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## Effect of organic manures in germination and vegetative growth of black gram (*Vigna mungo* L.)

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### Abstract

The efficiency of different organic manures on germination and vegetative growth of black gram was evaluated. A total of five organic manures were used for the study *viz.*, vermicompost, FYM, poultry manure, rice husk compost and wood ash compost. It was thoroughly mixed with soil in the ratio 2:1. The experiment was laid out in Completely Randomized Design (CRD). Different parameters such as germination percent, time required for germination, plant height, number of leaves per plant and root length were taken into account. Among all the treatments, soil + poultry manure showed the best results in all aspects. The highest germination percent was observed in case of soil + poultry manure i.e., 93.75 percent. The minimum time required for germination was 1.5 days in treatment soil + poultry manure. The mean germination rate was observed to be highest in treatment soil + poultry manure i.e., 0.67. The plant height was observed to be highest in soil + poultry manure with value 42.62 cm. The number of leaves was observed at 35 days after sowing and was found to be highest in treatment soil + poultry manure i.e., 18.70 numbers. The root length during vegetative growth of black gram was observed at 35 DAS and was found to be longest in soil + poultry manure with value 38.60 cm.

**Keywords:** Black gram, poultry manure, organic manures, germination

### Introduction

The grain legume crop, black gram (*Vigna mungo*) is a member of the Fabaceae family which is extensively cultivated in India. From the perspective of global food and nutritional security, it takes significant relevance. It is a short-duration pulse crop that grows well in practically every season is black gram. About 10% of India's total pulse production is produced as black grams. Black gram productivity is typically low because of insufficient soil fertility and bad management. One of India's most highly valued pulses, black gram originates in South Asia, where it has been cultivated since ancient times. In Indian cooking, it is incredibly common. One of the major pulses cultivated in India during both the kharif and rabi seasons. This crop is commonly grown in India, Nepal and Bangladesh. (Fuller and Harvey, 2006)<sup>[7]</sup> Blackgram is an erect, sub-erect or following, thickly shaggy, yearly hedge. The tap root creates an expanded underground root growth with smooth, adjusted knobs which help in nitrogen obsession. The units are restricted, round and hollow and up to six cm long. The plant grows 30-100 cm with enormous bristly leaves and 4 - 6 cm seed cases. (Chandel *et al.*, 1984)<sup>[5]</sup> While the urad dal was, alongside the mung bean, initially positioned in Phaseolus, it has since been moved to Vigna. This yield is broadly filled in southern piece of India, northern piece of Bangladesh and Nepal. In Bangladesh and Nepal it is known as squash daal. It is a well known daal (vegetable) side dish in South Asia.

Organic cultivation as of late is acquiring catalyst because of acknowledgment of innate benefits it presents in supporting harvest creation and furthermore in keeping up with dynamic soil supplement status and safe climate (Ahlawat *et al.*, 2006)<sup>[1]</sup>. Farmstead excrement, fertilizer, vermicompost, green manuring, agro-squanders and plant squanders from sources suggest both for manageability of soil natural carbon (Aoyama *et al.*, 1999)<sup>[3]</sup> and supply of plant supplements in customary natural cultivating. Vermicompost is the result of the disintegration interaction utilizing different types of worms, to make a combination of decaying vegetable or

food squander, bedding materials, and vermicast. (Britto and Giriya, 2006) [4] Farmyard manure is a decayed combination of compost and urine from livestock and litter and extra material from roughages of cows used to treat the land. A characteristic compost can be utilized in nurseries and finishing. All things considered, all around deteriorated barnyard compost contains 0.5 percent nitrogen, 0.2 percent phosphorus oxide, and 0.05 percent potassium oxide. (Darwish et al., 1995) [6] Poultry compost alludes to the defecation created by poultry birds, which is regularly utilized as a natural manure in cultivating or cultivating because of its high satisfied of nitrogen, phosphorus, and potassium. Rice husk ash is also used for manuring purpose. (Javed and Panwar, 2013) [8].

## Materials and Methods

The present investigation on was carried out during 2022- 23 in the campus of Arunachal University of Studies, Namsai, Arunachal Pradesh. During the investigation, a number of materials were used, each one for a specific purpose using a specific method to fulfil the objectives. The required details of the materials and the methodologies followed while carrying out the investigations are discussed in this chapter.

The experiment was carried out for the study on effect of organic manure on germination and vegetative growth of black gram during *khariif* season. The experiment was laid out in Completely Randomized Design (CRD) with six having four replications each. The variety used for the experiment was local landrace of Arunachal Pradesh. The different treatment combinations used for undergoing this experiment are shown in. The soil used was collected from the Instructional Farm of Arunachal University of Studies, Namsai. In the treatment combinations, soil was mixed with vermicompost, FYM, poultry manure, wood ash compost and rice husk compost in the ratio of 2: 1.

In order to know the effect of different organic manures on different parameters of germination and the growth characteristics of black gram, the following parameters were recorded. The germination percentage, time required for

germination and mean germination rate was observed. These parameters would help to assess the effect of the different organic manures on germination of black gram. A total of 5 samples were included in each replication. The time required for germination was counted as the average of all the samples for each replication and treatment. The germination percent and mean germination rate were calculated using the formulas given below:

$$\text{Germination percent} = \frac{\text{No. of seeds germinated}}{\text{Total no. of seeds sown}} \times 100$$

$$\text{Mean germination rate} = \frac{1}{\text{Mean germination time}}$$

Different vegetative growth attributes of black gram plant like plant height, number of leaves per plant and root length were taken into account to observe the effect of different organic manures. The plant height was observed at 7, 14, 21, 28 and 35 DAS. It was measured with the help of meter scale. The data was recorded for further analysis. The number of leaves was observed at 35 DAS. The number of leaves per plant was counted and the data was recorded for further analysis. The root length was observed at 35 DAS. The root length was measured and the data was recorded for further analysis.

## Results

The results of germination parameters are presented in Table 1. From the table it is observed that the highest germination percent is observed is 93.75 in T<sub>3</sub> (soil + poultry manure). The lowest germination percent was observed in case of T<sub>0</sub> (control) i.e. 31.25 percent. Likewise the time required for germination of black gram was observed to be minimum of 1.5 days. The maximum time required for germination was recorded as 4.5 days in T<sub>0</sub> (control).

**Table 1:** Effect of organic manure on the germination percent and time of germination on black gram

Treatments	Germination percent (%)	Time taken for germination (days)	Mean germination rate
T <sub>0</sub> (Control)	31.25 (33.98 <sup>***</sup> )*	4.5 <sup>c</sup>	0.22
T <sub>1</sub> (Soil + vermicompost)	81.25 (64.34 <sup>ab</sup> )	2.4 <sup>ab</sup>	0.41
T <sub>2</sub> (Soil + FYM)	75.00 (60.00 <sup>ab</sup> )	1.8 <sup>bc</sup>	0.56
T <sub>3</sub> (Soil + poultry manure)	93.75 (75.52 <sup>a</sup> )	1.5 <sup>bc</sup>	0.67
T <sub>4</sub> (Soil + wood ash)	62.50 (52.23 <sup>b</sup> )	3.6 <sup>a</sup>	0.27
T <sub>5</sub> (Soil + rice husk)	68.75 (56.01 <sup>b</sup> )	2.1 <sup>bc</sup>	0.47
CD (p=0.05)	20.05	0.64	

\*Figures in the parenthesis represent angular transformed values

\*\* Values superscripted with same letters are significantly *at par*

In Table 2. Effect of organic manure on the height of the plants are presented. It has been recorded that the highest plant height

was observed to be 42.62 cm for T<sub>3</sub> (soil + poultry manure) and lowest plant height was observed to be 36.32 cm for T<sub>0</sub> (control).

**Table 2:** Effect of organic manure on plant height of black gram plant

Treatments	Plant height (cm)				
	7 DAG	14 DAG	21 DAG	28 DAG	35 DAG
T <sub>0</sub> (Control)	6.90 <sup>d*</sup>	12.22 <sup>c</sup>	21.80 <sup>d</sup>	30.32 <sup>d</sup>	36.32 <sup>d</sup>
T <sub>1</sub> (Soil + vermicompost)	8.35 <sup>b</sup>	13.97 <sup>ab</sup>	24.70 <sup>ab</sup>	33.10 <sup>b</sup>	41.32 <sup>b</sup>
T <sub>2</sub> (Soil + FYM)	7.95 <sup>bc</sup>	13.87 <sup>ab</sup>	24.00 <sup>b</sup>	32.90 <sup>b</sup>	40.47 <sup>b</sup>
T <sub>3</sub> (Soil + poultry manure)	9.42 <sup>a</sup>	14.22 <sup>a</sup>	25.12 <sup>a</sup>	34.20 <sup>a</sup>	42.62 <sup>a</sup>
T <sub>4</sub> (Soil + wood ash)	7.50 <sup>cd</sup>	13.57 <sup>b</sup>	22.97 <sup>c</sup>	31.85 <sup>c</sup>	39.25 <sup>c</sup>
T <sub>5</sub> (Soil + rice husk)	7.95 <sup>bc</sup>	13.75 <sup>ab</sup>	23.95 <sup>b</sup>	32.77 <sup>b</sup>	40.57 <sup>b</sup>
CD (p=0.05)	0.81	0.50	0.96	0.51	1.10

\*Values superscripted with same letters are significantly *at par*

The number of leaves per plant was observed at 35 DAS. A perusal of results of number of leaves per plant is represented in the Table 3. The highest and lowest number of leaves per plant were found to be 18.70 and 9.45 for the treatments T<sub>3</sub> (soil + poultry manure), and T<sub>0</sub> (control), respectively. The root length during vegetative growth of black gram was observed at 35 DAS. The results are presented in the Table 3. The longest and shortest root length were observed for the treatments T<sub>3</sub> (soil + poultry manure) and T<sub>0</sub> (control) with root lengths of 38.60 cm and 31.30 cm, respectively. The present study shows a significant difference in root length due to the use of different organic manures at different treatments. It was observed that T<sub>3</sub> (soil + poultry manure) has the longest root length among other treatments, it may be due to the adding of poultry manure which enhances nitrogen content of the soil.

**Table 3:** Effect of organic manure on no. of leaves per plant and root length at 35 DAG of black gram plant

Treatments	No. of leaves / plant	Root length (cm)
T <sub>0</sub> (control)	9.45 <sup>fa</sup>	31.30 <sup>f</sup>
T <sub>1</sub> (soil + vermicompost)	16.57 <sup>b</sup>	37.35 <sup>b</sup>
T <sub>2</sub> (soil + FYM)	15.25 <sup>c</sup>	35.47 <sup>c</sup>
T <sub>3</sub> (soil + poultry manure)	18.70 <sup>a</sup>	38.60 <sup>a</sup>
T <sub>4</sub> (soil + wood ash)	12.32 <sup>e</sup>	32.57 <sup>e</sup>
T <sub>5</sub> (soil + rice husk)	13.12 <sup>d</sup>	33.50 <sup>d</sup>
CD(p=0.05)	0.68	0.39

\*Values superscripted with same letters are significantly *at par*

### Discussion

From the study, it was found that application of different organic manures had a significant difference on germination percentage and growth parameters of black gram. The germination percentage were found to be highest in the treatment group with poultry manure. The growth parameters like plant height, number of leaves and root length were found to be high in the treatment group with poultry waste as organic manure. So it can be concluded that soil + poultry manure was the best among all the organic manures used, it may be due to the adding of poultry manure which enhances nitrogen content of the soil also the nutrient content of poultry manure is higher as compared to other manures (nitrogen (4.55 to 5.46%), phosphorus (2.46 to 2.82%), potassium (2.02 to 2.32%), calcium (4.52 to 8.15%), magnesium (0.52 to 0.73%) and appreciable quantities of micronutrients like Cu, Zn, Fe, Mn etc.). (Amanullah *et al.*, 2007) [2] Similar findings were also found by Yadav *et al.*, 2007 [9] where he carried out a field experiment during the zaid season of 2001, to study the response of biofertilizers, poultry manure and different levels of phosphorus on the nodulation and yield of green gram cv. K-851.

### Conclusion

From the study, it was found that application of different organic manures had a significant difference on germination percentage and growth parameters of black gram. Poultry waste as organic manure had a significant effect on germination percent and mean germination rate of black gram. The growth parameters of the treatment group was found to be significantly different among the treatment groups. The maximum growth was observed in poultry waste as organic manure as compared to other treatment groups.

The use of organic manures has been proven to be eco- friendly, better productivity and sustainable. The beneficial microbes present in the soil are not hampered or harmed on application of organic manures. The future potential depends on the study and

use of organic manures and their effect on growth and yield in black gram. The change in soil quality on application of organic manures can be studied in pot culture for better outcome in near future and to promote sustainable agriculture.

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