Response of Green gram (vigna radiata L) crop to different fertilizers

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***ABSTRACT*: The field experiment was conducted for studying the influences of organic as well as chemical fertilizer on growth and yield of Green gram crop at outdoor nursery of Solapur University, agricultural farm in district of Solapur, Maharashtra. Experiment was set in randomized block design method, containing five treatments with three replications. Treatment inputs were vermicompost (T_1), NADEP compost (T_2), pit compost (T_3) were applied to research plot size 2m x1m at same rate @ 1.25kg/plot (@ 0.625 kg/sq. m) as common dose of organic fertilizers regularly used by farmers. The Chemical fertilizer (T_4) at rate 50:25:25-Kg/ha was used through urea, single super phosphate and murate of poatash. Weight of 100 grains of Green gram (vigna radiata L) crop increased with application of NADEP compost (T_2) after 60th day. The maximum yield of Green gram (vigna radiata L) crop was produced by the vermicompost treatment (T_1) after 60th day compared to remaining fertilizers treatments. Vermicompost is best organic fertilizer which is best treatment for production of Green gram crop.**

***KEYWORDS*: Fertilizer, Green gram (vigna radiata L), growth, NADEP, treatment, vermicompost, yield**

INTRODUCTION:

Green gram is commonly named as Mung bean. It is the most important rainy (kharif) season pulse crop in India. Vermicompost has more N, P, K contents than other organic fertilizers. The practice of vermicompost in agriculture performs to affect crop growth in ways those could not be directly connected to the physical and chemical properties. Continuous use of chemical fertilizer decline the quality of soil and food [1]. Organic fertilizers especially vermicompost is environmentally material, non-toxic, require low energy inputs for composting and is recycled biological natural product [2]. Nitrogen (N) is important to the growth of crops because the nitrogen is a component in the plant cells (chlorophyll) which gives appearance of green colour for the plants. Its function is to supply the foods to the plants during the process of photosynthesis and enhance the plant growth. Phosphorous (P) is a second ingredient in fertilizers which acts to enhance root growth and flowering. Potassium (K) is important in flowering and fruiting purposes. Lack or absence of potassium can have effects on plants protein synthesis. Potassium supports in plant chemical processes such as carbohydrates, sugar, protein and enzyme synthesis. Vaithiyanathan and Sundaramoorthy (2016) noted the effect of organic manure and inorganic fertilizers on seed germination of green Gram (Vigna radiata L.). Farm yard manure, vermicompost, composted coir pith and inorganic fertilizers (nitrogen, phosphorus and potassium) were used for their treatments. Vermicompost to applicator soil of the plant increases seedling growth and photosynthetic pigments parameters as compared to the other organic and inorganic fertilizers [3]. The current research work deals with the impact of organic and chemical fertilizers on growth and yield of Green gram (vigna radiata L) crop and find out appropriate treatment for growth and yield of Green gram (vigna radiata L).

MATERIALS AND METHODS:

The test crop is Green gram. The field experiment was arranged in randomized block design with three replications. The plot size was 2m x 1m. Total 66 local seeds of Mug bean were planting in every treatment of plot. Seeds were sowing in 30cm x 10cm spacing in every plot. Drip irrigation system was arranged in whole study work. Treatment consist of vermicompost (T_1), NADEP compost (T_2), pit compost (T_3), chemical fertilizers was applied in the proportion 50:25:25 Kg of NPK/ha according to recommended dose of fertilizers as T_4 and control (T_5). A common dose of organic fertilizers such as vermicompost (T_1), NADEP (T_2) and pit compost (T_3) were used at equal rate 1.25 kg/plot (@ 0.625 kg/sq. m) as per usual practice of farmers. Straight chemical fertilizers (Urea-21.7gm + single super phosphate -31.25m + murate of potash-.3gm) combinally used in treatment T_4 of plot size 2 m x 1 m. The method of composting of organic solid waste was followed by Chavan et al (2015) [4]. Ten crops were selected randomly at the time of harvesting from each unit plot for the assessment of growth and yield of Mug bean. Growth and yield characters were observed after 60 days. Morphological characters such as length of crop (cm), number of pods/crop, yield of pods/crop, dry weights of 100 grains and yield/plot were noted. The experimental view is presented in photo plate 1, 2 and 3.

Experimental details and cultivation practice for (vigna radiata L) crop was described below,

Botanical name: Vigna aconitifolia L

Varity: Local

Experiment: Field experiment

Design: Randomized Block design

Plot size: 2m x 1m

Treatments: Five

Replications: Three

Crop population per plot: 66 (Crop spacing-30cm x 10cm), [5].

Treatment details:

T_1- Vermicompost prepared from agricultural solid waste @ 6.25 t/ha, [6].

T_2- NADEP compost prepared from agricultural solid waste@ 6.25 t/ha, [6].

T_3-Pit compost prepared from municipal solid waste @ 6.25 t/ha, [6].

T_4- Chemical fertilizer- 50:25:25 - N: P_2O_5: K_2O Kg/ha, [5].

T_5-Control

Quantity of fertilizers used in plot size 2m X 1m.

T_1- @ 1.25 kg/plot (@ 0.625 kg/sq. m)
T_2- @ 1.25 kg/plot (@ 0.625 kg/sq. m)
T_3-@ 1.25 kg/plot (@ 0.625 kg/sq. m)
T_4- According to RDF
(Urea-21.7gm+single super phosphate-31.25gm+murate of potash-8.3gm)
T_5-Soil without fertilizers

RESULT AND DISCUSSION:

Nutrients found in various organic fertilizers and soil are presented in Table1.

Table 1. Soil and organic fertilizers characteristics.

Parameters	Soil	T_1	T_2	T_3
pH	08.14	8.04	7.67	7.12
Moisture (%)	8.10	30.27	18.35	05.35
Org. matter (%)	1.00	16.39	11.76	11.30
N (%)	0.32	1.06	0.92	0.81
P (%)	0.27	1.52	1.06	0.20
K (%)	0.11	1.06	1.91	0.86

T_1 indicates vermicompost, T_2 indicates NADEP compost and T_3 indicates Pit compost

Table 2. Effects of fertilizers on growth of Green gram (vigna radiata L) crop.

Treatments	Length of crop (cm/crop)	No. of pods/crop	Weight of 100 grains (gm)	Mean pod yield/crop (gm/crop)	Yield/plot (Kg/plot)
T_1	37.20 (±4.86)	16.00 (±10.02)	5.560	14.79 (±9.72)	0.87
T_2	35.52 (±5.17)	16.25 (±8.54)	5.680	14.73 (±8.59)	0.79
T_3	40.34 (±6.64)	10.71 (±4.19)	4.830	7.45 (±2.54)	0.45
T_4	36.35 (±5.60)	15.85 (±8.64)	5.130	12.29 (±7.86)	0.61
T_5	38.47 (±6.43)	17.42 (±9.69)	5.540	13.09 (±8.06)	0.71

T_1 indicate vermicompost, T_2 indicate compost, T_3 indicate pit compost, T_4 indicate chemical fertilizers, T_5 indicate control.

In present study, it was observed that the application of organic fertilizers such as vermicompost (T_1), NADEP compost (T_2) and other remaining fertilizer treatment had great influence of growth characters of Green gram (vigna radiata L) which are summarized in Table. 2.

A. **Crop length after 30th days:** Average crop length (cm/crop) of Green gram after 30th day in the treatments T_1, T_2, T_3, T_4 and T_5 were found to be 13.75cm/crop (±4.21), 9.04cm/crop (±2.67), 7.78 cm/crop (±1.24), 8.61cm/crop (±2.00) and 9.38cm/crop (±2.05) respectively. Throughout growth analysis after 30th day, maximum crop length (13.75cm/crop) was found in crops treated with vermicompost (T_1) followed by control treatment (T_5). The minimum value of length of crops was 9.04cm/crop with application of chemical fertilizer (T_4) while it was lowest (7.78cm/crop) using pit compost (T_3).

B. **Crop length after 60th days:** Average crop length (cm/crop) of Green gram after 60th day in the treatments T_1, T_2, T_3, T_4 and T_5 were 37.1 cm/crop (±4.86), 35.52 cm/crop (±5.17), 40.34 cm/crop (±6.64), 36.35 cm/crop (±5.60) and 38.47 cm/crop (±6.43) respectively (fig.1). The higher crop length/crop (40.34cm/crop) was observed in treatment T_3 followed by control treatment (T_5). The minimum value of length of Green gram was 37.20 cm/crop was found with application of vermicompost (T_1). The lower value of length of Green gram was 35.52 cm/crop was found with use of NADEP compost (T_2).

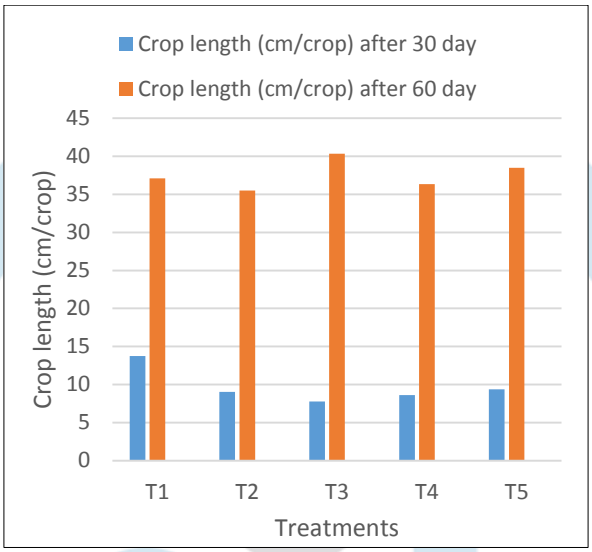

Fig. 1: Effects of fertilizer treatments on crop length Green gram crop.

C. **Number of pods /crop:** Average number of pods of Green gram (vigna radiata L) crop in the treatments T_1, T_2, T_3, T_4 and T_5 were observed to be 16.00cm (±10.02), 16.25 (±8.54), 10.71 (±4.19), 15.85 (±8.64) and 17.42 (±9.69) respectively (fig.2). The maximum number of pods/crop were recorded in control treatment (T_5) which was followed by NADEP compost treatment (T_2), minimum was 16.00 (±9.69) in vermicompost treatment (T_1) and lowermost value (10.71) was observed in pit compost treatment (T_3).

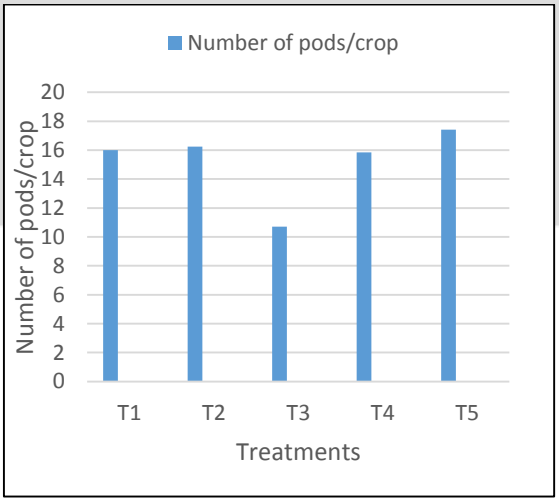

Fig. 2: Effects of fertilizer treatments on number of pods of Green gram crop.

D. **Weight of 100 grains (gm/crop):** Weight of 100 grains of Green gram (vigna radiata L) crop in the treatments T_1, T_2, T_3, T_4 an d T_5 were 5.560gm, 5.680gm, 4.830gm, 5.130gm and 5.540gm respectively (fig.3). Highest weights of 100 grains of Green gram (vigna radiata L) crop (5.680gm) was observed in treatment (T_2) followed by in vermicompost treatment (T_1) as compared to control and remaining fertilizers treatments.

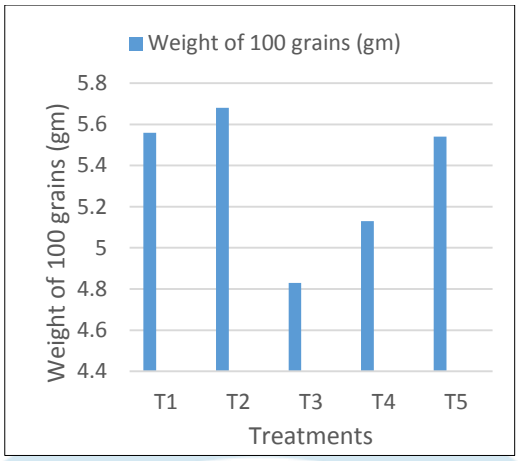

Fig. 3: Effects of fertilizer treatments on weight of 100 grains of Green gram crop.

E. **Mean pod yield /crop:** Mean pod yield/crop of Green gram after 60th day in the treatments T_1, T_2, T_3, T_4 and T_5 were 14.79gm/crop (±9.72), 14.73gm/crop (±8.59), 7.45gm/crop (±2.54), 12.29 gm/crop (±7.86) and 13.09 gm/crop (±8.06) respectively (fig.4). Maximum mean pod yield/crop (14.79gm/crop) was observed with application of vermicompost treatment (T_1) which is followed by NADEP compost treatment (T_2). The value of mean pod yield/crop was 7.45gm/crop with application of pit compost treatment (T_3) which is lowest than control treatment (T_5).

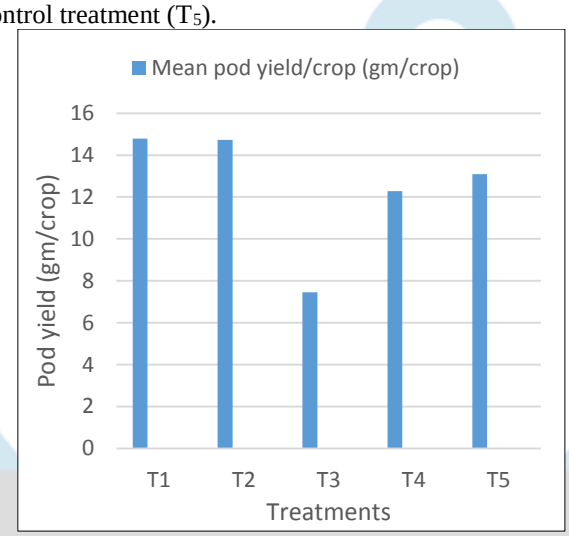

Fig. 4: Effects of fertilizer treatments on pod yield per crop.

F. **Yield/plot (Kg/plot):** The yield of Green gram (vigna radiata L) crop after 60th day in the treatments T_1, T_2, T_3, T_4 and T_5 were found to be 0.87 (Kg/plot), 0.79 (Kg/plot), 0.45 (Kg/plot), 0.61 (Kg/plot) and 0.71 (Kg/plot) respectively. At 60th day out of five treatments studied, maximum yield of Green gram (vigna radiata L) crop (0.87 Kg/plot) was with 1.25 kg/plot (@ 0.625 kg/sq. m) from vermicompost treatment (T_1) followed by 1.25 kg/plot (@ 0.625 kg/sq. m) from NADEP compost treatment (T_2). The minimum yield of Green gram (vigna radiata L) crop (0.71 Kg/plot) was with control treatment (T5) and the value of yield of Green gram (vigna radiata L) crop was 0.45 Kg/plot produced from pit compost treatment (T_3) which is lower than control treatment (T_5).

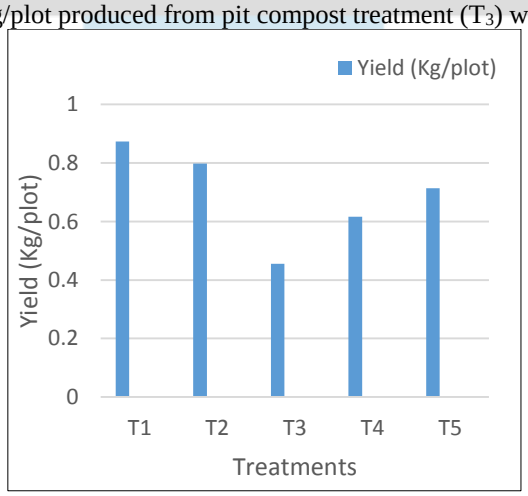

Fig. 5: Effects of fertilizer treatment on yield per plot

Photo plate 1. General view of experimental plot of Green gram

Photo plate 2. General view of experimental plot of Green gram

Conclusion:

The present research work reveals that the application of vermicompost to Green gram (vigna radiata L) crop is more beneficial for higher growth and yield as compared to other remaining fertilizers treatments studied.

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