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Effect of integrated nutrient management oneconomics of yardlong bean (*Vigna unguiculata* (L.) walp. ssp. *Sesquipedalis* verdc.)

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Abstract

The present investigation was carried out during *Rabi* season of 2018-19 to evaluate the effect of various sources of nutrients including organic, inorganic and biofertilizers on economics of yardlong bean (*Vigna unguiculata* ssp. *sesquipedalis*) cv. ArkaMangala. The results revealed that the application of 75% RDN through inorganic+25% RDN through vermicompost + biofertilizers (*Rhizobium* + PSB) fetched maximum net returns (Rs. 2,14,097.50 ha⁻¹) and BCR (4.01).

Keywords: Yardlong bean, RDN, *Rhizobium*, phosphate solubilizing bacteria, vermicompost

Introduction

Yardlong bean (*Vigna unguiculata* ssp. *Sesquipedalis* (L.) verdc.) is a distinct form of cowpea and it belongs to the family leguminosae, chromosome number 2n=22 and originated from Central Africa. It is cultivated mainly for its crisp and tender green pods which are consumed both fresh as well as in cooked form. Yard long bean belongs to sub family – Papilionaceae it is viny, indeterminate in growth habit, leaves are trifoliate and green in color. Flowers are of papilionaceous type with violet color. Pods are long, slender and pendent with sparsely arranged bold seeds. Considering the nutritive value, 100 g of green pods of yard long bean contain energy (34.00 Kcal), protein (4.20 mg), calcium (110.00 mg), iron (4.70 mg), vitamin A^{''} (2.40 mg), vitamin „C^{''} (35.00 mg) and is also good source of lysine (Anon; 2006) [1].

Yard long bean highly responsive to fertilizer application. The dose of fertilizer depends on the initial soil fertility status and moisture conditions. Although yard long bean being a legume is capable of fixing atmospheric nitrogen, it responds to small quantity of nitrogenous fertilizers applied as starter dose. Application of 20-30 kg N/ha has been found optimum to get better response. In terms of significance, phosphorus is most indispensable mineral nutrient for better root growth and development and thereby making them more efficient in biological nitrogen fixation (BNF). Use of biofertilizers can have a greater importance in increasing fertilizer use efficiency. Indian soils are characterized poor to medium status with respect to nitrogen and available phosphorus. The use of organic manures (vermicompost FYM, neemcake) will help in improving the efficiency of inorganic fertilizers. The present investigation was undertaken with a view to study the effect of integrated nutrient management on growth and yield of yardlong bean.

Materials and Methods

The experiment entitled studies on integrated nutrient management in yardlong bean was carried out at College of Horticulture, Venkataramannagudem, Andhra Pradesh during 2018-19. Geographically it is situated between 16.83° N latitude and 81.5° E longitude at an altitude of 34 m above the mean sea level. The climate of Venkataramannagudem is characterized by three distinct season hot and dry summer from March to May, warm humid and rainy monsoon from June to October and mid cold winter from November to February. The soil was loamy sand in texture with good water holding capacity. The soil pH (6.98), EC was (0.26 dsm⁻¹), organic carbon (0.34%), available nitrogen (140.0 kg/ ha), available phosphorus (41.0 kg P₂O₅/ ha) and potassium (175.0 kg K₂O/ha) content. The experiment was arranged in a randomized complete block design and replicated three times. Treatments included T₁-75% RDN through inorganic+25% RDN through vermicompost+ biofertilizers; T₂-75% RDN through inorganic+25% RDN through FYM +biofertilizers; T₃-75% RDN through inorganic+25% RDN through neemcake+biofertilizers; T₄-50% RDN through inorganic+50% RDN through vermicompost+biofertilizers; T₅-50% RDN through inorganic+50% RDN

through FYM +biofertilizers; T₆-50% RDN through inorganic +50% RDN through neemcake+biofertilizers; T₇-25% RDN through inorganic+75% RDN through vermicompost+biofertilizers; T₈- 25% RDN through inorganic+75% RDN through FYM +biofertilizers; T₉- 25% RDN through inorganic+75% RDN through neemcake+biofertilizers; T₁₀- 100% RDN through inorganic+vermicompost; T₁₁- 100% RDN through inorganic+ FYM; T₁₂-100% RDN through inorganic+neemcake; T₁₃-100% RDN through inorganic+biofertilizers; T₁₄-100% RDN (50:75:60 kg/ha); T₁₅-control (no fertilizer).Seeds of yardlong bean, var.ArkaMangala, were sown on 3 October 2018 on ridges measuring 8.5m × 1.50 m at the spacing of 1 m × 75 cm and irrigated timely according to the need of crop. To keep the crop free from insect pest four spraying were given. Observations on growth parameters were recorded at the time of harvest. The analysis of variance was carried out using the randomized complete block design (Panse and Sukhatme 1967) [2].

Results and Discussion

Economics

The data pertaining to economics (cost of cultivation, gross income, net income and BC ratio) of yardlong bean was calculated for all the treatments and presented in table.1. From the table, it is clear that, the cost of cultivation was highest (Rs 71,645/ha) in T₁₀ (100% RDN through inorganic +vermicompost) which is due to application of inorganic fertilizers along with vermicompost resulting in increased

costs. Cost of cultivation was minimum (Rs 69,995/ha) in T₁₅ (control). It is also evident from the table that, estimated gross returns are found to be maximum (Rs 2,85,200/ha) in T₁ (75% RDN through inorganic+25% RDN through vermicompost+ biofertilizers) due to highest yield recorded in that treatment and minimum gross returns (Rs 1,95,800/ha) was obtained in T₁₅ (control) due to lowest yield recorded. Similar trend was obtained for net returns also which was maximum (Rs2,14,097.50/ha) in T₁ (75% RDN through inorganic+25% RDN through vermicompost+biofertilizers) and minimum (Rs 1,25,805.00/ha) in T₁₅ (control).

Benefit cost ratio calculated for all the treatments revealed that, T₁ (75%RDN through inorganic+25% RDN through vermicompost+biofertilizers) showed highest BC ratio (4.01), which is due to highest yield and maximum returns obtained per hectare. In contrast, lowest BC ratio (2.79) was obtained for T₁₅ (control) due to lowest yield and minimum returns obtained per hectare. Hence, it can be concluded that, application of 75% RDN through inorganic+25% RDN through vermicompost+biofertilizers resulted that maximum yield, gross returns, net returns and B:C ratio, it is due to considerable reduction in the cost of inorganic fertilizers coupled with high yields. Further, 25 percent of recommended inorganic nitrogenous fertilizers can be saved with the addition of biofertilizers and organic manures without reduction in yields. These findings are in accordance with work done by Prabhavathi (2014) [3] in cluster bean, Ujjainiya and Choudhary (2015) [4] in Indian bean.

Table 1 Effect of Integrated Nutrient Management practices on economics of yardlong bean var. ArkaMangala

Treatments (t/ha) (Rs/ha)	Pod yield cultivation	Gross income (Rs/ha)	Cost of ratio	Net returns	Cost benefit
T1:75% RDN through in organic+25% RDN through vermicompost+biofertilizers	14.262,85,200	71,182.50	2,14,097.50	1:4.01	
T2:75% RDN through in Organic+25% RDN through FYM +biofertilizers	13.52	2,70,400	71,102.50	1,99,297.50	1:3.79
T3:75% RDN through in Organic+25% RDN through Neemcake+biofertilizers	13.20	2,64,000	71,102.50	1,92,897.50	1:3.71
T4:50 % RDN through in Organic+50% RDN through Vermicompost+biofertilizers	11.81	2,36,200	71,170.00	1,65,190.00	1:3.32
T5:50% RDN through in Organic+50% RDN through FYM+ biofertilizers	11.63	2,32,600	71,010.00	1,61,430.00	1:3.27
T6:50% RDN through in Organic+50% RDN through Neemcake+biofertilizers	11.55	2,31,600	71,010.00	1,60,590.00	1:3.26
T7:25% RDN through in Organic+75% RDN through Vermicompost+biofertilizers	11.21	2,24,200	71,157.50	1,53,282.50	1:3.16
T8:25% RDN through in Organic+75% RDN through FYM +biofertilizers	10.52	2,10,400	70,917.50	1,39,242.50	1:2.95
T9:25% RDN through in Organic+75% RDN through Neemcake+biofertilizers	10.14	2,02,800	70,917.50	1,31,882.50	1:2.85
T10:100% RDN through in Organic+vermicompost	12.56	2,51,200	71,645.00	1,79,875.00	1:3.52
T11:100% RDN through in Organic+FYM	12.29	2,45,800	71,325.00	1,74,475.00	1:3.44
T12:100% RDN through in Organic+neemcake	12.25	2,45,000	71,325.00	1,73,355.00	1:3.41
T13:100% RDN through in Organic+biofertilizers	12.00	2,40,000	71,195.00	1,69,155.00	1:3.38
T14:100% RDN (50:75:60kg/ha)	11.90	2,38,000	70,845.00	1,66,805.00	1:3.34
T15:control	9.79	1,95,800	69,995.00	1,25,805.00	1:2.79

Conclusion

It can be concluded that application of 75% RDN through inorganic+25% RDN through vermicompost + biofertilizers (Rhizobium+PSB) resulted that maximum yield, gross returns, net returns and B:C ratio in yardlong bean.

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