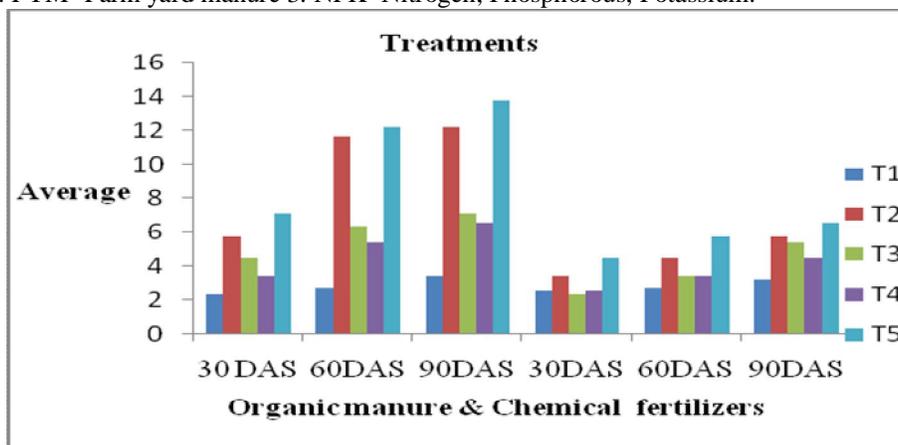


Table 3 indicated that among the treatments of organic manure T5 recorded maximum number of leaves (13.73) and minimum of 2.33 at 90 days after sowing, whereas in case of chemical fertilizer levels again T5 recorded maximum number of leaves (6.53) and minimum number of leaves (2.53) was recorded in T1.

Table: 3 Influence of organic manure and chemical fertilizers on plant leaves of bhendi at different intervals.

Treatments	Organic manure (VC+FYM)			Chemical fertilizers (NPK)		
	30 DAS	60DAS	90DAS	30DAS	60DAS	90DAS
T1	2.33	2.73	3.46	2.53	2.73	3.26
T2	5.73	11.6	12.13	3.43	4.46	5.73
T3	4.46	6.33	7.06	2.33	3.43	5.33
T4	3.43	5.33	6.53	2.53	3.46	4.46
T5	7.06	12.13	13.73	4.46	5.73	6.53

1. VC- Vermicompost 2. FYM- Farm yard manure 3. NPK- Nitrogen, Phosphorous, Potassium.



The number of pods presented in **Table 4** organic manure treatments, T5 recorded maximum number of pods (12.73) and minimum of 1.73 pods in T1. In chemical fertilizer levels again T5 recorded maximum number of pods (8.42) and minimum of 1.6 pods in T1.

Table: 4 Influence of organic manure and chemical fertilizers on pod yield of bhendi at different intervals.

Treatments	Organic manure (VC+FYM)		Chemical fertilizers (NPK)	
	60DAS	90DAS	60DAS	90DAS
T1	1.73	3.23	1.66	1.73
T2	3.23	5.53	2.61	3.86
T3	3.23	4.66	1.73	3.40
T4	3.40	4.53	3.23	3.40
T5	4.53	12.73	3.40	8.42

1. VC- Vermicompost 2. FYM- Farm yard manure 3. NPK- Nitrogen, Phosphorous, Potassium.

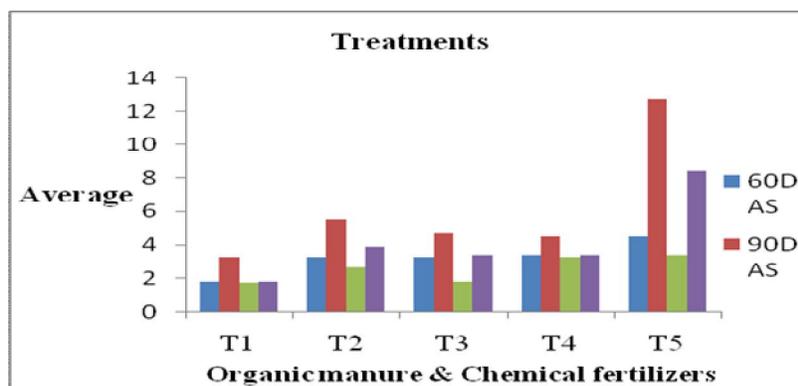
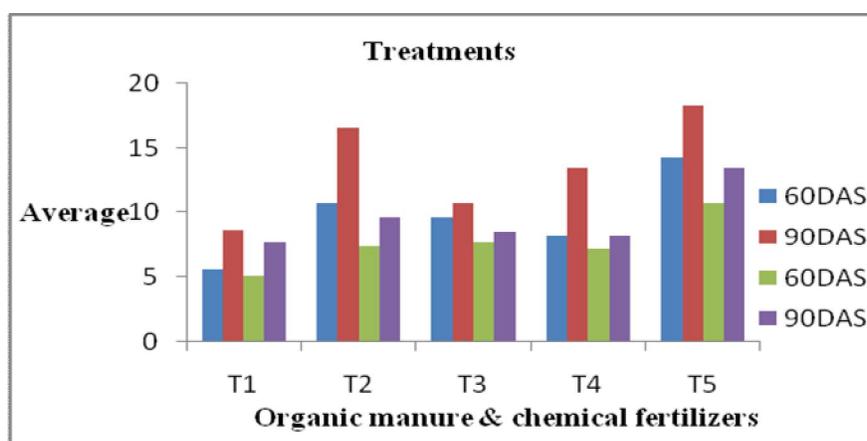


Table 5 indicated that it increased from 45 days to till harvest. Among the organic manure treatments, T5 recorded maximum number of pod lengths (18.28) and minimum of 5.58 pods length in T1. In chemical fertilizer levels again T5 recorded maximum number of pod lengths (13.46) and minimum of 5.08 pods length in T1.

Table 5: Influence of organic manure and chemical fertilizers on pods length (cm) of bhendi at different intervals.

Treatments	Organic manure (VC+FYM)		Chemical fertilizers (NPK)	
	60DAS	90DAS	60DAS	90DAS
T1	5.58	8.63	5.08	7.62
T2	10.66	16.51	7.36	9.65
T3	9.65	10.66	7.62	8.38
T4	8.12	13.46	7.11	8.12
T5	14.22	18.28	10.66	13.46

1. VC- Vermicompost 2. FYM- Farm yard manure 3. NPK- Nitrogen, Phosphorous, Potassium.



The combined use of organic and chemical fertilizers treatment yielded higher than chemical fertilizers in all the crops. Beneficial effect of combined use of organic and chemical fertilizers increased crop yield as well as maintained soil health on long term basis. The similar type of work was reported by Mishra *et al.* (1990). Organic farming is bio-organic manure is easily available to the farmers and its cost is low compared to that of chemical fertilizers. The crop production cost is more or less similar with organic and inorganic fertilizers (Haque, 2000), the use of readily available organic sources of nutrients should be used to maximize the economically. Fertilizers are materials added to the soil to supply the essential plant growth, development and enhance optimum productivity (Cooke, 1967). Organic manure is many wastes and residues of plant or animal life. The best known organic manure is the waste from mixed arable and livestock farming called farmyard manure. Farmyard manure is partially rotted straw containing urine and feces. Other rotting plant remains is usually called composts.

Table-1.1: Soil samples analysis of organic manure

Parameters	pH		Electro conductivity EC (μ mhos/cm)		Nitrogen (kg/ha)		Phosphorus (kg/ha)		Potassium (kg/ha)	
	1	2	1	2	1	2	1	2	1	2
Treatments										
T1	7.9	7.8	0.12	0.15	360	365	12	13	166	167
T2	7.9	7.2	0.12	0.20	360	397	12	19	166	187
T3	7.9	7.3	0.12	0.17	360	380	12	17	166	178
T4	7.9	7.5	0.12	0.15	360	352	12	14	166	171
T5	7.9	7.1	0.12	0.21	360	412	12	20	166	194

1. Before applying conventional manure 2. After Harvesting Crop

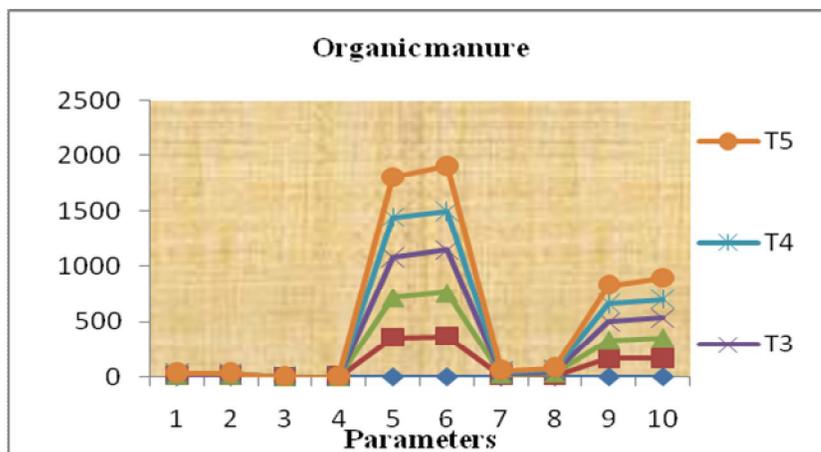
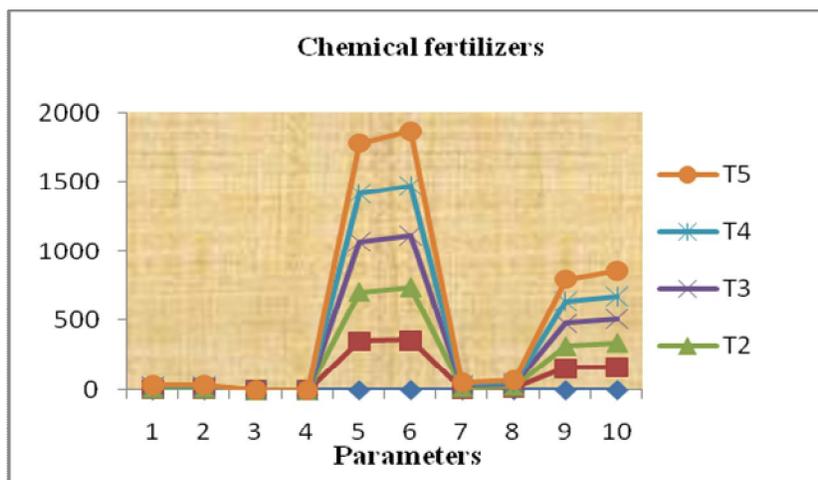


Table-1.2: Soil samples analysis of chemical fertilizers

Parameters	pH		Electro conductivity EC (μ mhos/cm)		Nitrogen (kg/ha)		Phosphorus (kg/ha)		Potassium (kg/ha)	
	1	2	1	2	1	2	1	2	1	2
T1	7.8	7.7	0.11	0.13	355	360	11	13	160	165
T2	7.8	7.3	0.11	0.18	355	382	11	16	160	177
T3	7.8	7.5	0.11	0.16	355	369	11	14	160	170
T4	7.8	7.6	0.11	0.14	355	362	11	13	160	164
T5	7.8	7.2	0.11	0.20	355	391	11	18	160	180



Soil nutrients such as calcium, magnesium and other nutrients play essential roles in crop production. Many physiology processes are linked with calcium, and magnesium uptake. High amount of calcium is required for grain formation and increase uptake of nitrates. (Cui *et.al.*1994, Egorava *et.al.*1995) while magnesium is very essential in the leaf formation pronounced ultra structural changes occur in the chloroplasts (Fischer and Bremer, 1993). Agusobo (1984) reported that organic manures are good sources of nitrogen, potassium, calcium, phosphorus which are essential nutrients that increase the growth and yield of crops.

Conclusion

The present investigation it is evident that the application of organic manures had the upper hand in influencing the growth against the chemical fertilizers NPK. Organic manure is cheaper than that of chemical fertilizers and to lesser the negative effect aroused from applying recommended dose of fertilizers to soil. The study was undertaken on a farmer's field to know the effect of both organic and chemical fertilizers on growth and yield of Bhendi. The organic manure is an eco-friendly, economically viable and economically sound that also played a significant role in soil biology. This huge quantity of wastes can be converted into nutrient rich bio-fertilizer (vermicompost) for sustainable land restoration practices. Indiscriminate use of chemical fertilizers and pesticides has led to several problems such as environmental pollution, decreases in crop yields and loss in soil fertility and increase in pesticide resistance in pests. The ill effects on chemical farming have generated interest in organic farming by using farm and urban wastes through vermiculture. In recent years vermicomposting has emerged as an efficient technology for recycling wide range of organic waste into good quality compost with the help of epigenic group of earthworms. The rapid breakdown of organic wastes by earthworm produces vermicompost having high amount of total and available nitrogen, phosphorous, potassium, micronutrients, enzymes and growth regulators Parthasarathi *et.al.*2008). During the process of vermicomposting various organic wastes were converted into easily available forms, to its uptake of nutrients by plants. On contrary of this prosperity, the country is facing problems related to the supply of fertilizers and the other valuable inputs as these inputs are getting diminished day by day. However there are intense showing adverse effect due to indiscriminate use of inputs especially inorganic chemicals which are polluting soil, water and environment. Consequently an ecofriendly and sustainable production technologies is the need of the present day. For which the concept of organic vegetable production need to be adopted.

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