Assessment of Effect of Vermicompost on Black Gram (*Vigna mungo* L.) Productivity

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***Abstract*- The subject of the current study was to assess the effect of graded levels of Vermicompost on yield attributes of Black gram. Seven treatments were included in three replications of the experiment, which was set up in a Randomized Block Design: Tl (Control), T2 (vermicompost @ 2.5 t/ha), T3 (vermicompost @ 5 t/ha), T4 (vermicompost @ 7.5 t/ha), T5 (vermicompost @ 10 t/ha), T6 (vermicompost @ 12.5 t/ha), and T7 (vermicompost @ 15 t/ha). The studies revealed significantly higher plant height, number of primary branches, number of pods per plant, seed weight, and seed index were reported with T7 @ 15t/ha followed by T6 @ 12.5 t/ha and T5 @ 10 t/ha. Treatments T2 @ 2.5 t/ha, T3 @ 5 t/ha and T4 @ 7 t/ha values are at par with each other and the variation is not significant when compared to T1 control. Therefore, black gram growth and yield attributes were significantly high with T7 @ 15 t/ha when compared to other treatments and control.**

***Index Terms*—Black gram, Randomized Block Design, Replications, Vermicompost, Yield attributes.**

I. INTRODUCTION

An annual herbaceous legume black gram is scientifically known as ***(Vigna mungo (L.) Hepper)***. It is a member of the papilionacee subfamily and the leguminosae family [5]. With an area of 37.52 lakh ha, India is the world's greatest producer of black gram, accounting for 70% of global production with average productivity of 500 kg per hectare and a production of 1.5 to 1.9 million tonnes. Growing over all three crop seasons, black gram is a short-duration pulse crop [1]. However, the nutrient requirement for black gram is relatively low, it responds well to manures and fertilizers when applied in optimum quantities.

Vermicompost is one of the organic forms that supply crop essential Macro and Micronutrients Vermicompost has been advocated in integrated nutrient management system in field crops [14]. The application of vermicompost not only adds plant nutrients (macro and micro) and growth regulators to the soil but also increases soil water retention, microbial population, humic substances of the soil, mineralization and release of nutrients [8].

Vermicompost has a high concentration of plant nutrients and enzymatic microbial activity, which makes it easy for plants to absorb [7]. Vermicompost consists of nitrogen (N) 2–3% phosphorous (P) 1.55–2.25%, potassium (K) 1.85–2.25% along with micronutrients, and soil microbes like 'nitrogen fixing bacteria' and mycorrhizal fungi. Vermicompost has been scientifically proved as miracle plant growth enhancer [4].

Cultivation of black gram with more or less than recommended doses combined with low organic matter had affected the quality and quantity of crop [11]. The addition of organic manures like vermicompost positively effects the seed yield of black gram, soil health and even nutritive quality. Therefore, the present study is to assess the effect of graded levels of vermicompost on yield of attributes of black gram.

II. MATERIALS AND METHODS

A field experiment was conducted to study the effect of graded levels of vermicompost on yield attributes of black gram at experimental field of HINDU COLLEGE FARM, GUNTUR during summer season of the year 2023 in black gram cultivar LBG 17. It is a both *Rabi* and summer season cultivar. The experiment was designed as 7 treatments and 3 replications. The treatments were T1 control, T2 vermicompost at 2.5t/ha, T3 vermicompost at 5t/ha, T4 vermicompost at 7.5t/ha, T5 vermicompost at 10t/ha, T6 vermicompost at 12.5t/ha, and T7 vermicompost at 15t/ha. The application of vermicompost was in split doses viz., basal application and pre-flowering stages. The height of the randomly

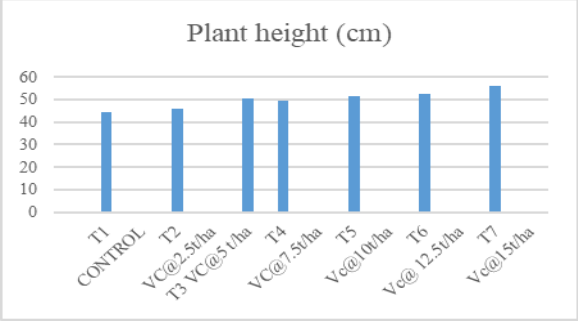
selected and tagged five plants in each net plot were measured in cm at the time of harvest. The number of branches per plant was determined by counting five previously selected plants from each net plot one day before crop harvest. The average number of branches per plant was determined and recorded individually for each treatment. The total number of mature pods from previously tagged five plants was tallied at each harvest, and the average value per plant was calculated and recorded for each treatment. At harvest time, all pods from selected plants were threshed, cleaned, and their seeds weighed and averaged to measure yield. Following the harvest, 100 dry seeds were counted and weighed on an automated weighing balance.

The statistical analysis of the numerous growth and yield characteristics evaluated during the course using the Randomized Block Design statistical approach [15]. The variances of different sources of variation in ANOVA were investigated using the "F-test" and compared to the values at 5% level of significance.

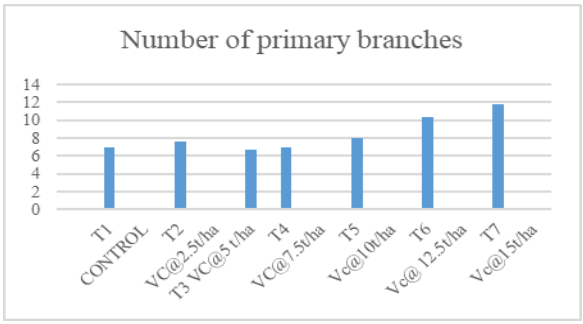
III RESULTS AND DISCUSSION

The current study examined growth and yield characteristics consisting of control and vermicompost-treated soil, with observations made for five characters. The average performance of 7 treatments across 5 criteria was investigated.

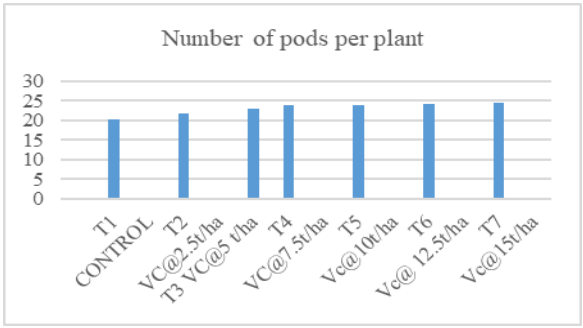
All treatments resulted in substantial differences in plant height, ranging from 44.18 to 56.13 cm with an average of 49.99 cm. According to the findings of the current study, the T7 @ 15 t/ha treatment (56.13cm) produced the highest plant height, whereas T1 @ control produced the lowest plant height. When compared to the control, plants treated with vermicompost had shown improved results with improved vermicompost application.



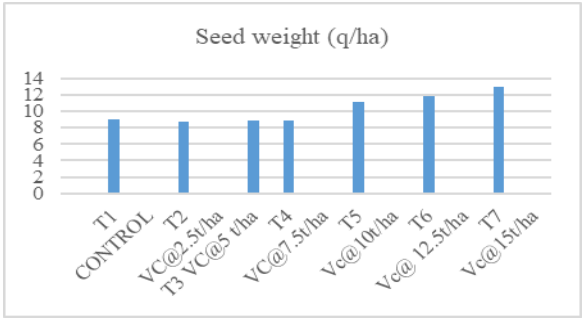
All treatments had substantial differences in the number of primary branches per plant. The number of major branches per plant ranged between 6.96 and 11.79, with an average of 8.36. Treatment T7 @ 15 t/ha (11.79) had the highest number of primary branches per plant whereas TI (6.96) had the fewest primary branches per plant.



All treatments produced dramatically varied numbers of pods per plant. The number of pods per plant ranged between 20.34 and 24.55, with a mean of 23.12. The T7 treatment (24.55) produced the most pods per plant, followed by T4 with a minor difference (23.99), and T1 with the fewest pods per plant (20.346). Plants with more pods per plant are more likely to produce more.

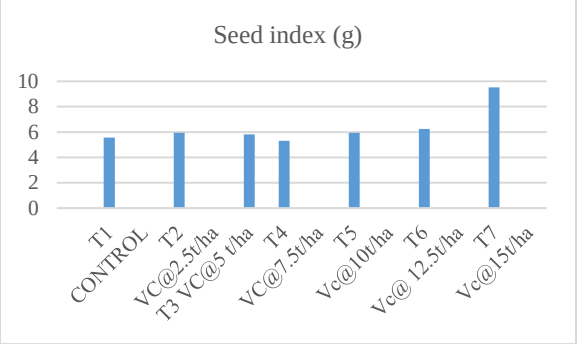


Significant differences in seed weight were identified among treatments, ranging from 9.01 to 12.96 quintal per hectare, with a mean value of 10.18 q/ha. Among all treatments, T7 (12.97) revealed the highest seed weight. The TI treatment yields the lowest seed weight.



There was significant difference between all treatments for 100 seed weight. The 100 seed weight ranged from 5.56 to 9.51 g, with an average of 6.32 g.

Among all treatments, T7 (9.51g) had the greatest seed index, while TI (5.56 g) had the lowest.



All the treatments responded well with increased vermicompost application. There was gradual incline in the values with increased application. However, few treatments *viz.*, T2 @ 2.5 t/ha and T3 @ 5t/ha performed better for characters like seed weight and seed index with low vermicompost application. This might be due to differences in number of seeds per pod and weight of an individual seed in pod.

Further, T7 @ 15 t/ha followed by T6 @ 12.5 t/ha shown highest values for all the characters in study, indicating the higher doses might be associated with increased productivity in Black gram.

Vermicompost has been proven to improve soil's physical and biological qualities, including supply. Plants require nearly all vital nutrients to grow and develop successfully. Balanced nutrition in a favorable environment might have aided in the formation of new tissues and shoots with increased vermicompost application and therefore all growth and yield parameters were significantly improved over control. These findings are consistent with [12] in green gram.

IV. CONCLUSION

Vermicompost increased plant height, number of primary branches, pods per plant, seed weight, and seed index compared to the control. Vermicompost at 15t ha-1 is thought to be the best concentration in terms of plant height (56.13 cm), primary branches per plant (11.79), pod count (24.55), seed weight (12.96), and seed index (9.51). The higher yield associated with increased dose of vermicompost may be due to improved organic matter which affects various soil physical and chemical properties. Further it helps to conserve soil moisture and maintain soil fertility, which increases nitrogen content in the soil, causing the emergence of primary branches to begin sooner and a greater number of pods.

REFERENCE

[1] D. Balachandar, P. Nagarajan and S. Gunasekaran. –Effect of organic amendments and micronutrients on nodulation and yield of black gram in acid soil. || *Legume Research*, 26: 192- 195, 2003.

[2] D. Chandra and R. B. Khandelwal. -Effect of zinc and phosphorus on yield, nutrient uptake and oil content of mustard growth on the gypsum-treated sodic soil. || *Journal of Indian Society and Soil Science*. 57:66-70, 2009.

[3] H. C. Choudhary, S. Khan and S. K. Uttam. -Effect of N, P, S and Zn nutrition and moisture conservation practices on nutrient uptake, quality and yield of rainfed Indian mustard in eroded soil. || *Indian Agriculture.*, 53:125-130, 2007.

[4] H. I. Chaoui, L. M. Zibilske and Ohnot. -Effects of earthworms cast and compost on soil microbial activity and plant nutrient availability. ||*Soil Biology and Biochemistry*, 35:295 302, 2003.

[5] H. S. Athokpam, N. Chongtham, R. K. K. Singh, N. G. Singh N. B. and Singh. – Effect of nitrogen, phosphorus and potassium on growth, yield and nutrient uptake by blackgram *(Vigna mungo L.),* ‖ *Environment and Ecology, 27: 682-684*, 2009.

[6] J. R. Jat and R. K. Mehra. -Effect of sulphur and zinc on yield, macronutrient content in and uptake by mustard Haplustepts. || *Journal of Indian Society and Soil Science*, 55:190-195, 2007.

[7] L. S. Ranganathan and K. Parthasarathi. -Enhanced phosphatase activity in earthworm casts is more of microbial origin. || *Current Science*. 79:1158-1159, 2000.

[8] M. C. Manna and A. K. Biswas. || *Yojana*, Pp. 34, 1996.

[9] M. C. Meena, K. P. Patel and D. D. Rathor. -Effect of zinc, iron and sulphur on mustard in loamy sand soil. || *Indian Journal of Fertilizer*, 2: 55-58, 2006.

[10] P. K. Kumawat, R. C. Tiwari, S. L. Golada, A. S. Godara, R. S. Garhwal and R. Choudhary. -Effect of Phosphorus sources,

levels and Biofertilizers on Yield attributes, Yield and Economics of Black gram *(Phaseolus Mungo L.).* ||*Legume Research*, 36: 70-73, 2013.

[11] S. Kumaran and M. Subramanian. -Influence of plant population and methods of nutrient application on yield of black gram. || *Crop Research*, 22 :359-362, 2001.

[12] S. Tak. -Effect of vermicompost and zinc on growth and yield of mungbean (*Vigna radiata* (L.) Wilczek). M.Sc. (Ag.), Thesis, Rajasthan Agricultural University, Bikaner. 2003.

[13] S. P. Hussain, N. Mehdi and R. H. Kant. Response of Nitrogen and Phosphorus on Growth and Yield Attributes of Black gram *(Vigna mungo).* || *Research Journal of Agricultural Sciences*, 2: 334-336, 2011.

[14] V. N. Shorff and S. Devathali. -Earthworm farming scope and limitation. || *Proceeding national seminar an natural farming (Ed.).* L.L. Somani, K.L, Totawat and B.L., Baser. 126-142, 1992.

[15] W. G. Cochran and G. M. Cox, *Experimental Designs*, 2nd Edition, U.K: *Wiley*, 1957.