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Effect of integrated nutrient management and sources of nutrients on growth, yield and quality of lentil (*Lens culinaris* L.)

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Abstract
A field experiment was conducted during rabi season of 2022-2023 at the instructional farm, AKS, University, Sherganj, Satna (M.P.) site is situated at the latitude of 23^0 58' N and longitude of 80 ^{0} 81' East in kymore plateau of M.P. The experiment consisted of 12 treatments in randomized block design with 3 replications *viz*; F_1 control, F_2 RDF100%, F_3Vermicompost 2.5 ton-ha^{-1}, F_4 FYM5 ton-ha^{-1}, F_5RDF + Vermicompost 100%+2.5ton-ha^{-1}, F_6RDF+ FYM 100%+ 5-ton ha^{-1}, F_7 Vermicompost + FYM 2.5-ton+5-ton ha^{-1}, F_8 RDF+ Vermicompost50% + 1.25-ton ha^{-1}, F_9Vermicompost + FYM2.5-ton + 5-ton. ha^{-1}, F_{10}RDF+ FYM75% + 2.5-ton. ha^{-1}, F_{11}RDF + Vermicompost+ FYM50%+ 1.25 +5 ton. ha^{-1}, F_{12}RDF + Vermicompost + FYM100% + 5-ton. + 10-ton. ha^{-1}. The different INM treatments, the combined application of 100% RDF + 2.5 t vermicompost/ha + 5 t FYM/ha (T_{12}) resulted in significantly higher plant height as well as number of branches and leaves per plant over other treatments at every stage of observations. Thus, at 90 days stage, the maximum height was 31.50 cm and 15.22 branches/plant and 168.5 leaves/plant. treatment T_{12} producing maximum productivity of grain and straw brought about maximum net income up to Rs.49359/ha with 2.24 B:C ratio. This was followed by T_5 (Rs.46101/ha net income with 2.32 B:C ratio).

Keywords: utilization, nutrients, productivity and INM of lentil

Introduction
LentiI (*Lens culinaris* L.) is an important and remunerative pulse crop and grown extensively in an area of 13.90 lakh ha with a production of 10.93 lakh tons in India. However, in Madhya Pradesh it is grown in an area of 5.50 lakh ha with a production of 3.36 lakh tones. (Annual Report 2020-21 Minister of Agriculture & Farmers Welfare). The seed of lentil contains about 24% - 26% protein, 1.3% fat, 2.1% minerals, 3.2% fibre and 57% carbohydrate (Singh *et al*., 2013) [7]. Lentil also provides a considerable amount of vitamin A and B.
Being a leguminous crop, lentil can make use of atmospheric N_2 to fulfill its N requirements through biological nitrogen fixation. Nitrogen fixation in legumes is governed by several factors like rhizobia strains as well N and P availability in the soil. Phosphorus (P) and nitrogen (N) play specific roles in symbiotic N2-fixation through their effects on nodulation and N_2-fixation process. Symbiotic nitrogen fixation has a high P demand indirectly because the process consumes large amounts of energy and energy generating metabolism strongly depends upon the availability of P (Plaxton, 2004) [5].

Materials and Methods
Field studies were conducted during rabi season of 2022-2023 at the instructional farm, AKS, University, Sherganj, Satna (M.P.) site is situated at the latitude of 23^0 58' N and longitude of 80 ^{0} 81' East in kymore plateau of M.P. state of India The soil of the experimental unit was sandy loam in texture, neutral in reaction (7.4) having medium in organic carbon (0.43) and available N (176.60 kg/ ha) and medium in phosphorus (12.50 Kg /ha) whereas it was high in available k (200 Kg/ha). The experimental farm lies in humid subtropical zone with an average rainfall from 1077 mm. The mean temperature ranges from 21°C to 31°C during summer and rarely goes below 5 °C in winter due to high atmospheric humidity. The experiment consisted of 12 treatments in randomized block design with 3 replications. Wheat was sown in 30.00 cm apart, using 40 kg/ha seeds.

Results and Discussion

Growth characters

Among the different INM treatments, the combined application of 100% RDF + 2.5 t vermicompost/ha + 5 t FYM/ha (T_{12}) resulted in significantly higher plant height as well as number of branches and leaves per plant over other treatments at every stage of observations (Table no 2). Thus, at 90 days stage, the maximum height was 31.50 cm and 15.22 branches/plant and 168.5 leaves/plant. The followed by treatment was 100% RDF + 2.5 t/ha (T_5) and then 100% RDF + 5 t FYM/ha (T_6). This increase may be owing to increased supply of multi-nutrients and beneficial microflora from vermicompost and FYM in addition to increased supply of N, P and K to crop plants (Singh *et al.*, 2013; Saket *et al.*, 2014; and Gupta *et al.*, 2020 Dey A, Kumar A. S., *et al*. 2022) [7, 6, 3, 2].

Root nodulation

Root nodulation studies at 60 days stage indicated (Table no 2) that the INM treatments exerted significant impact upon root nodulation. The combined application of 100% RDF + VC 2.5 t + FYM 5 t/ha (T_{12}) tended to form significantly higher 9.85 root nodules/plant. The was however followed by combined application of 100% RDF + VC 2.5 t/ha (T_5) or 100% RDF + FYM 5 t/ha (T_6). These results on lentil corroborate with those of many workers (Saket *et al.*, 2014 and Dey *et al.*, 2022) [6, 2].

Productivity

The data furnished in Table 2 & 3 signify that the grain yield of lentil was deviated up to significant extent due to applied INM treatments. The best INM treatment was T_{12} having 100% RDF + VC 2.5 t + FYM t/ha where the grain yield was found significantly highest (14.46 q/ha). The second best treatment was T_5 having 100% RDF + VC 2.5 t/ha, the grain yield having 12.21 q/ha. The third best treatment was T_6 (100% RDF + FYM 5 t/ha) which produced 10.85 q/ha grain. The fourth best INM treatment was T_{11} (50% RDF + VC 1.25 t/ha + FYM 2.5 t/ha), the grain productivity was 10.15 q/ha.

Economical gain

The economical gain per hectare was estimated under each treatment and the results are exhibited in Table 3. The treatment T_{12} producing maximum productivity of grain and straw brought about maximum net income up to Rs.49359/ha with 2.24 B:C ratio. This was followed by T_5 (Rs.46101/ha net income with 2.32 B:C ratio). The third best treatment was T_6 (Rs.37137/ha with 2.06 B:C ratio). Ultimately, the lowest economical gain (Rs.11665/ha net income and 1.42 B:C ratio) was obtained from the control (T_1) treatment where no any fertilizers were applied.

Table 1: Plant height and branches/plant at different growth intervals growth intervals as influenced by organic and inorganic sources of nutrients

Tr. No.	Treatments	Plant height (cm)				No. of branches/plant		
		30 DAS	60 DAS	90 DAS	At harvest	30 DAS	60 DAS	90 DAS
T_1	Control	8.35	15.27	21.76	25.14	1.52	5.35	7.98
T_2	100% RDF ($N_{20}P_{40}K_{20}$)	10.65	18.76	26.14	29.72	2.35	8.85	12.83
T_3	VC 2.5 t/ha	10.00	17.37	25.18	28.56	2.08	8.16	11.69
T_4	FYM 5 t/ha	9.72	16.64	24.37	27.10	1.94	7.65	10.76
T_5	100% RDF + VC 2.5 t/ha	13.55	23.17	29.20	33.15	3.45	10.70	15.00
T_6	100% RDF + FYM 5 t/ha	13.20	21.40	27.92	32.72	3.10	10.37	14.63
T_7	VC 2.5 t + FYM 5 t/ha	11.93	19.12	26.33	31.45	2.62	9.30	13.27
T_8	50% RDF + VC 1.25 t/ha	11.15	19.00	25.96	30.24	2.54	9.00	13.17
T_9	VC 1.25 t + FYM 2.5 t/ha	10.32	18.63	25.72	29.28	2.14	8.52	12.43
T_{10}	75% RDF + FYM 1.25 t/ha	12.26	19.52	26.65	31.85	2.77	9.68	13.78
T_{11}	50% RDF + VC 1.25 t/ha + FYM 2.5 t/ha	12.84	20.35	27.10	32.30	2.86	10.12	14.12
T_{12}	100% RDF + VC 2.5 t/ha + FYM 5 t/ha	13.92	24.76	31.50	34.66	3.78	10.96	15.22
	SEm +	0.38	0.52	0.55	0.58	0.12	0.18	0.25
	C.D. (P=0.05)	1.11	1.49	1.5	1.69	0.34	0.53	0.72

Table 2: Growth, root nodulation and flowering of barley as influenced by organic and inorganic sources of nutrients

Tr. No.	Treatments	No. of leaves/plant			Root nodulation/ plant	Days taken to 50% flowering
		30 DAS	60 DAS	90 DAS		
T_1	Control	43.4	104.8	123.7	3.52	90.2
T_2	100% RDF ($N_{20}P_{40}K_{20}$)	60.2	118.5	142.3	4.92	96.3
T_3	VC 2.5 t/ha	54.8	113.6	137.4	5.40	65.2
T_4	FYM 5 t/ha	50.9	110.5	132.2	6.76	65.3
T_5	100% RDF + VC 2.5 t/ha	74.5	141.9	165.2	7.25	97.0
T_6	100% RDF + FYM 5 t/ha	71.9	138.2	161.5	8.30	97.2
T_7	VC 2.5 t + FYM 5 t/ha	64.7	125.8	150.8	6.45	96.0
T_8	50% RDF + VC 1.25 t/ha	62.6	121.2	146.4	5.16	96.2
T_9	VC 1.25 t + FYM 2.5 t/ha	57.5	115.4	139.7	5.78	96.6
T_{10}	75% RDF + FYM 1.25 t/ha	68.7	130.3	154.7	6.60	96.4
T_{11}	50% RDF + VC 1.25 t/ha + FYM 2.5 t/ha	71.2	134.8	154.8	7.35	96.8
T_{12}	100% RDF + VC 2.5 t/ha + FYM 5 t/ha	76.8	145.2	168.5	9.85	97.4
	SEm +	0.83	1.17	1.27	0.70	1.12
	C.D. (P=0.05)	2.41	3.37	3.67	2.02	3.25

Table 3: Yield-attributes, yield, economics and quality of barley as influenced by organic and inorganic sources of nutrients

Tr. No.	Treatments	No. of pods/ plant	Length of pod (cm)	Test weight (1000 seeds) (g)	Seed weight/ plant (g)	Grain yield (q/ha)	Straw yield (q/ha)	Harvest index (%)	Seed protein (%)	Net income (Rs./ha)	B:C ratio
T_1	Control	31.80	1.34	24.52	4.38	5.88	9.45	38.36	20.68	11665	1.42
T_2	100% RDF ($N_{20}P_{40}K_{20}$)	44.23	1.65	26.85	4.89	8.12	12.62	39.15	23.74	24142	1.81
T_3	VC 2.5 t/ha	39.55	1.54	26.00	4.58	7.48	11.58	39.24	23.65	17278	1.53
T_4	FYM 5 t/ha	37.42	1.49	25.16	4.50	7.16	11.23	38.93	22.03	15163	1.47
T_5	100% RDF + VC 2.5 t/ha	62.86	1.85	29.23	6.22	12.21	16.36	42.74	24.58	46101	2.32
T_6	100% RDF + FYM 5 t/ha	59.78	1.80	28.75	5.85	10.85	15.12	41.78	24.42	37137	2.06
T_7	VC 2.5 t + FYM 5 t/ha	50.27	1.72	27.46	5.24	9.26	14.10	39.64	24.15	24100	1.64
T_8	50% RDF + VC 1.25 t/ha	47.40	1.69	27.13	5.00	8.49	13.72	38.23	23.95	25357	1.81
T_9	VC 1.25 t + FYM 2.5 t/ha	41.35	1.60	26.42	4.69	7.82	11.90	39.66	23.75	19520	1.60
T_{10}	75% RDF + FYM 1.25 t/ha	53.73	1.75	27.93	5.45	9.87	14.39	40.68	24.30	33794	2.06
T_{11}	50% RDF + VC 1.25 t/ha + FYM 2.5 t/ha	56.14	1.78	28.25	5.72	10.15	14.76	40.75	24.37	31251	1.86
T_{12}	100% RDF + VC 2.5 t/ha + FYM 5 t/ha	65.83	1.90	29.80	6.65	14.46	18.69	43.62	24.72	49359	2.24
	SEm +	0.72	0.05	0.60	0.22	0.34	0.39	0.42	0.82		
	C.D. (P=0.05)	2.07	0.15	1.74	0.63	0.98	1.13	1.21	2.38		

Conclusion

Based on one year field experimentation, the present results on the lentil var. IPL-316 concluded that the treatment receiving 100% RDF + VC 2.5 t/ha + FYM 5 t/ha (T_{12}) resulted in maximum growth parameters (plant height 34.66 cm, branches 15.22/plant, leaves 168.5/plant), yield-attributes (65.83 pods/plant, 1.90 cm pod length, 29.80 g test weight, 6.65 g seed weight/plant), grain yield (14.46 q/ha), straw yield (18.69 q/ha), seed protein (24.72%) and net income (Rs.49359/ha with 2.24 B:C ratio).

References

1. Channabasavanna AS, Hegde M, Biradar DP. Evaluation of poultry manure in combination with inorganic fertilizers for its productivity, sustainability and economic feasibility in maize. Research on Crops. 2007;8(1):95-98
2. Dey A, Kumar AS, *et al*. Effect of integrated nutrient management on plant growth and yield attributes: A case of lentil crop. The Pharma Innovation Journal. 2022;11(5):742-751
3. Gupta G, Dhar S, Dass A, Sharma VK, Shukla L, Singh R, *et al*. Assessment of bio-inoculants-mediated nutrient management in terms of productivity, profitability and nutrient harvest index of pigeon pea–wheat cropping system in India. J Plant Nutr. 2020;43:2911-2928.
4. Pragy G, Singh T, *et al*. Effect of integrated nutrient management in lentil (*Lens culinaris* L.) Journal of The Pharma Innovation Journal. 2022;11(10):1447-1450.
5. Plaxton WC. Plant response to stress: biochemical adaptations to phosphate deficiency. In: Goodman R, ed. Encyclopedia of plant and crop science. New York, NY: Marcel Dekker; c2004. p. 976-980.
6. Saket, Sukhlal, Singh SB, Namdeo KN, Parihar SS. Effect of organic and inorganic fertilizers on yield, quality and nutrients of lentil Ann. Ps. Soll Res. 2014;16(3):238-241.
7. Yogendra S, Praven S, Sharma RD, Marko GS, Namdeo KN. Effect of organic sources of nutrients on growth, yield and quality of lentil. Annals of Plant and Soil Research. 2013;15(2):134-137.
8. Sachan HK, Krishna D. Effect of Organic and Inorganic Fertilization on Growth and Yield of French Bean (*Phaseolus vulgaris* L.) in Fiji. Legume Research-An International Journal, 2020, LR-4376. DOI: 10.18805/LR-437.