International Journal of Agricultural Sciences ☞ DOI:10.15740/HAS/IJAS/17-AAEBSSD/150-154
Volume 17 | AAEBSSD | 2021 | 150-154 ■ ISSN : 0973-130X Visit us : www.researchjournal.co.in

RESEARCH PAPER

Effect of nutrient management on growth attributes, yield and quality of summer green gram (*Vigna radiata* L.)

V. R. Patil, J. B. Patil*, M.J. Patil[1] **and** V. B. Gedam
Department of Agronomy, RCSM College of Agriculture, Kolhapur (M.S.) India
(Email: patiljb1976@gmail.com)

Abstract : An present field experiment was carried out to assess the effect of nutrient management on summer green gram (*Vigna radiata* L.) during summer 2020 at Agronomy Research Farm, RCSM College of Agriculture, Kolhapur (MH), India. The soil of experimental field was sandy clay loam textural class, slightly alkaline in reaction (pH 7.43), having electrical conductivity 0.22 dS m^{-1}, bulk density 1.34 mg m^{-3} and low organic carbon content (0.39%), low in available nitrogen (238.29 kg ha^{-1}), high in available phosphorus (30.61 kg ha^{-1}) and medium in available potassium (251.29 kg ha^{-1}). The field experiment was laid out in Randomized Block Design (RBD) having eight treatments and three replications.A 30 cm x10cm spacing and Phule Vaibhav variety was used for seed sowing.The result showed that growth attributes at harvest *viz.*, plant height (66.40 cm), numbers of branches $plant^{-1}$ (8.20), number of functional leaves $plant^{-1}$ (29.80), leaf area $plant^{-1}$ (7.39 dm^2) and dry matter accumulation $plant^{-1}$ (31.70 g) were observed maximum with application of 100% RDF + Vermicompost 2.5 t ha^{-1} along with biofertilizers seed treatment as compared to other treatment. Also grain yield (15.70 q ha^{-1}), stover yield (33.97 q ha^{-1}), biological yield (49.67q ha^{-1}) and quality attribute like proteincontent and protein yield were recorded more with the integrated application of 100% RDF + Vermicompost 2.5 t ha^{-1} along with biofertilizers seed treatment as compare to other treatments. However, lowest values of growth attributes, yield and protein content were recorded in un manured condition (Control plot).

Key Words : Green gram, Vermicompost, Growth attributes, Yield, Protein

View Point Article : Patil, V.R., Patil, J.B., Patil, M.J. and Gedam, V.B. (2021). Effect of nutrient management on growth attributes, yield and quality of summer green gram (*Vigna radiata* L.). *Internat. J. agric. Sci.*, **17** (AAEBSSD) : 150-154, **DOI:10.15740/HAS/IJAS/17-AAEBSSD/150-154.**

Article History : Received : 16.07.2021; **Revised :** 19.07.2021; **Accepted :** 24.07.2021

INTRODUCTION

Pulses are one of the important food crops globally due to higher protein content.Pulses are the edible seeds of plants in the legume family.Summer pulses are very important for improving soil health, providing additional income to farmers and crop diversification in northern states of India. Growing crops like summer green gram can certainly lead to increase in house-hold income of farmers and help in combating malnutrition and sustaining agricultural production.

Green gram or mung bean (*Vigna radiata* L.) is one of the most ancient and extensively grown leguminous crops of India. It is primarily rainy season crop but with development of early maturing varieties, it has also proved to be an ideal crop for spring and summer seasons. Pulses as a candidate crop, contributes

*** Author for correspondence :**
[1]RCSM College of Agriculture, Kolhapur (M.S.) India

immensely towards doubling farmers' income through diminishing cost of production, scaling per unit productivity, efficient marketing networks and successful technology delivery mechanisms by giving emphasis sustainable intensification and crop diversification, climate resilient production technologies backed with strong research outputs in pulses can contribute towards doubling the farmers' income (Singh, 2018).The humble mung bean is a powerhouse of nutrition. It is valued for the protein enriched seed as an important dietary ingredient to overcome protein malnutrition of human beings. India is the highest producer as well asconsumer of pulses in the world. Pulses play a vital role in Indian Agriculture. Green gram is a protein rich staple food. It contains about 25 per cent protein, which is almost three times that of cereals.

Integrated use of inorganic sources of nutrient with organic sources of nutrient helps to not only in maintaining higher productivity but also in providing greater stability in crop production. Application of organic amendments may increase supply of macro and micronutrients to plants and could mobilize unavailable nutrients to available forms and as a cumulative effect, nutrient uptake is higher than synthetic fertilizers (Sharma *et al*. 2008). In spite of being widely adapted crop in India, its productivity is very low. Maximum productivity of crop could be achieved with the maximum use of agrochemicals. The impressive gains in food production achieved due to green revolution but due to intensive use of agro-chemicals soil health is being affected. There is now tremendous scope on growers to use integrated nutrient management approach to increase productivity and sustain soil health. Organic amendment offers an alternative or supplementing control tactic to increase production (Meena, 2015).

Organic sources of nutrients like vermicompost are extensively used in various crops. These organic additives can be used to promote the development of beneficial organisms in the soil. Several workers used organic sources of additives to enhance the growth, yield and quality of crops (Meena, 2013; Mujahid and Gupta, 2010).

Keeping all these views in front, a field experiment entitled "Effect of nutrient management on summer green gram", was planned and conducted at the Post Graduate Research Farm, Agronomy Section of Rajarshee Chhatrapati Shahu Maharaj College of Agriculture, Kolhapur (M.S.), India, during summer, 2020.

MATERIAL AND METHODS

The field experiment was conducted during summer season of 2020 at Agronomy Research Farm, Agronomy Section, RCSM College of Agriculture, Kolhapur (MH).Agro-climatically Kolhapur comes under Sub Mountain Zone of Maharashtra and geographically it is situated on an elevation of 548 meters above the mean sea level on 16^0 42' North latitude and 74^0 14' East longitude.The soil of the experimental field was sandy clay loam in texture, slightly alkaline in reaction (pH 7.43), having electrical conductivity 0.22dS m^{-1} and organic carbon content was (0.39%), low in available nitrogen (238.29 kg ha^{-1}), high in available phosphorus (30.61 kg ha^{-1}) and medium in available potassium (251.29 kg ha^{-1}). The field experiment was laid out in Randomized Block Design, consisting eight treatments which was replicated three times. The different nutrient management treatments included in the field experimental study were T_1-Control (un manured), T_2-100% RDF (20:40:00 NPK kg ha^{-1}), T_3-100% RDF + Vermicompost 2.5 t ha-1, T_4-100% RDF + Vermicompost 2.5 t ha^{-1} + Biofertilizer (ST), T_5-75% RDF (15:30:00 NPK kg ha^{-1}), T_6-75% RDF + Vermicompost 2.5 t ha^{-1} , T_7-75% RDF + Vermicompost 2.5 t ha^{-1} + Biofertilizer (ST), T_8-Vermicompost 5 t ha^{-1}+ Biofertilizer (ST). Experimental green gram crop Phule Vaibhav variety sowed at the space of 30 x 10 cm by using 16 kg ha^{-1} seed rate.The periodical observations of crop growth attributes and yield were recorded after seed emergence w. e. f. 30 DAS on 15 days interval up to harvest and at harvest *viz*., plant stand, plant height (cm), numbers of branches $plant^{-1}$, number of functional leaves $plant^{-1}$, leaf area $plant^{-1}$ (dm^2), dry matter accumulation $plant^{-1}$(g), grain yield (q ha^{-1}), stover yield (q ha^{-1}), biological yield (q ha^{-1}) and harvest index (%). The protein content in grain of different treatments was also worked out.The experimental data was statistically analyzed by using a standard method of "analysis of variance" as reported by Panse and Sukhatme (1967).

RESULTS AND DISCUSSION

The results obtained from the present investigation as well as relevant discussion have been summarized under following heads :

Growth attributes:

The data furnished in Table 1 clearly shows that growth parameters at harvest *viz.*, plant height (66.40

cm),numbers of branches plant^{-1} (8.20),number of functional leaves plant^{-1}(29.80), leaf area plant^{-1} (7.39 dm^2) and dry matter accumulation plant^{-1} (31.70 g) were significantly more with the integrated application of 100% RDF + Vermicompost 2.5 t ha^{-1} as well as seed treatment with biofertilizer and which was remained on par with application of T_7-75% RDF + Vermicompost 2.5 t ha^{-1} + Biofertilizer (ST),T_3-100% RDF + Vermicompost 2.5 t ha^{-1}, T_6-75% RDF + Vermicompost 2.5 t ha^{-1} and significantly superior over T_2-100% RDF (20:40:00 NPK kg ha^{-1}),T_8-Vermicompost 5 t ha^{-1}+ Biofertilizer (ST).,T_5-75% RDF (15:30:00 NPK kg ha^{-1}) and T_1-Control (unmanured). However treatment T_1(control) was found significantly inferior over the all treatments. Combined application of organic and inorganic source of fertilizer which creates potential source of balanced nutrition resulted in enhanced growth of summer green gram crop. Similar findings on growth parameters were recorded by Pandey *et al*. (2019), Kumar and Yadav (2018) and Kale (2017). The integrated application of RDF, Vermicompost and biofertilizer increased growth of green gram (Kale, 2017).

Yield:

The different nutrient management treatments greatly influenced the yield of summer green gram. The data furnished in Table 2 indicates that grain yield (15.70 q ha^{-1}), stover yield (33.97 q ha^{-1}), biological yield (49.67q ha^{-1}), were significantly more with the integrated application of 100% RDF + Vermicompost 2.5 t ha^{-1} as well as seed treatment with biofertilizer and which was remained on par with application of T_7-75% RDF +

Table 1: Effect of nutrient management treatments on growth attributes of summer green gram

Treatments	Growth attributes				
	Plant height (cm)	Number of branches plant^{-1}	Number of leaves plant^{-1}	Leaf area (dm^2)	Dry matter production plant^{-1} (g)
T_1 - Control (un manured)	52.47	6.40	20.13	3.63	23.39
T_2 - 100% RDF (20:40:00 NPK kg ha^{-1})	60.69	7.20	25.27	5.45	28.08
T_3 - 100% RDF + Vermicompost 2.5 t ha^{-1}	64.69	7.73	27.73	6.72	30.10
T_4 - 100% RDF + Vermicompost 2.5 t ha^{-1} + Biofertilizer (ST)	66.40	8.20	29.80	7.39	31.70
T_5 -75% RDF (15:30:00 NPK kg ha^{-1})	58.90	6.93	23.93	4.96	27.12
T_6 -75% RDF + Vermicompost 2.5 t ha^{-1}	63.75	7.60	26.47	6.32	29.24
T_7 -75% RDF + Vermicompost 2.5 t ha^{-1} + Biofertilizer (ST)	65.88	8.00	28.87	6.95	30.92
T_8 - Vermicompost 5 t ha^{-1} + Biofertilizer (ST)	59.68	7.13	24.67	5.14	27.71
S. Em±	1.87	0.31	1.14	0.35	1.14
C. D. at 5%	5.68	0.96	3.47	1.07	3.46
General mean	61.55	7.40	25.85	5.82	28.53

Table 2 : Effect of nutrient management treatments on yield and quality of summer green gram

Treatments	Grain yield (q ha^{-1})	Stover yield (q ha^{-1})	Biological yield (q ha^{-1})	Harvest index (%)	Protein content (%)	Protein yield (kg ha^{-1})
T_1 - Control (un manured)	8.73	24.67	33.40	26.14	20.90	182.89
T_2 - 100% RDF (20:40:00 NPK kg ha^{-1})	13.06	29.43	42.49	30.80	21.44	279.33
T_3 - 100% RDF + Vermicompost 2.5 t ha^{-1}	14.76	32.66	47.41	31.12	22.01	325.40
T_4 - 100% RDF + Vermicompost 2.5 t ha^{-1} + Biofertilizer (ST)	15.70	33.97	49.67	31.61	22.77	357.74
T_5 -75% RDF (15:30:00 NPK kg ha^{-1})	11.95	28.09	40.04	29.88	21.20	253.39
T_6 -75% RDF + Vermicompost 2.5 t ha^{-1}	13.89	31.48	45.37	30.60	21.73	301.47
T_7 -75% RDF + Vermicompost 2.5 t ha^{-1} + Biofertilizer (ST)	15.20	33.24	48.44	31.46	22.44	340.59
T_8 - Vermicompost 5 t ha^{-1} + Biofertilizer (ST)	12.71	28.52	41.24	30.82	21.15	269.76
S. Em±	0.77	1.47	1.49	1.89	0.38	17.83
C. D. at 5%	2.35	4.49	4.54	NS	1.17	17.09
General mean	13.25	30.25	43.50	30.30	21.70	288.82

Vermicompost 2.5 t ha^{-1} + Biofertilizer (ST),T_3-100% RDF + Vermicompost 2.5 t ha^{-1}, T_6-75% RDF + Vermicompost 2.5 t ha^{-1} and significantly superior over T_2-100% RDF (20:40:00 NPK kg ha^{-1}),T_8-Vermicompost 5 t ha^{-1}+ Biofertilizer (ST).,T_5-75% RDF (15:30:00 NPK kg ha^{-1}) and T_1-Control (unmanured). However, lowest yield recorded in control plot (T_1). Due to integrated and balanced dose of nutrients from organic and inorganic source, maximum grain yield, stover yield and biological yield were recorded. Similar results were observed by Singh *et al.* (2019), Pandey*et al*., (2019) and Tyagi and Singh (2019) . Higher availability of both macro and micro nutrient improved root growth which leads to adequate amount of absorption from deeper layer of soil which resulted in highest yield of crop.

Quality attributes (Protein content and protein yield):

The data tabulated in Table 2 clearly shows thatprotein content in grain reached the level of significance under different nutrient management treatments. The maximum protein content (22.77%) was observed in plot fertilized with 100% RDF + Vermicompost 2.5 t ha^{-1} + Biofertilizer (T_4) and it was found significantly superior over T_2, T_8, T_5 and T_1 treatments except treatment T_7 [75% RDF+ Vermicompost 2.5 t ha^{-1} + Biofertilizer (ST)], T_3 (100% RDF + Vermicompost 2.5 t ha^{-1}) and T_6 (75% RDF + Vermicompost 2.5 t ha^{-1}), these were found numerically on par with it. However, lowest protein content (20.90%) was observed in unmanured plot (T_1). It might be due to higher absorption of nutrient by crop leading to higher nitrogen content of green gram grainswhich decides protein content of grain. Dhakal *et al.*(2016) found similar results on protein content. Also the maximum protein yield (357.74 kg ha^{-1}) was observed in plot fertilized with 100% RDF + Vermicompost 2.5 t ha^{-1} + Biofertilizer (T_4) due to higher protein content as well as grain yield and it was found significantly superior over T_6, T_2, T_8, T_5 and T_1 treatments except treatment T_7 [75% RDF + Vermicompost 2.5 t ha^{-1} + Biofertilizer (ST)] and T_3 (100% RDF + Vermicompost 2.5 t ha^{-1}), these were found numerically on par with it. However, lowest protein yield was observed in control treatment (T_1) due to lower nutrient availability, absorption and lower yield.

Conclusion:

Based on above results of the experiment it may be concluded that for obtaining better growth, yield and quality of plant, application of 75% RDF + Vermicompost @ 2.5 t ha^{-1} along with seed treatments of biofertilizers is the best nutrient application treatment.

Aknowledgement:

The authors are thankful to Agronomy Section, RCSM College of Agriculture, Kolhapur – 416004, Maharashtra, India for providing necessary facilities to undertake the field experiment.

REFERENCES

Dhakal, Y., Meena, R. S. and Kumar, S. (2016). Effect of INM on nodulation, yield, quality and available nutrient status in soil after harvest of green gram. *Legume Research*, **39** (4) : 590-594.

Kale, P. B. (2017). Integrated nutrient management in kharif green gram (*Vigna radiata* L.). M.Sc. Ag. Thesis, College of Agriculture Pune, Mahatma Phule KrishiVidyapeeth Rahuri, Maharashtra.

Kumar, S. and Yadav, S. (2018). Effect of phosphorus fertilization and bio-organics on growth, yield and nutrient content of mungbean (*Vigna radiata* (L.)Wilczek)]. *Research Journal of Agricultural Sciences*,**9** (6) : 1252-1257.

Meena, R. S. (2013). Response to different nutrient sources on green gram (*Vigna radiata* L.) productivity. *Indian Journal of Ecology,* **40** : 353-355.

Meena, R. S., Dhakal, Y., Bohra,J. S., Singh,S. P., Singh,M. K., Sanodiya, P. and Meena, H. (2015). Influence of bioinorganic combinations on yield, quality and economics of mung bean. *American Journal of Experimental Agriculture*, **8** (3): 159-166.

Mujahid, A. M. and Gupta, A. J. (2010). Effect of plant spacing, organic manures and inorganic fertilizers and their combinations on growth, yield and quality of lettuce (*Lactuca sativa*). *Indian Journal of Agricultural Sciences*, **80**: 177–81.

Pandey, O. P., Shahi, S. K., Dubey, A. N. and Maurya, S. K. (2019). Effect of integrated nutrient management of growth and yield attributes of green gram (*Vigna radiata* L.). *Journal of Pharmacognosy and Phytochemistry*, **8** (3): 2347-2352.

Panse, V. G. and Sukhamate, P. V. (1967). *Statistical methods for agricultural workers,* ICAR, New Delhi, India, 361pp.

Sharma, A., Parmar, D.K, Kumar, P., Singh Y. and Sharma R.P. (2008). Azotobacter soil amendment integrated with cow manure reduces need for NPK fertilizers in sprouting broccoli. *International Journal of Vegetable Science*, **14**: 273-285.

Singh, N. P. (2018). Pulses as a candidate crops for doubling

farmers income. *Indian Farming*, **68** (01) : 36–43.

Singh, P. K., Anees, M., Kumar, M., Yadav, K. G., Kumar, A., Kumar, M., Sharma, R., Singh, R.B. and Shiv Kumar (2019). Effect of integrated nutrient management on growth, yield and quality of moongbean (*Vigna radiata* L.). *Journal of Pharmacognosy and Phytochemistry,* SP **2**: 1003-1006.

Tyagi, P.K. and Singh, V.K. (2019). Effect of integrated nutrient management on growth, yield and nutrients uptake of summer black gram (*Vigna mungo*). *Annals of Plant and Soil Research.,* **21**(1): 30 – 35.