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Influence of different organic nutrient sources on nodulation and economics of lentil (*Lens culinaris* L.) under certified organic production system

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Abstract
The field experiment was conducted during Rabi 2019 at SMOF (SHIATS Organic Modal Farm). Department of Agronomy, SHUATS, Prayagraj (UP). The soil of the experimental field is sandy loam in texture, nearly neutral in soil reaction (pH 7.6), the available N, P, K fertilizer is applied through organic fertilizers i.e. Vermicompost and Poultry manure. The treatment consisted of application of Vermicompost and Poultry manure in different levels *viz*: whose effect is observed on IPL-316. The experiment was laid out in Randomized Block Design with nine treatments which are replicated thrice. The treatment with Vermicompost 2.5 t/ha + Poultry manure 2.5 t/ha shown significantly higher number of nodules (18.85 at 60 DAS) and growth parameters. The maximum gross return (123793.3 ₹/ha), net return (77273.33 ₹/ha) and benefit cost ratio (1.55) is recorded in treatment with Vermicompost 2.5 t/ha + Poultry manure 2.5 t/ha.

Keywords: Lentil, vermicompost, poultry manure, economics, organic farming

Introduction
Lentil is a herbaceous annual plant, mostly erect and bushy type with 4-6 primary branches. It has well developed root system including a central tap root with several lateral branches spread out in all directions. The stem is weak and quadrangular. The leaves are small, compound and pinnate. The end of leaflets sometimes forms tendrils. The inflorescence is a receme of 2-4 flowers. Flowers are small, white tinged with blue violet or pink. Lentil is considered to have its primary area of diversity in south-west Asia and Mediterranean region.

The important lentil-growing countries of the world are India, Canada, Turkey, Bangladesh, Iran, China, Nepal and Syria. India ranked first in area and second in the production with 39.79% and 22.79% of world area and production respectively. The highest productivity was recorded in Croatia (2862 kg/ha) followed by New Zealand (2469 kg/ha). Canada rank first in production (41.16%) due to very high level of productivity (1633 kg/ha) as compared to India (611 kg/ha). (FAO 2014) [1].

Agrochemicals which helped the 'green revolution' in the 1965 came as a 'mixed blessing' for mankind. It boosted food productivity, but at the cost of environment and society. It dramatically increased the 'quantity' of the food produced but decreased its 'nutritional quality' and also destroyed the 'physical, chemical and the biological properties' of soil over the years of use. Chemically grown foods have adversely affected human health all over the world. In recent times, attention has been directed towards organic manure because of the rising cost of inorganic fertilizers coupled with their inability to give the soil the desired sound health. Green manuring seems to be difficult under intensive cropping system so, recycling of different plant and animal wastes also be the good source of organic manures.

The effect of vermicompost in combination with other mineral fertilizer and/or soil is quite encouraging for better crop growth and yield of pulses. Even at the lower dose than that of the recommended dose of the mineral fertilizers, vermicompost has shown better results for nodulation and crop yield, which is not only economical but also beneficial with soil improvement point of view. (Sanu *et al.*, 2009) [7]. Poultry manure can be efficiently used for the crops after composting the same to save the nutrients.

(Amanullah *et al.*, 2003). Plants that received poultry manure grew taller than other plants possibly because more concentrated nutrients or minerals were made readily available and easily absorbable by the receiving plants leading to faster growth and development. (Enujeke 2013) [3].

Materials and Methods

The experiment was carried out during *Rabi* season of 2019 at the SMOF (SHIATS Model Organic Farm), Department of Agronomy, Naini Agricultural Institute, Sam Higginbottom University of Agriculture, Technology and Sciences, Prayagraj (Allahabad), Uttar Pradesh. The SMOF is situated at 25º24‘41.27” N latitude, 81°50‘56” E longitude (Google, 2019) and 98 m altitude above the mean sea level. This area is situated on the right side of the river Yamuna and south east side of Prayagraj city. SMOF was developed under the National Project on Organic Farming (NPOF) by Department of Agronomy with Dr. Thomas Abraham, Professor (Agronomy) as its Principal Investigator. The two hectares area has been certified by Lacon Quality Certification (P) Ltd. [Accreditation Number, NPOP/NAB/006 Ministry of Commerce, Govt. of India] till 2019. The field was in its 10th year of certification during the duration of the current trial. All the facilities required for crop cultivation are available. The treatment consisted of 2 levels of Vermicompost *viz.* V_1: (1.5t/ha), V_2: (2.5t/ha) and 4 levels of Poultry Manure P_1: (0.5t/ha), P_2: (1.5t/ha), P_3: (2.0t/ha), P_4: (2.5t/ha). There are nine treatments each replicated thrice. The experiment was laid out in Randomized Block Design. It was sown on 14 November 2019 with seed rate of 40 Kg/ha at spacing 30×10 cm. The farm yard manure was mixed in the soil before sowing and cow urine and neem oil were used as plant protection measures.

Results and discussion

Number of nodules per plant

A perusal of data from Table 1 showed that application of organic manures from different sources increased the number of nodules per plant. Significantly higher number of nodules per plant was observed in treatment 8 (2.5 t/ha Vermicompost + 2.5 t/ha Poultry Manure) with 18.85/plant over the other treatments.

The improvement of nodules population is may be due to the symbiotic association of *Rhizobium* bacteria and the application of vermicompost might have enhanced the population of desired microbes in the root zone during the early stage of infection by improving the physical, chemical and biological of properties of soil. Higher population of the desired organisms will always have greater possibilities of infection and consequently formation of more healthy and effective root nodules having higher amount of leghaemoglobin and thus increases the nodule population. (Khan *et al.*, 2015) [4].

Economics

Cost of cultivation varied due to application of different organic manures from Rs.46520 to Rs. 21520. Highest gross return net return and B:C ratio was observed in treatment 8 (2.5 t/ha Vermicompost + 2.5 t/ha Poultry Manure) *i.e* Rs.123793, Rs. 75273 and 1.55 respectively as we observed in Table 2. Similar results were found with Kumari *et al.*, 2012, Tyagi *et al.*, 2015, and Singh *et al.*, 2017.

Table 1: Influence of different organic nutrient sources on Nodulation of lentil

	Treatment	Nodules/plant (No.) at 60 DAS
1.	1.5 t/ha Vermicompost + 0.50 t/ha Poultry Manure	13.86
2.	1.5 t/ha Vermicompost + 1.5 t/ha Poultry Manure	14.24
3.	1.5 t/ha Vermicompost + 2.0 t/ha Poultry Manure	15.83
4.	1.5 t/ha Vermicompost + 2.5 t/ha Poultry Manure	16.31
5.	2.5 t/ha Vermicompost + 0.50 t/ha Poultry Manure	14.76
6.	2.5 t/ha Vermicompost + 1.5 t/ha Poultry Manure	16.81
7.	2.5 t/ha Vermicompost + 2.0 t/ha Poultry Manure	17.32
8.	2.5 t/ha Vermicompost + 2.5 t/ha Poultry Manure	18.85
9.	Control	12.60
	SEm (±)	0.45
	CD (P= 0.05)	1.34
	CV %	4.96

Table 2: Influence of different organic nutrient sources on Economics of lentil

	Treatment	Cost of cultivation (₹/ha)	Gross return (₹/ha)	Net return (₹/ha)	B:C ratio
1.	1.5 t/ha Vermicompost + 0.50 t/ha Poultry Manure	37520	70762.67	33242.67	0.89
2.	1.5 t/ha Vermicompost + 1.5 t/ha Poultry Manure	38520	78025	39505.00	1.03
3.	1.5 t/ha Vermicompost + 2.0 t/ha Poultry Manure	39020	96210.33	57190.33	1.47
4.	1.5 t/ha Vermicompost + 2.5 t/ha Poultry Manure	39520	98013.33	58493.33	1.48
5.	2.5 t/ha Vermicompost + 0.50 t/ha Poultry Manure	46520	86883	40363.00	0.87
6.	2.5 t/ha Vermicompost + 1.5 t/ha Poultry Manure	47520	103963.3	56443.33	1.19
7.	2.5 t/ha Vermicompost + 2.0 t/ha Poultry Manure	48020	121416.7	73396.67	1.53
8.	2.5 t/ha Vermicompost + 2.5 t/ha Poultry Manure	48520	123793.3	75273.33	1.55
9.	Control	23520	51236.67	27716.67	1.18

Conclusion

It may be concluded that based on one season experimentation application of 2.5 t/ha VC + 2.5t/ha PM t/ha was found more economic (75273 ₹/ha) and B:C ratio (1.55). The above conclusion is a result of one season work and it may be considered for recommending to farmers, after at least one more year field trail.

References

1. Anonymous. Statistics, FAO- Food and Agriculture Organization 2013-2014.

2. Anupma Kumari, Singh O.N. and Rakesh Kumar. Effect of integrated nutrient management on growth, seed yield and economics of field pea (*Pisum sativum* L.) and soil fertility changes. Journal of Food Legumes. 2012;25(2):121-124.
3. Enujeke EC. Effects of Poultry Manure on Growth and Yield of Improved Maize in Asaba Area of Delta State, Nigeria. Journal of Agriculture and Veterinary Science, 2013;4(5):24-30.
4. Khan VM, Manohar KS, Verma HP. Effect of vermicompost and biofertilizer on yield, quality and economics of cowpea. Annals of Agriculture Research 2015;36(3):309-311.
5. Mohamed Amanullah, Somasundaram M, Vaiyapuri E, Sathyamoorth K. Poultry manure to crops – A Review. Agriculture Revison 2007;28(3):216-222.
6. Patel AR, Sadhu AC, Chotaliya Rl, Patel CJ. Yield, quality, nutrient content and uptake of chickpea (*Cicer arietinum* L.) as influenced by vermicompost, phosphorus and zinc levels. Haryana Journal Agronomy 2011;27(1-2):54-56.
7. Sanu K Bajracharya, Suresh Rai K. Study on the Effects of Vermicompost on the Nodulation and the Yield of Chickpea. Nepal Agriculture. Research Journal 2009, 9.
8. Guriqbal Singh, Harpreet Kaur Virk, Veena Khanna. Integrated nutrient management for high productivity and net returns in lentil (*Lens culinaris*). Journal of Applied and Natural Science 2017;9(3):1566-1572.
9. Tyagi PK, Upadhyay AK. Effect of integrated nutrient management on yield, quality, nutrients uptake and economics of summer green gram. Annals of Plant and Soil Research 2015;17(3):242-247.