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RESEARCH ARTICLE

STUDIES ON THE EFFECT OF INTEGRATED NUTRIENT MANAGEMENT IN IRRIGATED GREEN GRAM

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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., T_1-control, T_2-RDF@ 25kgN, 50 kg P_2O_5, 25 kg K_2O and 10 kg S ha^{-1}, T_3-RDF+FYM 5t ha^{-1}, T_4-RDF+Vermicompost 3t ha_{-1}, T_5-RDF+composted sugarcane trash5t ha^{-1},T_6-RDF+FYM5t ha^{-1}+Rhizobium +Phosphobacteria, T_7-RDF+vermicompost 3t ha^{-1} + Rhizobium +Phosphobacteria and T_8- 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 (T_7) had favourably increased the growth components such plant height, number of branches per plant LAI, DMP and seed yield (1280 $kgha^{-1}$). The control T_1 recorded the lowest seed yield of 450 $kgha^{-1}$.

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INTRODUCTION

Pulses are important food crops due to their high protein content and essential amino acid content. Protein malnutrition has created disorder in developing countries including India. The per capita availability of pulses in India is decreasing from 60.7g in 1951 to 35.9g in 2011 as against 60.0g recommended by Indian Council of Medical Research (Agrl.Stat.2012). The current level of production is well below the requirement and future projected demand for 2017 and 2022 also mounting high to 14.3 and 16.3 mt respectively to meet the specified per capita requirement (Praduman *et al*. 2009). The green gram occupies a unique place among the pulses in Tamil Nadu for use as seed and vegetable. In Tamil Nadu area under pulses around 6.6 lakh hectares with a production of 3.69 lakh tonnes and average productivity is 588.47$kgha^{-1}$ (GOTN 2012). The low yield in pulses is attributed to several reasons viz., cultivated as rainfed crop, as intercrops in marginal lands and poor management practices. In addition to that lack of nutrients during the critical stages of crop growth leads to nutritional stress and then poor productivity of crop. Proper nutrient management is an important factor to be considered for sustaining pulse productivity. Fertilizers play a vital role in maintaining soil fertility as source of readily available nutrients to plants.

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In the context of both cost and environment impact of chemical fertilizers, excessive reliance on the chemical fertilizers is not a viable strategy in the long run. Organic manure viz., FYM, sugarcane trash compost, vermicompost and biofertilizers along with recommended chemical fertilizers could be a viable option for the farmers to increase the productivity for unit area in greengram.

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., T_1-control, T_2-RDF@ 25kgN, 50 kg P_2O_5, 25 kg K_2O and 10 kg S ha^{-1}, T_3-RDF+FYM 5t ha^{-1}, T_4-RDF+Vermicompost 3t ha^{-1}, T_5-RDF+composted sugarcane trash5t ha^{-1},T_6-RDF+FYM5t ha^{-1}+Rhizobium +Phosphobacteria, T_7-RDF+vermicompost 3t ha^{-1} + Rhizobium +Phosphobacteria and T_8- 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

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Treatments	Plant height at harvest (CM)	LAI at flowering 45 DAS	DMP at harvest kgha^{-1}	Number of nodules plant^{-1}	Number of branches plant^{-1}	Seed yield kgha^{-1}	Haulm yield Kg ha^{-1}
T_1-control	36.0	1.38	1843	11.71	3.1	450	1243
T_2-RDF@ 25kgN, 50 kg P_2O_5, 25 kg K_2O and 10 kg S ha^{-1}	36.3	1.62	2329	13.66	3.8	600	1569
T_3-RDF+FYM 5t ha^{-1}	38.1	1.63	2565	14.59	4.2	698	1717
T_4RDF+Vermicompost 3t ha^{-1}	39.8	1.81	3889	16.39	5.0	1080	2649
T_5-RDF+composted sugarcane trash5t ha^{-1}	38.8	1.69	2925	15.50	4.6	790	1975
T_6-RDF+FYM5t ha^{-1}+Rhizobium +Phosphobacteria	41.6	1.82	3034	17.26	5.4	840	2034
T_7-RDF+vermicompost 3t ha^{-1} + Rhizobium +Phosphobacteria	45.0	2.05	4498	18.89	6.1	1280	3044
T_8- RDF+composted sugarcane trash 5t ha^{-1}+Rhizobium +Phosphobacteria	43.3	1.96	3312	18.09	5.7	930	2217
S.Ed	1.03	0.12	30.98	0.16	0.16	19.22	25.40
CD(P=0.05)	2.21	0.27	66.62	0.36	0.32	41.33	54.61

urea, single super phosphate and muriate of potash at 25:50:0 NPK ha^{-1}respectively 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

Among the integrated nutrient management practices, application of RDF - vermicompost @ 3t + rhizobium + phosphobacteria (T_7) exhibited an accelerated effect on the growth attributes viz., plant height (45cm) at harvest LAI 2.05 at 45 DAS, DMP of 4498 kg ha-1at harvest, Number of branches of 6.1and seed yield of 1820 kg ha-1. This might be due to better performance of INM treatments contributed to the availability of nutrients from vermicompost along with inorganic fertilizer. It is reflected on increased growth attributes (Blaise and Prasad, 2005). Favourable effect of vermicompost on plant height could be attributed to sustained availability of major and micronutrients with different growth hormones gibberellins, NAA and cytokinin resulting in increased plant height. The least plant height was recorded under T_1 (control). This was also confirmed by Ramprakash*et al*. (2001).Higher LAI could be attributed to increase of metabolic activity in plant by vermicompost with RDF which could have promotedmeristamatic activities causing apical growth (Yadav *et al*, 2013). The increased leaf area due to sustained and enhanced availability of nutrients from combined source of organic (vermicompost) and inorganic fertilizer till the maturity that would have enhanced better dry matter production. This was supported by the findings of Tejeswara Rao *et al* (2013). Vermicompost soil application might have provided optimum availability of both manganese and sulphur for green gram at critical stages of crop (flowering and maturity), which in turn might have resulted in vigorous root and shoot initiation reflecting upon enhanced crop growth and establishment in terms of plant height, LAI and DMP 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.

Conclusion

Cognizing the several parameters in unison, application of RDF - vermicompost @ 3t + rhizobium + phosphobacteria (T_7) to green gram registered the maximum values of growth attributes and yield of green gram without affecting the soil fertility and thereby sustaining the crop production..

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