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Effect of integrated nutrient management on growth and yield of green gram (*Vigna radiata* L.)

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ABSTRACT

A field experiment was conducted during *Kharif* season 2014 at the Research farm of Soil Science, Allahabad School of Agriculture, laid out in randomized block design, consisted nine treatments and three replications, it was observed that growth and yield of green gram in treatment $N_{20}P_{40}K_{40}$ + FYM @10 t ha^{-1} and *Rhizobium* was maximum. Maximum plant height 50.66 cm, number of leaves $plant^{-1}$ 33.00, number of branches $plant^{-1}$ 4.66 at 60 DAS, number of cluster $plant^{-1}$ 9.33, number of pods $plant^{-1}$ 37.33 and total seed yield 12.10 q ha^{-1} were found to be significant over all other treatment. Adequate plant nutrient supply holds the key for improving the growth and food grain production of crop.

Key words: Growth, INM, Yield attributes.

INTRODUCTION

Pulses are the main source of protein particularly for vegetarians and contribute about 14% of the total protein of average Indian diet. Production of pulses in the county is far below the requirement to meet even the minimum level per capita consumption. The per capita availability of pulses in India has been continuously decreasing which is 32.52 g/ day against the minimum requirement of 80 g/day per capita prescribed by Indian Council of Medical Research (ICMR). Therefore, it is necessary for agricultural scientists to evolve strategies to increase production of pulses to meet the protein requirements of increasing population of the country.

Green gram [*Vigna radiata* (L.) Wilczek] also known as mungbean is a self pollinated leguminous crop which is grown during kharif (July- October) as well as summer (March- June) seasons in arid and semi arid regions of India. It is primarily a rainy season crop but with the development of early maturing varieties, it has also proved to be an ideal crop for spring and summer season. It is tolerant to drought and can be grown successfully on drained loamy to sandy loam soil in areas of erratic rainfall. It is a native of Central Asia. It is a short duration crop, fits well in various multiple and intercropping systems. After picking of pods, mungbean plants may be used as green fodder or green manure. Besides these, the crop also enriches soil by fixing atmospheric nitrogen.

In India, it is the third important pulse crop after chickpea and pigeon pea, mungbean is cultivated in state of Rajasthan, Madhya Pradesh, Punjab, Haryana, U.P., Maharashtra, Karnataka, Andhra Pradesh and Tamil Nadu. It is rich in protein and vitamin B. Green gram is an excellent source of protein (24.5%) with high quality of lysine (460 mg/g N) and tryptophan (60 mg/g N). It contains also remarkable quantity of ascorbic acid and riboflavin (0.21 mg /100 g). (Azadi *et al.* 2013). The yield of pulse crops is low due to lack of awareness in adoption of improved technology (Kumar,2013, Kumar,2014 a and Kumar, 2014 b). The use and development of improved technology particularly integrated nutrient management will help in bridging gap between demand and supply of pulses.

The basic concept of integrated nutrient management is the supply of the required plant nutrients for sustaining the desired crop productivity with minimum deleterious effect on soil health environment. Integrated nutrient management intended for four major goals to be achieved. These are to maintain soil productivity, to ensure sustainable productivity, to prevent degradation of the environment and to reduce expenditure on the cost of chemical fertilizers. (Sharma *et al.* 2004).

Nutrient balance is the key component to increase crop yields. Excess and imbalanced use of nutrients has caused nutrient mining from the soil, deteriorated crop productivity and ultimately soil health. Replenishment of these nutrients through organic and combination with organic and inorganic has a direct impact on soil health and crop productivity. By keeping in view all the factors related to soil fertility and productivity fertilizers are applied to soil to maintain soil status and crop productivity. Mungbean is highly responsive to fertilizer application. The dose of fertilizer depends on the initial soil fertility status

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and moisture availability conditions. (Saravanan *et al.* 2013).

MATERIALS AND METHODS

The experiment was conducted during *Kharif* season 2014-15 on crop research farm of department of Soil Science, Allahabad School of Agriculture, Allahabad. The area is situated on the south of Allahabad on the right side of the river Yamuna on the South of Rewa road at a distance of about 6 Km from Allahabad city. It is situated at $25^0 24' 23''$ N latitude, $81^0 50' 38''$ E longitude and at the altitude of 98 meter above the mean sea level.

The treatment consisted of nine combination of organic and inorganic source of fertilizers T_0 (L_0 F_0 & R_0) Control, T_1 **(**$N_0P_0K_0$ + FYM @ 5 t ha^{-1} and *Rhizobium* @ 200 g/10 kg seed**)**, T_2 **(**$N_0P_0K_0$ + FYM @ 10 t ha^{-1} and *Rhizobium* @ 200 g/10 kg seed**)**, T_3 **(**$N_{10}P_{20}K_{20}$ kg ha^{-1} + FYM_0 and *Rhizobium* @ 200 g/10 kg seed**)**, T_4 **(**$N_{10}P_{20}K_{20}$ Kg ha^{-1} + FYM @ 5 t ha^{-1} and *Rhizobium* @ 200 g/10 kg seed**)**, T_5 **(**$N_{10}P_{20}K_{20}$ kg ha^{-1} + FYM @ 10 t ha^{-1} and *Rhizobium* @ 200 g/10 kg seed**)**, T_6 **(**$N_{20}P_{40}K_{40}$ kg ha^{-1} + FYM_0 and *Rhizobium* @ 200 g/10 kg seed**)**, T_7**(**$N_{20}P_{40}K_{40}$ kg ha^{-1} + FYM @ 5 t ha^{-1} and *Rhizobium* @ 200 g/10 kg seed**)**, T_8 **(**$N_{20}P_{40}K_{40}$ kg ha^{-1} + FYM @ 10 t ha^{-1} and *Rhizobium* @ 200 g/10 kg seed**)**. The trial was laid out in a randomized block design with three replication; plot size was 2 x 2 m for crop seed rate is 15-20 kg ha^{-1} (*Vigna radiata* L.) Cv. T- 44. Green gram was sown on 30th July 2014 and the source of nitrogen, phosphorus and potassium were Urea, SSP, MOP, respectively. Basal dose of fertilizer was applied in respective plots according to treatment allocation unifurrows opened by about 5 cm. The seeds were then treated with *Rhizobium* (@ 200 g *Rhizobium*/10 kg seed). The inoculated seeds were dried under shade and sown immediately after drying. All the agronomic practices were carried out uniformly to raise the crop. The crop was harvested on 10th October. During the course of experiment, green gram plant data were taken at 30, 45 and 60 days after sowing (DAS).

RESULTS AND DISCUSSIONS

The results given in Table-1 indicate some of the important parameters *viz.* plant height (cm), number of leaves $plant^{-1}$ and number of branches $plant^{-1}$ of green gram crop. The maximum Plant height (cm), Number of leaves $plant^{-1}$ and number of branches $plant^{-1}$ was recorded 50.66 cm., 33.00, 4.66, respectively at 60 DAS in the treatment T_8 that was significantly higher as compared to other treatments. Plant height (cm), Num,ber of leaves $plant^{-1}$ and number of branches $plant^{-1}$ of green gram crop was increased significantly and progressively with the increasing level of NPK, FYM and *Rhizobium* at 60 DAS.

The results given in Table-1 indicate data on number of clusters $plant^{-1}$, number of pods $plant^{-1}$ and total seed yield q ha^{-1} of green gram crop. The maximum number of clusters $plant^{-1}$, number of pods $plant^{-1}$ and total seed yield q ha^{-1} was recorded 9.33, 37.33 and 12.10 respectively at in the treatment T_8 that was significantly higher as compared to other treatment combination. Number of clusters $plant^{-1}$, number of pods $plant^{-1}$ and total seed yield q ha^{-1} of green gram crop was increased significantly and progressively with the increasing level of NPK, FYM and *Rhizobium* was found to be significant.

CONCLUSION

It was concluded from trial that the various level of NPK, FYM and *Rhizobium* seed inoculation used from different sources in the experiment, the treatment $N_{20}P_{40}K_{40}$ Kg ha^{-1}, FYM @ 10 t ha^{-1}, and *Rhizobium* @ 200 g/10 kg seed was found to be the best, in increasing plant height $plant^{-1}$ 50.66 cm, number of leaves $plant^{-1}$ 33.00, number of branches $plant^{-1}$ 4.66, number of clusters $plant^{-1}$ 9.33, number of pods $plant^{-1}$ 37.33 and total seed yield 12.10 q ha^{-1}.

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TABLE 1: Effect of different levels of NPK, FYM and *Rhizobium* on Growth and Yield of Green Gram (*Vigna radiata* L.) Cv. T- 44

Treatment combination	Plant Height (cm)	No. of Leaves of $Plant^{-1}$	No.Branches $plant^{-1}$	No. of Clusters $plant^{-1}$	No. of Pods $plant^{-1}$	Seed Yield (q ha^{-1})
T_0 ($L_0F_0R_0$)	45.33	27.00	2.00	3.89	11.67	8.68
T_1 ($L_0F_1R_1$)	46.00	28.00	2.33	4.55	14.89	9.15
T_2 ($L_0F_2R_1$)	46.66	28.00	2.33	5.00	16.22	9.62
T_3 ($L_1F_0R_1$)	45.66	28.00	3.00	6.00	19.55	9.95
T_4 ($L_1F_1R_1$)	47.66	29.00	3.55	7.11	23.33	10.38
T_5 ($L_1F_2R_1$)	48.00	29.00	3.66	7.33	24.22	10.72
T_6 ($L_2F_0R_1$)	48.66	31.00	3.77	7.55	27.77	11.13
T_7 ($L_2F_1R_1$)	49.66	32.00	4.33	8.66	31.78	11.60
T_8 ($L_2F_2R_1$)	50.66	33.00	4.66	9.33	37.33	12.10
S. Em ±	0.000001	0.27	0.07	0.19	0.80	0.04
C. D. at 5%	0.000002	0.58	0.15	0.40	1.69	0.08

REFERENCES

Achakzai, A. K. K., Shah, B. H. and Wahi, M. A. (2012). Effect of nitrogen fertilizer on the growth of mung bean [*Vigna radiata* (L.) Wilczek] grown in Quetta. *Pak. J. Bot*., **44:** 981-987.

Ali, A., Akhtar, J. and Yaseen, M. (2010). Effects of Phosphorus in combination with Rhizobium inoculation on growth and yield parameters of mung bean. *Crop Environ*, **1:** 53-56.

Azadi, E., Rafiee, M. and Hadis, N. (2013). The effect of different nitrogen levels on seed yield and morphological characteristic of mung bean in the climate condition of Khorramabad. *Annals of Biological Research*, **4:**51-55.

Hussain, A., Ali, A. and Ijaz, N. R. (2012). Effect of phosphorus with and without rhizobium inoculation on nitrogen and phosphorus concentration and uptake by mungbean (*Vigna radiata* L.). *J. Agric. Res*., **50**.

Hussain, F., Baloch, S. K., Sanaullah, Y. Y. and Bashir, W. (2014). Growth and yield response of Mongbean (*Vigna radiata* L.) to Different Levels of Potassium. Persian Gulf Crop Protection, **3:** 49-53.

Koushal, S. and Singh, P. (2011). Effect of integrated use of fertilizer, FYM and biofertilizer on growth and yield performance on soyabean (*Glycine Max* (L) Merill). *Research Journal of Agricultural Science*, **43**.

Malik, M. A., Saleem, M. F., Ali, A. and Mahmood, I. (2003). Effect of nitrogen and phosphorus application on growth yield and quality of mung bean (*Vigna radiata* L.). *Pak. J. Agri. Sci*., **40**.

Mondal, M. M. A., Chowdhury, S., Mollah, M.L.R. and Reza, M.H. (2010). Effect of biofertilizer and urea on growth and yield of mung bean. *J. Agrofor. Environ*. **4:** 101-104.

Kumar, R. (2014a). Crop technology demonstration: an effective communication approach for dissemination of wheat production technology. *Agricultural Science Digest* **34:**131-134.

Kumar, R. (2014b). Assessment of technology gap and productivity gain through Crop technology demonstration in chickpea. *Indian J. Agric. Res*.., **48:** 162-164.

Kumar, R. (2013). Evaluation of Crop technology demonstration of mustard crop in transitional plain of Inland Drainage Zone of Rajasthan. *International Journal of Agricultural and Statistical Sciences* **9:**657-660.

Rathod, S. L. and Gawande, M. B. (2012). Response of Green gram Varieties to Different Fertilizer Grades. *International Journal of Science and Research* (IJSR), ISSN (Online): 2319-7064, Impact Factor (2012): 3.358.

Saravanan, P., Singh, S. K. and Kumar, I. (2013). Effect of organic manures and chemical fertilizers on the yield and macronutrient concentrations of green gram. International Journal of Pharmaceutical Science Invention ISSN (Online): 2319 – 6718, ISSN (Print): 2319 – 670X.

Sharma, K. L., Srinivas, K., Mandal, U. K., Vittal, K. P. R., Grace, K. J. and Maruthi, S. G. R. (2004). Integrated nutrient management strategies for sorghum and green gram in semi-arid Tropical Alfisol. *Indian J. Dry land Agric. Res. & Dev*. **19:** 13-23.