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Effect of integrated nutrient management on quality and economics of dolichos bean (*Lablab purpureus* L.) under southern Telangana conditions

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Abstract
A field investigation entitled "Studies on effect of integrated nutrient management on quality and economics of dolichos bean (*Lablab purpureus* L.) Cv. Konkan Bhushan under Southern Telangana Conditions" was conducted during rabi season from December 2021 to March 2022 at College of Horticulture, Rajendranagar, Sri Konda Laxman Telangana State Horticultural University. The experiment was laid out in Randomized Block Design with 11 treatments. The results indicated that, among different integrated nutrient management treatments, T5 treatment (75% RDF + 12.5% FYM + 12.5% Vermicompost + *Rhizobium* (50 g per kg seed) + PSB (20 g per kg seed)) recorded significantly maximum protein percentage, lower crude fibre content (24.53 %, 10.32 % respectively) and highest benefit cost ratio (3.55) proved superior over other treatments.

Keywords: Integrated nutrient management, dolichos bean, vermicompost, *Rhizobium*, PSB

Introduction
Dolichos bean (*Lablab purpureus* L.) is an important vegetable crop commonly known as Field bean, Hyacinth bean, Garden bean, Lablab bean, Egyptian bean, Bonavist bean and Sem (Raghu *et al*., 2018) [7]. It belongs to the family leguminaceae, is believed to have originated in India and its diploid chromosome number is 2n=2X=22, 24. It is commonly used for pulse, vegetable and fodder. It is generally grown for pods as edible vegetable and dry seeds as pulse. The fresh pods and green seeds are eaten on boiled, are used to prepare curries, ripe seeds are also used as pulse, often as soup "dhal" (Sultana, 2001) [9] and mature seeds are occasionally sun-dried and stored are used as vegetable. The foliage of the crop also used as silage and green manure (Ramprakash, 2020) [8]. This crop fixes atmospheric nitrogen in a symbiotic relationship with *Rhizobium* bacteria in the soil (Karla, 2009) [3]. It plays a big dietary role for supplying proteins, carbohydrates, essential elements and vitamins to both rural and urban people.

To boost the yield of any vegetable crop, nutrient management plays an important role. Both, organic and inorganic sources and also biofertilizers are being used to increase the yield. Application of chemical fertilizers could lead to residues in grains, fruits and vegetables and the problem is more acute as the toxic substances gain entry in human system directly. FYM and Vermicompost provide nutrients to the plants with beneficial effects on physiochemical and biological properties of soil. FYM contains 0.5% N, 0.2% P2O5 and 0 .5 % K2O, Whereas Vermicompost contains 1.60 % N, 2.20% P2O5 and 0.67% K2O. Biofertilizers are culture of microbials which benefit the plant by providing nitrogen or phosphorus to bring about rapid multiplication of organic materials. Nutrient requirement of vegetables in general is high due to short duration of the crops, and thus cannot be supplied by biofertilizers alone. Therefore, it is necessary to explore the possibility of supplementing chemical fertilizers with biofertilizers for sustainable vegetable production.

However, in the current state of Indian agriculture, organic farming cannot be considered as comprehensive alternative for chemical fertilisers and pesticides due to the scarcity of organic manures and the existing imbalance between demand and supply of vegetables. Organic fertilisers should only be used as a complement to chemical fertilisers, not as a full substitute. As a result, the current period needs a plan for careful mixing of both. It will be economically feasible, as well as aiding in the attainment of production sustainability and the maintenance of soil health and an environmentally friendly environment.

Therefore, this research was investigated to find out the response of country bean to organic and inorganic fertilization and to identify the possible fertilizer treatment which enhances production. Keeping the above facts and importance of the work in view, the present investigation has been taken with the following objectives.

Material and methods

A field investigation entitled "Studies on effect of integrated nutrient management on quality and economics of dolichos bean (*Lablab purpureus* L.) Cv. Konkan Bhushan under Southern Telangana Conditions" was carried out during the rabi season from December 2021 to March 2022 at College of Horticulture, Rajendranagar, Sri Konda Laxman Telangana State Horticultural University.

The experiment was laid out in Randomized Block Design with 11 treatments viz., T1 - 75% RDF + 25% FYM + *Rhizobium* (50 g per kg seed), T2 - 75% RDF + 25% FYM + *Rhizobium* (50 g per kg seed) + PSB (20 g per kg seed), T3 - 75% RDF + 25% Vermicompost + *Rhizobium* (50 g per kg seed), T4 - 75% RDF + 25% Vermicompost + *Rhizobium* (50 g per kg seed) + PSB (20 g per kg seed), T5 - 75% RDF + 12.5% FYM + 12.5% Vermicompost + *Rhizobium* (50 g per kg seed) + PSB (20 g per kg seed), T6 - 50% RDF + 50% FYM + *Rhizobium* (50 g per kg seed), T7 - 50% RDF + 50% FYM + *Rhizobium* (50 g per kg seed) + PSB (20 g per kg seed), T8 - 50% RDF + 50% Vermicompost + *Rhizobium* (50 g per kg seed), T9 - 50% RDF + 50% Vermicompost + *Rhizobium* (50 g per kg seed) + PSB (20 g per kg seed), T10 - 50% RDF + 25% FYM + 25% Vermicompost + *Rhizobium* (50 g per kg seed) + PSB (20 g per kg seed) and T11 - 100% RDF (Control). Recommended dose of Chemical fertilizer are N P K 30:60:60 kg ha-1, FYM (25 t ha-1), vermicompost (5 t ha-1) and Biofertilizers (*Rhizobium* 50 g per kg seed and PSB 20 g per kg seed). Prepare the slurry of required quantity of inoculant in sufficient water (generally 400-500 ml of water for 200 g inoculant). To prepare the slurry, boiled 50 g of jaggery in one litre of water and cool it. Pour the slurry over the seeds and mix them thoroughly with hands. Data based on the mean of the individual plants chosen for observation were statistically analyzed as defined by Panse and Sukhatme (1967) [5].

Results and discussion Protein percentage (g/100g)

The data pertaining to protein percentage as influenced by the integrated nutrient management treatments is presented in the table 1 and depicted in the fig 1.

Significant difference observed among the integrated nutrient management treatments with respect to protein percentage. Among the treatments, T5 treatment (75% RDF + 12.5% FYM + 12.5% vermicompost + *Rhizobium* + Phosphorus solubilizing bacteria [PSB]) recorded significantly maximum value (24.53 %), which might be due to an increase in the N uptake which might have proportional increase in the protein content. Since protein content is function of nitrogen accumulation, higher nitrogen content resulting in the higher protein content (Ahire *et al*. 2020) [1] in lablab bean. These results are in close conformity with the results reported by Dhangada (2015) [2] and Mhashelkar (2015) [4] in dolichos bean.

Crude fibre (%)

The data on crude fibre (%) content of dolichos bean pods is presented in the table 1 and graphically illustrated in the fig.1.

All treatments differed significantly due to crude fibre content. The lower crude fibre (10.32 %) was recorded in treatment T5 (75% RDF + 12.5% FYM + 12.5% vermicompost + *Rhizobium* + Phosphorus solubilizing bacteria [PSB]) and it was comparable with T4 (75% RDF + 25% Vermicompost + *Rhizobium* (50 g per kg seed) + PSB (20 g per kg seed)) which was due to the application of inorganic fertilizers with integration of little amount of organic fertilizers (FYM + Vermicompost), biofertilizers resulted in lower crude fibre content than inorganic sources. Application of organic form of nitrogen in combination with inorganic form reduced the crude fibre content.

Preetham *et al*., (2019) [6] also stated that easy availability of nitrogen leading to balanced C:N ratio, enhancing the vegetative growth resulting in high photosynthesis activity in dolichos bean.

Economics

B:C ratio

The data pertaining to benefit cost ratio as influenced by the integrated nutrient management treatments is presented in the table 2.

Among the various treatments tested, the nutrient combination of 75% RDF + 12.5% FYM + 12.5% vermicompost + *Rhizobium* + Phosphorus solubilizing bacteria [PSB] (T5) was found superior in terms of net returns (₹ 1,83,800 ha-1) and benefit cost ratio (3.55), which was due to the same treatment recorded higher pod yield per hectare over other treatments.

Table 1: Effect of integrated nutrient management on quality parameters

Treatments	Protein content (%)	Crude fibre (%)
T1: 75% RDF + 25% FYM + *Rhizobium* (50 g per kg seed)	21.60	10.71
T2: 75% RDF + 25% FYM + *Rhizobium* (50 g per kg seed) + PSB (20 g per kg seed)	22.33	10.65
T3: 75% RDF + 25% Vermicompost + *Rhizobium* (50 g per kg seed)	23.13	10.48
T4: 75% RDF + 25% Vermicompost + *Rhizobium* (50 g per kg seed) + PSB (20 g per kg seed)	23.60	10.38
T5: 75% RDF + 12.5% FYM + 12.5% Vermicompost + *Rhizobium* (50 g per kg seed) + PSB (20 g per kg seed)	24.53	10.32
T6: 50% RDF + 50% FYM + *Rhizobium* (50 g per kg seed)	19.20	11.13
T7: 50% RDF + 50% FYM + *Rhizobium* (50 g per kg seed) + PSB (20 g per kg seed)	20.10	11.01
T8: 50% RDF + 50% Vermicompost + *Rhizobium* (50 g per kg seed)	21.10	10.79
T9: 50% RDF + 50% Vermicompost + *Rhizobium* (50 g per kg seed) + PSB (20 g per kg seed)	21.20	10.73
T10: 50% RDF + 25% FYM + 25% Vermicompost + *Rhizobium* (50 g per kg seed) + PSB (20 g per kg seed)	20.46	10.84
T11: 100% RDF (Control)	22.43	10.64
S.Em±	0.15	0.03
CD at 5%	0.44	0.09

Table 2: Effect of integrated nutrient management on economics.

Treatments	Cost of cultivation (₹)	Net returns (₹)	Benefit cost ratio
T1: 75% RDF + 25% FYM + *Rhizobium* (50 g per kg seed)	53680	146000	2.71
T2: 75% RDF + 25% FYM + *Rhizobium* (50 g per kg seed) + PSB (20 g per kg seed)	53880	146200	2.72
T3: 75% RDF + 25% Vermicompost + *Rhizobium* (50 g per kg seed)	52680	152000	2.88
T4: 75% RDF + 25% Vermicompost + *Rhizobium* (50 g per kg seed) + PSB (20 g per kg seed)	52880	176000	3.32
T5: 75% RDF + 12.5% FYM + 12.5% Vermicompost + *Rhizobium* (50 g per kg seed) + PSB (20 g per kg seed)	51630	183800	3.55
T6: 50% RDF + 50% FYM + *Rhizobium* (50 g per kg seed)	60180	76400	1.26
T7: 50% RDF + 50% FYM + *Rhizobium* (50 g per kg seed) + PSB (20 g per kg seed)	60380	90800	1.50
T8: 50% RDF + 50% Vermicompost + *Rhizobium* (50 g per kg seed)	58180	106600	1.83
T9: 50% RDF + 50% Vermicompost + *Rhizobium* (50 g per kg seed) + PSB (20 g per kg seed)	58380	137400	2.35
T10: 50% RDF + 25% FYM + 25% Vermicompost + *Rhizobium* (50 g per kg seed) + PSB (20 g per kg seed)	55880	115800	2.07
T11: 100% RDF (Control)	47000	157800	3.35

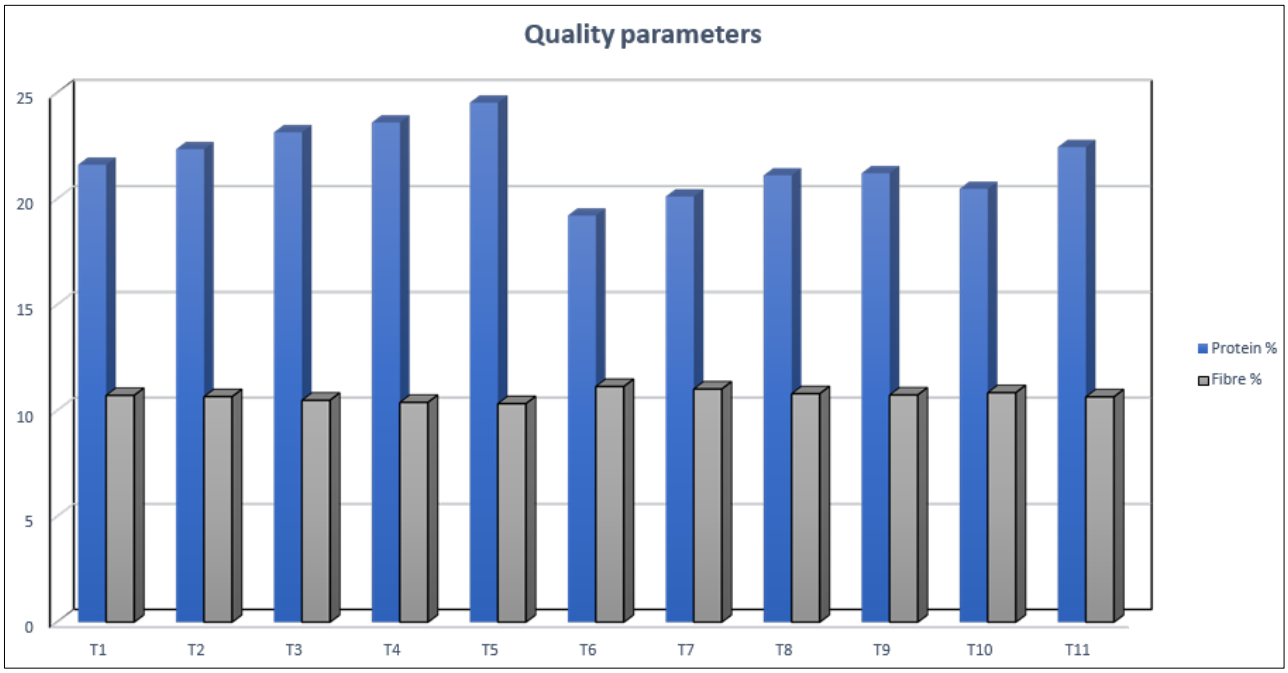

Fig 1: Effect of integrated nutrient management on quality parameters

Conclusion

It could be concluded from the present investigation that, different treatment combinations significantly influence the quality and economics of dolichos bean Cv. Konkan Bhushan. T5 treatment 75% RDF + 12.5% FYM + 12.5% vermicompost + *Rhizobium* + Phosphorus solubilizing bacteria [PSB] proved the best followed by T4 treatment 75 % RDF + 25 % Vermicompost + *Rhizobium* (50 g per kg seed) + PSB (20 g per kg seed) to improve quality and economics of dolichos bean cv. Konkan Bhushan under Southern Telangana Conditions.

Future scope

From present work it is evident that conjunctive use of organic manures and bio fertilizers with inorganic fertilizers can help in maintaining good soil health and soil fertility. However, it is felt that the future line of work may be carried out in following lines. Effect of integrated nutrient management along with micronutrients on growth, yield and quality of dolichos bean need to be conducted. Effect of integrated nutrient management along with novel growth regulators on growth, yield and quality of dolichos bean need to be conducted.

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Conflict of Interest: None.

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