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International Journal of Current Research
Vol. 7, Issue, 12, pp.23575-23577, December, 2015

INTERNATIONAL JOURNAL OF CURRENT RESEARCH

ISSN: 0975-833X

RESEARCH ARTICLE

EFFECT OF INTEGRATED NUTRIENT MANAGEMENT ON YIELD COMPONENTS, YIELD AND NUTRIENT UPTAKE OF GREEN GRAM

***Kandasamy, S.**

Associate Professor, Department of Agronomy, Annamalai University, Annamalainagar

ARTICLE INFO

Article History:
Received 14th September, 2015
Received in revised form
20th October, 2015
Accepted 25th November, 2015
Published online 30th December, 2015

Key words:

Vermicompost, sugarcane trash compost, rhizobium , phosphobacteria, green gram.

ABSTRACT

Field investigations was carried out at the experimental farm, Department of Agronomy, Annamalai University, Annamalai Nagar to study the effect of integrated nutrient management in greengram (Vignaradiata L). During 2014 (February to April) experiment was laid out in randomized block design with three replications. There were altogether eight treatments viz., T1-control, T2-RDF@ 25kgN, 50 kg P2O5, 25 kg K2O and 10 kg S ha-1, T3-RDF+FYM 5t ha-1, T4-RDF+Vermicompost 3t ha-1, T5-RDF+composted sugarcane trash5t ha-1,T6-RDF+FYM5t ha-1+Rhizobium +Phosphobacteria, T7-RDF+vermicompost 3t ha-1 + Rhizobium +Phosphobacteria and T8-RDF+composted sugarcane trash 5t ha-1+Rhizobium +Phosphobacteria. The combined application of organic and inorganic fertilizers significantly influenced the growth and yield components of greengram. Among the treatments, soil application of RDF+vermicompost 3t ha-1 + Rhizobium +Phosphobacteria (T7) had favourably increased the yield components such pods per plant, number of seeds per pod and test weight and seed yield (1280 kgha-1). The same treatment also recorded the highest uptake of NPK during the cropping period. The control T1 recorded the lowest seed yield of 450 kgha-1.

***Citation*: Kandasamy, S., 2015.** "Effect of integrated nutrient management on yield components, yield and nutrient uptake of green gram", *International Journal of Current Research*, 7, (12), 23575-23577.

INTRODUCTION

Pulses are important food crop due to their high protein and aminoacid content. Pulses are used as food and animal feed. Many exporting countries are dependent on India for marketing their pulses. Even though India is the world largest producer, importer and consumer of pulses still there is a gap of 2.4 million tonnes between the production and consumption of pulses in the country which is met through imports. Green gram ranking third among all pulses in the country and contributes to 10 per cent of the national pulse production from the area of 13 per cent. The current level is well below the requirement because both the production and area under this crop had decreased by 15 per cent during the last decade. The decrease in the production is mainly due to lack of nutrients during the critical stages of crop growth, proper balanced nutrient management practices with organic and inorganic manures offers better scope to increase the production potential and productivity of green gram (Shweta *et al*. 2010).

****Corresponding author:*** **Kandasamy, S.**
Associate Professor, Department of Agronomy, Annamalai University, Annamalainagar

Bio-fertlizers being the essential components of organic farming play a vital role in maintaining long term soil fertility and sustainability by fixing atmospheric N, mobilising fixed macro and micro nutrients or converting insoluble P in the soil into available form to plants thereby increase their efficiency and availability to the plants and increase the yield (Dhavabarathi 2005). Keeping these points in view the present investigation was carried out to develop specific management practices such as application of organics like FYM, vermicompost, composted sugarcane trash alongwith the recommended dose of fertilizer for green gram to enhance the yield and productivity.

MATERIALS AND METHODS

Field investigations was carried out at the experimental farm, Department of Agronomy, Annamalai University, Annamalai Nagar during 2014 (February to April) to study the effect of integrated nutrient management in greengram (Vignaradiata L). The soil of the experimental field is clay loam in texture with low in available nitrogen, medium in available phosphorus, high in available potassium. There were altogether eight treatments viz., T1-control, T2-RDF@ 25kgN, 50 kg P2O5, 25 kg K2O and 10 kg S ha-1, T3-

Table 1. Effect of integrated nutrient management on yield components, yield and nutrient uptake of green gram

Treatments	Numer of pods plant^{-1}	Number of seeds pod^{-1}	100 seed weight g	Seed yield kgha^{-1}	Haulm yield kgha^{-1}	Nutrient uptake kg ha^{-1}		
						N	P	K
T_1-control	12.6	6.3	3.53	450	1243	39.87	11.02	47.82
T_2-RDF@ 25kgN, 50 kg P_2O_5, 25 kg K_2O and 10 kg S ha^{-1}	21.6	9.4	3.78	600	1569	42.29	11.53	51.14
T_3-RDF+FYM 5t ha^{-1}	23.0	9.9	3.92	698	1717	43.69	12.03	52.43
T_4RDF+Vermicompost 3t ha^{-1}	24.5	10.7	4.05	1080	2649	46.38	12.96	54.95
T_5-RDF+composted sugarcane trash5t ha^{-1}	23.8	10.3	3.99	790	1975	43.05	12.51	53.7
T_6-RDF+FYM5t ha^{-1}+Rhizobium +Phosphobacteria	25.0	11.1	4.01	840	2034	47.68	13.38	56.16
T_7-RDF+vermicompost 3t ha^{-1} + Rhizobium +Phosphobacteria	26.0	11.8	4.31	1280	3044	50.23	14.15	58.50
T_8- RDF+composted sugarcane trash 5t ha^{-1}+Rhizobium +Phosphobacteria	25.6	11.5	4.26	930	2217	48.96	13.78	57.35
S.Ed	0.21	0.26	0.02	19.22	25.40	0.63	0.18	0.56
CD(P=0.05)	0.45	0.57	0.04	41.33	54.61	1.26	0.36	1.12

RDF+FYM 5t ha-1, T4-RDF+Vermicompost 3t ha-1, T5-RDF+composted sugarcane trash5t ha-1,T6-RDF+FYM5t ha-1+Rhizobium +Phosphobacteria, T7-RDF+vermicompost 3t ha-1 + Rhizobium +Phosphobacteria and T8- RDF+composted sugarcane trash 5t ha-1+Rhizobium +Phosphobacteria. The trial was laid out in a randomized block design with three replication plot size was 5 x 4 m for crop seed rate is 25 kg ha-1(ADT3 green gram). N, P, and K were applied in the form of urea, single super phosphate and muriate of potash at 25:50:0 NPK ha-1respectively was followed as RDF. Organic manures viz. FYM, sugarcane trash compost and vermicompost were applied as per treatment schedule at the time of land preparation. All the agronomic practices were carried out uniformly to raise the crop.

RESULTS AND DISCUSSION

Application of RDF - vermicompost @ 3t + rhizobium + phosphobacteria (T_7) recorded higher values on Number of pods plant^{-1}(26), Number of seeds pod^{-1} (11.86), Test weight (4.31 gm) and seed yield 1280 kg ha-1. The treatment T4 was next in order. The constant release of N from organic manure, particularly from vermicompost supplemented with NPK fertilizer might have satisfied the demand of green gram crop. Increased uptake of nutrients by green gram was due to increased availability of nutrients from both NPK fertilizer and vermicompost might have enhanced the metabolic activity of the plants and increased photosynthetic efficiency as evident from optimum LAI values and increase uptake of nutrients resulting in increased values on yield components and increased seed yield. The similar result was reported by Kazem Taleshi *et al.,* (2011). The least components were recorded under (control) might be due to reduced supply of nutrients which in turn affecting the growth and yield components of crop, reflecting on the yield.

Among the integrated nutrient management practices, application of RDF + vermicompost @ 3 t ha-1 + rhizobium + phosphobacteria (T_7) recorded, maximum nutrient uptake during the growing period. Enhanced nutrient uptake in this treatment could be attributed to increased dehydrogenase activity and microbial biomass-N by vermicompost, correlating positively with the increased availability NH4¬-N, NO3- Nand orthophosphates (Arancon *et al,* 2006).

It also might have the activity of native microbial population resulting in enhanced macro, secondary and micro nutrients. In addition, constantavailabilityof most essential nutrients viz., manganese and sulphur might havecontributed to better uptake of nutrients by green gram. The least uptake of nutrientswas observed under control due to restricted supply of nutrients supplied to the crop.

Conclusion

Based on the above findings, application of RDF - vermicompost @ 3t + rhizobium + phosphobacteria (T_7) to green gram registered the maximum values of yield attributes and yield of green gram without affecting the soil fertility and thereby sustaining the crop production.

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