www.sabujeema.com

SABUJEEMA

An International Multidisciplinary e-Magazine

Volume 1| Issue 4 | July, 2021

INFLUENCE OF INM ON NUTRIENT UPTAKE AND YIELD OF GREEN GRAM IN COASTAL REGION OF TAMILNADU [Vigna radiata (L.) Wilczek]

- R. KamaleshwaranP. Anandan & R. Kannan

"Read More, Grow More"

Sabujeema Sabujeema

editorsabujeema@gmail.com

sabujeema-international multidisciplinary-e-magazine

Volume 1 - Issue 4 – July, 2021
SABUJEEMA
An International Multidisciplinary e-Magazine

INFLUENCE OF INM ON NUTRIENT UPTAKE AND YIELD OF GREEN GRAM IN COASTAL REGION OF TAMILNADU

[Vigna radiata (L.) Wilczek]

[Article ID: SIMM0101]

R. Kamaleshwaran
Department of soil science and agricultural chemistry, Annamalai University, Chidambaram

P. Anandan
Department of Agronomy, Annamalai University, Chidambaram

R. Kannan
Department of Plant Pathology, Annamalai University, Chidambaram.

ABSTRACT

A field experiment was carried out at kharif season of 2020 at farmer's field at Maanampaadi village, near Chidambaram using variety VBN 3 to study the influence of integrated nutrient management practices on greengram [Vigna radiata (L.) Wilczek]. Three sources of nutrients viz. inorganic, organic and bio-fertilizers were used in twelve combinations with randomized block design. Among different treatments, significant improvement in number of pods plant-1 (21.01), number of seeds per pod-1 (10.91), seed yield (9.26 q ha-1) and straw yield (22.14 q ha-1), nutrient content (55.58, 17.91, and 47.75 kg ha-1) NPK kg/ha respectively and available NPK (201.03 kg ha-1, 31.76 kg ha-1 and 219.63 kg ha-1) respectively after harvest in soil were recorded with application of nutrients through T10 – RDF @ 75% + Rhizobium + PSB + Castor cake(500kg/ha) + FYM 12 t ha-1 as compared to other combinations and control, but it was at par with T12 – RDF @ 100% + FYM 12 t ha-1.

INTRODUCTION

The Indian agricultural scenario has become a depletion of nutrients in soil, land and water resources becomes contaminated. To overcome the agriculture farm lands proper fertilization methods based on available nutrients and management should followed for needs of food for such a large population, India needs to produce large quantities of food grain, fodder and fuel. Green gram [Vigna radiata (L.) Wilczek] alternatively known as the mung bean is a plant species belonging to the leguminosae family which is native to the Indian subcontinent. In India, it is grown on an area of 2.75 m ha with average production 1.19 mt and productivity is 432 kg ha-1 (Purushottam and Singh, 2015). The southern region of India also has tremendous potential for increasing pulse production and productivity due to its favourable climatic conditions. Mung bean has an edge over other pulses because of its high nutritive value. It contains about 25% protein which is almost three times that of cereals. The composition of mungbean split (per 100 g) is as follows: protein 21-24 g, fat 1.31 g, minerals 3.48 g, fiber 4.11 g, carbohydrates 56.72 g, energy 334 kcal, calcium 124 mg, phosphorous 326 mg and iron 4.42 mg (Gopalan et al., 2002; Dhakal et al., 2015). It also contains high quality of lysine (4600 mg/g N) and

tryptophan (60 mg/g N) and consumed as whole grain or as well as in the form of dal for table purposes. Greengram is supposed to be easily digestible, hence, is preferred by patients. The sprouted seeds of greengram are rich in ascorbic acid (vitamin C), riboflavin and thiamine (Choudhary et al., 2003). In addition to being an important source of human food and animal feed, an important feature of the mung bean crop is its ability to establish a symbiotic relationship with specific bacteria, setting up the biological nitrogen fixation in root nodules that supply the plant needs for nitrogen. The green biomass of the crop as well as residues can be incorporated in the soil for the purpose of replenishing exported plant nutrients and improving fertility status of the soil. The associated chemical changes in the soil can restrict the availability of essential plant nutrients specially; macro nutrients are i.e., nitrogen, phosphorus and potassium. In spite of being widely adapted crop in India, its productivity is very low. Crop productivity could be achieved with the help of agrochemicals. The green revolution brought impressive gains in food production but due to intensive use of Agro-chemicals soil biodiversity is being affected. There is now tremendous pressure on growers to use integrated nutrient management approach to increase productivity and sustain soil health. organic additives can be used to promote the development of beneficial organisms in the soil. Several workers used organic additives to enhance the growth, yield and quality of crops (Meena, 2013; Mujahid and Gupta 2010). Organic amendments also increase the efficiency of bio-fertilizers. Such bio-fertilizers are cheaper, eco-friendly and based on renewable energy sources has gained momentum in recent years to supplement the parts of chemical fertilizers (Meena et al., 2015). The rhizosphere is inhabited by actively growing microbial population that immensely affects the root and plant metabolic activities. Use of soil amendments and application of farm yard manure and green manure reduces the effects of salt stress.

Improper use of inorganic fertilizer depletes the soil fertility and productivity besides the depletion of nutritional quality of pulses (Bairwa et al., 2009). Thus, the integration of inorganic fertilizer and organic manures resulted in better growth, yield and nutrient uptake (Kumpawat, 2010). Being a leguminous crop, greengram has ability to fix atmospheric nitrogen in soil but it is adversely affected in salt affected soils. Therefore, application of bio-fertilizer is needed to ensure nodulation and nitrogen fixation. Hence, the present investigation was carried out to find out appropriate integrated nutrient management option for greengram productivity and to find out available NPK and nutrient content in soil after harvest of greengram in coastal regions of Tamilnadu.

MATERIALS AND METHODS

An attempt was made to study the response of greengram to integrated nutrient management. Field experiment was conducted during kharif season of 2020 at farmer's field at Maanampaadi village, near Chidambaram using variety VBN 3. The experimental site is geographically located at 11º24' N latitude, 79º44' E longitudes and altitude of 5.79 M above mean sea level (MSL). The experimental soil was sandy in texture and taxonomically classified as Typic Usticpsamments with pH-8.37, EC-1.58 dS m-1 and represented low status of organic carbon (2.31 g kg-1), KMnO4 –N (134.56 kg

ha-1), low in Olsen-P (9.43 kg ha-1) and medium in NH4OAc-K (159.31kg ha-1). The various treatments included were different doses of RDF combination with , T1–Control , T2– RDF @ 50% alone, T3– RDF @ 75% alone, T4– RDF @ 100% alone, T5 – RDF @ 50% + Rhizobium + PSB + Castor cake(500kg/ha), T6 – RDF @ 50% + FYM 12 t ha-1 , T7 – RDF @ 50% + Rhizobium + PSB + Castor cake(500kg/ha) + FYM 12 t ha-1 , T8 – RDF @ 75% + Rhizobium + PSB + Castor cake(500kg/ha), T9 – RDF @ 75% + FYM 12 t ha-1, T10 – RDF @ 75% + Rhizobium + PSB + Castor cake(500kg/ha) + FYM 12 t ha-1, T11 – RDF @ 100% + Rhizobium + PSB + Castor cake(500kg/ha), T12 – RDF @ 100% + FYM 12 t ha-1 . The experiment was carried out in a Randomized Block Design (RBD) with three replications. Recommended dose of fertilizers 20: 40: 20 kg /ha (N2: P2O5: K2O) were applied as per treatments as basal dose at the time of sowing in furrows at 30 cm apart in at the depth of 10 cm. As per the treatment castor cake were applied as basal and fertilizers were applied in the form of di-ammonium phosphate (DAP), Urea and muriate of potash (MOP) and incorporated manually in the furrow before sowing.

Before sowing, the seeds were inoculated with Rhizobium and PSB each @20 g/ kg of seed and shade dried as per the treatment. All other agronomic practices were carried out as per TNAU crop production guide. After harvest, the plant and soil samples were collected for analysis. As per the treatment castor cake were applied as basal and fertilizers were applied in the form of di-ammonium phosphate (DAP), Urea and muriate of potash (MOP) and incorporated manually in the furrow before sowing. The collected data for various parameters were analysed using AGRESS software

RESULTS AND DISCUSSION

Yield and yield attributes

The results given in table 1 showed that yield and yield attributes of greengram were significantly influenced by different integrated nutrient management practices (INM). Among the treatments, application of T10 – RDF @ 75% + Rhizobium + PSB + Castor cake(500kg/ha) + FYM 12 t ha-1 increased the number of pods plant-1 (21.01), number of seeds per pod-1 (10.91), seed yield (9.26 q ha-1) and straw yield (22.14 q ha-1) of greengram in coastal saline soil which was on par with T12 – RDF @ 100% + FYM 12 t ha-1. It is due to availability of nutrients to plant increased with enhanced early root growth and cell multiplication leads to maximum absorption of nutrients and ultimately results in increased yield and yield attributes. Maximum absorption and translocation of nutrients resulted in higher stover yield. Similar results were also reported by Yadav et al. (2007) and Yubaraj Dhakal et al. (2016).

Table 1: Effect of INM on yield and yield attributes of greengram

Treatments	No. of. pods plant^{-1}	No. of seeds pod^{-1}	Seed yield (q ha^{-1})	Straw yield (q ha^{-1})
T_1–Control	7.64	3.62	2.52	8.54
T_2– RDF @ 50% alone	9.14	4.13	3.38	10.16
T_3– RDF @ 75% alone	10.63	4.68	4.20	11.68
T_4– RDF @ 100% alone	12.05	5.23	4.99	13.16
T_5 – RDF @ 50% + Rh + PSB + CC (500kg/ha)	13.44	5.75	5.75	14.58
T_6 – RDF @ 50% + FYM 12 t ha^{-1}	14.83	6.57	6.47	15.95
T_7 – RDF @ 50% + Rh + PSB + C C(500kg/ha) + FYM 12 t ha^{-1}	16.20	7.56	7.11	17.29
T_8 – RDF @ 75% + Rh + PSB + C C(500kg/ha)	17.51	8.53	7.72	18.58
T_9 – RDF @ 75% + FYM 12 t ha^{-1}	18.72	9.45	8.26	19.82
T_{10} – RDF @ 75% + Rh + PSB + C C(500kg/ha) + FYM 12 t ha^{-1}	21.01	10.91	9.26	22.14
T_{11} – RDF @ 100% + Rh + PSB + C C(500kg/ha)	19.89	10.23	8.78	20.99
T_{12} – RDF @ 100% + FYM 12 t ha^{-1}	20.49	10.81	9.11	21.62
S.Ed (±)	0.67	0.19	0.18	0.75
CD (P = 0.05)	1.04	0.51	0.42	1.07

RDF: Recommended dose of fertilizer, FYM: Farm Yard Manure, Rh: Rhizobium, PSB: Phosphorus solublizing Bacteria

Nutrient uptake and nutrient status

Among all the combinations, the maximum uptake of N, P and K (Table 2) by greengram (55.58, 17.91, and 47.75 kg ha-1 respectively) was recorded with T10 – RDF @ 75% + Rhizobium + PSB + Castor cake(500kg/ha) + FYM 12 t ha-1, which was significantly on par with T12 – RDF @ 100% + FYM 12 t ha-1. Addition of organics and inorganics leads to the maximum absorption and translocation of nutrients, and resulted that higher uptake of nutrients by greengram. Combined application of inorganics, organics and bio-fertilizer increased the nutrient uptake by plant (Ipsita Das and Singh, 2014). The higher removal of nutrients might be due to better development of root and shoot (Karnavat Rekha et al., 2018). Similar findings were reported by Gorade et al. (2014) and Bhavya et al. (2018).

The results given in table 2 revealed that the treatment of T10 – RDF @ 75% + Rhizobium + PSB + Castor cake(500kg/ha) + FYM 12 t ha-1 increased nitrogen (201.03 kg ha-1), phosphorus (31.76 kg ha-1) and potassium (219.63 kg ha-1) content in coastal saline soil recorded after harvest of the greengram but it was found to be at par with the T12 – RDF @ 100% + FYM 12 t ha-1. Hence it is clear that application of inorganics, organics and bio-fertilizers increased the soil nutrient status after harvest of the crop by mineralisation of nutrients from manure during decomposition and also fixation and solubilisation of N and P by the bio-fertilizers. FYM with or without chemical fertilizer increased the soil NPK in clay loam and sandy loam soil (Manivannan et al., 2009). Application of farm yard manure along with zinc improved the chemical properties of soil (Parshottam Sinha et al., 2017). Similar studies were reported by Tyagi et al. (2014).

Table 2: Effect of INM on nutrient uptake and available nutrients in soil after harvest of greengram

Treatments	Nutrient uptake (kg ha^{-1})			Available nutrients in soil (kg ha^{-1})		
	N	P	K	N	P	K
T_1–Control	47.80	9.55	35.21	180.59	19.18	200.30
T_2– RDF @ 50% alone	48.01	10.66	37.44	187.89	21.10	208.70
T_3– RDF @ 75% alone	49.80	11.59	38.41	190.16	22.73	210.10
T_4– RDF @ 100% alone	50.57	11.91	40.67	191.33	24.00	212.53
T_5– RDF @ 50% + Rh + PSB + CC (500kg/ha)	51.48	12.88	42.64	192.02	25.15	213.13
T_6– RDF @ 50% + FYM 12 t ha^{-1}	51.02	12.15	42.93	192.93	25.92	213.89
T_7– RDF @ 50% + Rh + PSB + C C(500kg/ha) + FYM 12 t ha^{-1}	52.0 7	13.12	43.07	193.94	26.47	214.18
T_8– RDF @ 75% + Rh + PSB + C C(500kg/ha)	52.32	14.05	44.54	194.13	27.26	215.08
T_9– RDF @ 75% + FYM 12 t ha^{-1}	52.82	14.93	44.50	194.84	27.98	215.93
T_{10}– RDF @ 75% + Rh + PSB + C C(500kg/ha) + FYM 12 t ha^{-1}	55.58	17.91	47.75	201.03	31.76	219.63
T_{11}– RDF @ 100% + Rh + PSB + C C(500kg/ha)	53.17	15.89	45.73	197.24	29.17	216.43
T_{12}– RDF @ 100% + FYM 12 t ha^{-1}	55.13	17.83	47.66	200.21	31.24	218.62
S.Ed (±)	0.47	0.13	0.10	2.65	0.59	2.91
CD (P = 0.05)	2.65	0.79	2.12	10.1	1.51	10.76

RDF: Recommended dose of fertilizer, FYM: Farm Yard Manure, Rh: Rhizobium, PSB: Phosphorus solublizing Bacteria.

CONCLUSION

From this study, it is concluded that the integration of T10 – RDF @ 75% + Rhizobium + PSB + Castor cake(500kg/ha) + FYM 12 t ha-1 gives higher yield in greengram and also increasing the nutrient availability in coastal saline soils of cuddalore district.

REFERENCES

Bairwa HL, Mahawer LN, Shukla AK, Kaushik RA, Mathur Sudha R. Response of integrated nutrient management on growth, yield and quality of okra (Abelmoschus esculentus). Indian Journal of Agricultural Sciences. 2009; 79(5):38-40.

Bhavya G, Chandra Shaker K, Jayasree G, Malla Reddy M, Nutrient uptake and yield of green gram (Vigna radiata L.) as influenced by phosphorus fertilization, organic manures and biofertilizers. International Journal of chemical studies. 2018; 6(3):32-35.

Chaudhary, R. P., Sharma, S. K. and Dahama, A. K. (2003). Yield components of mungbean [Vigna radiata (L.) wilczek] as influenced by phosphorus and thiourea. Ann. Agri. Res. 24: 203-204. Ecol. 40:353-355.

Gopalan, C., Rama Sastri, B.V. and BAlasubramanian, S.C. (2002). Nutritive Value of Indian Foods, National Institute of Nutrition, Hyderabad, India. pp 76-82.

Gorade VN, Chavan LS, Jagtap DN, Kolekar AB. Response of green gram (Vigna radiata L.) varieties to integrated nutrient management in summer season. Agricultural Science Digest. 2014; 34(1):36-40.

Ipsita D, Sing AP. Effect of PGPR and organic manures on soil properties of organically cultivated mungbean. The Bioscan. 2014; 9(1):27-29.

Karnavat Rekha, Pavaya RP, Malav JK, Neha Chaudhary, Patel IM, Patel JK. Effect of FYM, phosphorus and PSB on yield, nutrient content and uptake by green gram (Vigna radiata L.) on loamy sand. International Journal of Chemical Studies. 2018; 6(2):1026-1029.

Kumpawat BS. Integrated nutrient management in blackgram (Vigna mungo) and its residual effect on succeeding mustard (Brassica juncea) crop. Indian Journal of Agricultural Sciences. 2010; 80(1):76-79.

Manivannan S, Balamurugan M, Parthasarathi K, Gunasekaran G, Ranganathan LS. Effect of vermicompost on soil fertility and crop productivity - beans (Phaseolus vulgaris). Journal of Environmental Biology. 2009; 30(2):275-281.

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

Meena, R. S., Dhakal, Y., Bohra, J. S., Singh, S. P., Singh, M. K. and Sanodiya, P. (2015). Influence of Bioinorganic combinations on yield, quality and economics of Mungbean. Amer. J. Exper. Agric. 8:159-166.

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 J. Agrl .Sc. 80: 177–81.