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Effect of integrated nutrient management on growth, yield and quality of lablab bean (*Lablab purpureus*)

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Abstract
The field experiment was conducted at Dapoli during Rabi season 2019-2020 to study the "Effect of Integrated Nutrient Management on growth, yield and quality of Lablab bean (*Lablab purpureus*) and soil properties in Alfisols". The field experiment was laid out in randomized block design comprising of Sixteen treatments replicated thrice. In all sixteen treatments combinations consisting of different levels of organic manures alone or integration with inorganic manure with or without application of biofertilizers were tried in randomized block design. The results revealed that the application of equal integration of RDN through inorganics and organics, either through poultry manure or vermicompost with or without bio-inoculations proved It's significance in enhancing the nodulation, and quality of lablab bean crop.

Keywords: Integrated, nutrient, lablab, *Lablab purpureus*

Introduction
Lablab bean is an important leguminous vegetable of India. It occupies a unique position as vegetable among the legume crops due to its high nutritive value (Basu *et al*., 2002) [5]. They provide not only nutritious food and feed but also improve soil health and crop productivity. India is major pulse growing country in the world sharing about 25% of total production and 32% of global acreage in the world. In India pulses are grown on area of 297.77 lakh ha and production of 224.01 MT of grains with average yield of 765 kg ha^{-1} Maharashtra ranks first in acreage and production of pulses followed by Madhya Pradesh, Uttar Pradesh, Rajasthan, Orissa, Haryana, Gujrat, Karnataka, Tamil Nadu, Andhra Pradesh. In Maharashtra, pulses are grown on an area of 37.56 lakh ha and production of 25.48 lakh tonnes of grains with average yield of 679 kg ha^{-1}, while in Konkan region, total pulse area was 27.2 thousand ha; production of 16.70 lakh tonnes of grains with average yield of 537 kg ha^{-1}. Lablab bean has 227.78 '000-hectare area under cultivation with 2,276.95 '000 metric tonnes vegetable bean production and 10 metric tonnes per hectare productivity (Anonymous, 2018) [3].
Though, this crop has good demand in market, it is being cultivated in limited area due to its markedly low productivity. Low productivity of crop is attributed mainly due to inadequate nutrient management practices. Use of chemical fertilizers along with organic manures and biofertilizers may increase productivity of lablab bean, soil fertility and reduces the costs of production (Gandhi and Sivakumar, 2010) [7]. Being a nodule forming crop, it is advantageous of taking useful interaction of microorganisms in the form of consortium. Further, consortium bio fertilizer application was helpful to maintain diversity in agricultural ecosystem which are living in rhizosphere environment and are capable of improving plant nutrition and soil fertility through biological fixation of nitrogen, phosphate solubilization, and enhancement of plant growth (Akram Jafari fara *et al*., 2014) [1].
Dual inoculation of Rhizobium and VAM was suggested to minimize nitrogen and phosphorus fertilizer application for leguminous crops. Application of organic manures like farmyard manure, press mud and vermicompost proved to be a better alternative to inorganic fertilizers in enhancing growth and yield of the plant (Arora and Maini, 2011; Aleem *et al*., 2014) [4, 2]. Integrated approach of using both organic and inorganic nutrient sources along with consortium of bio fertilizers seems to be a viable alternative to achieve higher yields in lablab bean with acceptable quality. Further, integrated nutrient management system has become an accepted strategy to augment the yield and quality of vegetable crops under commercial production. Hence an experiment was conducted to study the Effect of integrated nutrient management on growth, yield and quality of lablab bean (*Lablab purpureus*) and soil properties in Alfisols.

Materials and Methods

The experiment was conducted in randomized block design with three replications during the year 2019-2020 in field of Agronomy, College of Agriculture, Dapoli, DBSKKV, Dapoli. The experiment comprised of 16 treatments *viz*., organic manures and inorganic manures at different levels as 100 per cent doses of RDN through Inorganic fertilizer and FYM, vermicompost and poultry manure (100 per cent RDN through organics) and further integration of organic and inorganic fertilizers with or without bio inoculations. Organic manures were thoroughly incorporated into the soil before 30 days of sowing. Lablab bean seeds of cultivar Dapoli-2 were sown at the spacing of 15 x 30 cm. In each replication, five plants were selected randomly for recording observations. The growth, yield and quality characters *viz*., nodulation, grain and stover yield per hectare, chlorophyll and protein content were recorded. Nodulation and chlorophyll content were recorded at 30, 60 and 90 DAS in lablab bean crop. Protein content in pod was determined as per Jackson (1973) [8] method. The statistical analysis of data was carried out as per the procedure given by the Panse and Sukhatme (1967) [10].

Results and Discussion

Growth Parameter

The effect of sources of nutrients *viz*., organic manures, inorganic fertilizers and consortium biofertilizers had shown significant and beneficial influence on growth attributes such as Nodulation. Treatment (T_7) receiving 50% RDN through Inorganics + 50% RDN through Vermicompost recorded the highest nodule count at 30, 60 and 90 DAS in lablab bean.

Table 1: Effect of Integrated Nutrient Management (INM) on growth attributing character (Nodulation)

Tr. No.	Treatments	30 DAS	60 DAS	90 DAS
T_1	Absolute control	12	13	15
T_2	100% RDF through Inorganic Fertilizes	8	11	12
T_3	100% RDN through FYM	12	13	15
T_4	100% RDN through VC	13	14	15
T_5	100% RDN through PM	12	14	15
T_6	50% RDN through Inorganics + 50% RDN through FYM	11	12	14
T_7	50% RDN through Inorganics + 50% RDN through VC	14	15	16
T_8	50% RDN through Inorganics + 50% RDN through PM	7	9	12
T_9	T2+ *Rhizobium* + PSB Inoculation	11	13	15
T_{10}	T6+ *Rhizobium* + PSB Inoculation	8	10	11
T_{11}	T7 + *Rhizobium* + PSB Inoculation	7	11	12
T_{12}	T8 + *Rhizobium* + PSB Inoculation	9	11	15
T_{13}	75% RDN through Inorganics + *Rhizobium* + PSB Inoculation	9	10	12
T_{14}	T13 + 25% RDN through Farm Yard Manure	6	9	13
T_{15}	T13 + 25% RDN through Vermicompost	6	10	12
T_{16}	T13 + 25% RDN through Poultry Manure	10	13	13
	Mean	9.69	11.75	13.56
	S.E.±	0.70	0.76	0.86
	C.D. (P=0.05)	2.03	2.19	2.48

Note: RDF- Recommended Dose of Fertilizers, RDN- Recommended Dose of Nutrients, FYM- Farm Yard Manure, VC- Vermicompost, PM- Poultry manure, PSB- Phosphate Solubilizing Bacteria

There is definite increase in the number of nodules with advancement in growth period of lablab bean at 30, 60 and 90 DAS. Treatment of Absolute control counted more nodules but might be less effective, it may be due the absence of biofertilizer. However, treatments when superimposed with biofertilizers have shown less number of nodules but they may effective. Manure application slightly increased the number of nodules relative to the control. This was probably due to the slow mineralization of manure hence slow nitrogen release. In addition, the additional phosphorus present in the manure perhaps resulted in the positive effect of manure on nodulation. Hence poultry manure showed superiority over farm yard manure as far as nodulation in lablab bean is concerned. Gandhi and Sivakumar (2010) [7] who observed enhancement in growth characters due to application of vermicompost in combination with inorganic nutrients.

Increased nutrient uptake, nodulation and biological nitrogen fixation of Rhizobium, and supplement of nutrients through vermicompost contributed to enhancement in growth of lablab bean (Sajitha, *et al*., 2016) [11].

Yield parameters and yield

Equal integration of inorganic fertilizer and organic manure such as poultry manure with inoculation of bio fertilizers resulted in higher seed as well as stover yield of lablab bean.

Among the treatments, the highest yield parameters in terms of seed yield (5.81 q ha^{-1}) and stover yield (4.20 q ha^{-1}) were recorded with the treatment (T_{12}) receiving 50% RDN through Inorganics + 50% RDN through PM + *Rhizobium* + PSB Inoculation.

Table 2: Effect of Integrated Nutrient Management (INM) on Yield (Seed and Stover Yield (q ha-1), of lablab bean

Tr. No.	Treatments	Grain Yield (q ha-1)	Stover Yield (q ha-1)
T_1	Absolute control	4.01	2.74
T_2	100% RDF through Inorganic Fertilizes	7.10	4.77
T_3	100% RDN through FYM	5.34	3.81
T_4	100% RDN through VC	5.68	3.75
T_5	100% RDN through PM	6.27	4.20
T_6	50% RDN through Inorganics + 50% RDN through FYM	5.63	3.70
T_7	50% RDN through Inorganics + 50% RDN through VC	5.59	4.19
T_8	50% RDN through Inorganics + 50% RDN through PM	7.20	5.30
T_9	T2+ *Rhizobium* + PSB Inoculation	5.91	4.88
T_{10}	T6+ *Rhizobium* + PSB Inoculation	4.29	3.38
T_{11}	T7 + *Rhizobium* + PSB Inoculation	5.31	4.58
T_{12}	T8 + *Rhizobium* + PSB Inoculation	8.87	6.36
T_{13}	75% RDN through Inorganics + *Rhizobium* + PSB Inoculation	6.54	2.86
T_{14}	T13 + 25% RDN through Farm Yard Manure	6.28	3.74
T_{15}	T13 + 25% RDN through Vermicompost	6.54	4.50
T_{16}	T13 + 25% RDN through Poultry Manure	4.89	4.42
	Mean	5.81	4.20
	S.E.±	0.69	0.53
	C.D. (P=0.05)	2.00	1.54

Note: RDF- Recommended Dose of Fertilizers, RDN- Recommended Dose of Nutrients, FYM- Farm Yard Manure, VC- Vermicompost, PM- Poultry manure, PSB- Phosphate Solubilizing Bacteria

The next best treatments which had shown significant influence on yield was T_8 receiving equal integration of 50% RDN through Inorganics and 50% RDN through poultry manure without bio fertilizers. All yield parameters were lowest in the absolute control treatment.

Quality parameters

The data on effect of integrated nutrient management on Quality parameters such as protein and chlorophyll at 30, 60, and 90 DAS and after harvest of lablab bean.

Data when studied revealed that the protein content in lablab bean seed is 20.04 per cent were recorded in the treatment (T_5) receiving 100% RDN through Poultry Manure.

The significant protein content is observed in lablab bean as a result of symbiotic nitrogen fixation by rhizobia and mycorrhizae which are nitrogen fixing bacteria live in the plant root nodules.

Meena *et al.*, (2006) [9], concluded that higher nitrogen in seed is directly responsible for higher protein because it is a primary component of amino acid which constitute the basis for protein. The reason for higher nitrogen content might be due to increased activity of nitrate reductase enzyme. The influence of applied inorganic fertilizers *i.e.* nitrogen and phosphorus and higher N_2 fixation by root nodules, the availability of these nutrients in soil was found to be increased and resulted in higher uptake by plant. There was an increase in the chlorophyll content with advancement in the growth period as there was an increased in leaf area resulted in more photosynthesis by plant and as a result leaves changes their color from light green to dark green showing green pigmentation. Since 0.97 mg g^{-1}, 2.11 mg g^{-1}, and 3.04 mg g^{-1} of chlorophyll 30,60 and 90 DAS of lablab bean.

Table 3: Effect of Integrated Nutrient Management (INM) on Protein % of seed of lablab bean

Tr. No.	Treatment	Protein%
T_1	Absolute control	17.96
T_2	100% RDF through Inorganic Fertilizes	18.76
T_3	100% RDN through Farm Yard Manure	19.65
T_4	100% RDN through Vermicompost	20.10
T_5	100% RDN through Poultry Manure	21.98
T_6	50% RDN through Inorganics + 50% RDN through Farm Yard Manure	18.88
T_7	50% RDN through Inorganics + 50% RDN through Vermicompost	19.95
T_8	50% RDN through Inorganics + 50% RDN through Poultry Manure	20.39
T_9	100% RDF through Inorganic Fertilizes + *Rhizobium* + PSB Inoculation	21.65
T_{10}	50% RDN through Inorganics + 50% RDN through Farm Yard Manure + *Rhizobium* + PSB Inoculation	18.06
T_{11}	50% RDN through Inorganics + 50% RDN through Vermicompost + *Rhizobium* + PSB Inoculation	19.54
T_{12}	50% RDN through Inorganics + 50% RDN through Poultry Manure + *Rhizobium* + PSB Inoculation	21.69
T_{13}	75% RDN through Inorganics + *Rhizobium* + PSB Inoculation	21.04
T_{14}	75% RDF through Inorganics + *Rhizobium* + PSB Inoculation + 25% Farm Yard Manure	19.84
T_{15}	75% RDF through Inorganics + *Rhizobium* + PSB Inoculation + 25% Vermicompost	20.38
T_{16}	75% RDF through Inorganics + *Rhizobium* + PSB Inoculation + 25% Poultry Manure	20.75
	Mean	20.04
	S.E.±	0.35
	C.D. (P=0.05)	1

Note: RDF- Recommended Dose of Fertilizers, RDN- Recommended Dose of Nutrients, FYM- Farm Yard Manure, VC- Vermicompost, PM- Poultry manure, PSB- Phosphate Solubilizing Bacteria

Table 4: Effect of Integrated Nutrient Management (INM) on Chlorophyll (mg g^{-1}) of leaves of lablab bean

Tr. No.	Treatments	30 DAS	60 DAS	90 DAS
T_1	Absolute control	0.52	1.61	3.48
T_2	100% RDF through Inorganic Fertilizes	1.66	1.80	3.58
T_3	100% RDN through FYM	0.77	1.71	3.47
T_4	100% RDN through VC	0.58	1.85	2.89
T_5	100% RDN through PM	0.64	1.85	4.21
T_6	50% RDN through Inorganics + 50% RDN through FYM	0.58	1.88	2.74
T_7	50% RDN through Inorganics + 50% RDN through VC	0.66	2.07	3.07
T_8	50% RDN through Inorganics + 50% RDN through PM	0.84	2.11	2.99
T_9	T2+ *Rhizobium* + PSB Inoculation	0.89	2.35	2.59
T_{10}	T6+ *Rhizobium* + PSB Inoculation	0.97	2.62	2.90
T_{11}	T7 + *Rhizobium* + PSB Inoculation	1.00	2.07	2.64
T_{12}	T8 + *Rhizobium* + PSB Inoculation	1.20	2.62	2.13
T_{13}	75% RDN through Inorganics + *Rhizobium* + PSB Inoculation	1.32	2.42	2.66
T_{14}	T13 + 25% RDN through Farm Yard Manure	1.44	2.45	3.32
T_{15}	T13 + 25% RDN through Vermicompost	0.79	2.23	3.02
T_{16}	T13 + 25% RDN through Poultry Manure	1.68	2.14	3.01
	Mean	0.97	2.11	3.04
	S.E.±	0.01	0.01	0.00
	C.D. (P=0.05)	0.03	0.02	0.01

Note: RDF- Recommended Dose of Fertilizers, RDN- Recommended Dose of Nutrients, FYM- Farm Yard Manure, VC- Vermicompost, PM- Poultry manure, PSB- Phosphate Solubilizing Bacteria

Treatment (T_{16}) receiving the application of 75% RDF through Inorganics + *Rhizobium* + PSB Inoculation + 25% Poultry Manure recorded the highest (1.68 mg g^{-1}) chlorophyll content 30 DAS of leaves of lablab bean, while treatment (T_{12}) receiving 50% RDN through Inorganics + 50% RDN through Poultry Manure + *Rhizobium* + PSB Inoculation recorded the highest chlorophyll content 60 DAS and The maximum chlorophyll content recorded in the treatment (T_5) receiving the application of 100 per cent RDN through Poultry Manure at 90 DAS.

The lowest (1.5mg/gm) chlorophyll content was recorded in no fertilizer treatment. The higher chlorophyll content was observed in the treatment receiving application of inorganic fertilizers. Also, photoperiod, rate of photosynthesis responsible for chlorophyll content, Bojovic *et al*. (2005) [6].

Conclusion

From the results it may be concluded that, the application of equal integration of RDN through inorganics and organics, either through poultry manure or vermicompost with or without bio-inoculations proved it's significance in enhancing the nodulation, yield (seed an stover yield) and quality (protein and chlorophyll) of lablab bean crop.

References

1. Akram Jafari Fara, Tayeb Saki Nejada, Mani Mojadam. Effect of different methods of *Rhizobium* bacteria inoculation on Biological Nitrogen Fixation in Broad Bean. International journal of plant animal and environmental sciences 2014;4(2):346-352.
2. Aleem MO, Alamu LO, Olabode SO. Allelopathic effect of some selected tree species on the germination and growth of cowpea (*Vigna unguiculata* L. Walp.). Journal of Forestry. 2014;4(4):47742-5.
3. Anonymous. Agricultural Statistical Information. Maharashtra State. 2016, 2018.
4. Arora N, Maini P Anaerobic digested slurry-an input for sustainable agriculture. Asian Journal of Experimental Science. 2011;25(1):59-6259.
5. Basu AK, Samantha SK, Sasmala AC. Genetic analysis for some seed parameters in Lablab bean. Vegetable Science. 2002;32(2):129-132.
6. Bojovic B, Stojanovic J. Chlorophyll and carotenoid content in wheat cultivars as a function of mineral nutrition. Arch. Biol. Sci., Belgrade, 2005;57(4):283-290.
7. Gandhi A, Sivakumar K. Impact of vermicompost carrier based bioinoculants on the growth, yield and quality of rice (*Oryza sativa*) cv. NLR 145. The Ecoscan. 2010;4(1):83-88.
8. Jackson ML. Soil Chemical Analysis. Prentice Hall of India Pvt. Ltd., New Delhi. 1973, 498.
9. Meena KR, Dahama AK, Reager ML. Effect of phosphrous and zinc fertilization on growth and quality of cluster bean [*Cyamopsis tetragonoloba* (L.) Taub.], Ann. Agric. Res. New Series. 2006;27(3):224-226.
10. Panse VG, Sukhatme PV. Statistical method for Agricultural Workers, I.C.A.R, New Delhi. 1967.
11. Sajitha JP, Haripriya K, Umamaheshwari T, Stella D. Effect of organic manures and biofertilizers on the productivity of garden bean [*Dolichos lablab* (Roxb.) L. var. typicus]. Asian Journal of Horticulture. 2016;11(1):129-131.