

Integrated nutrient management in fenugreek (*Trigonella foenum-graecum* L.)

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Abstract

A field experiment was conducted at Jagudan (Gujarat) to study the effect of integrated nutrient management (INM) practices in fenugreek (*Trigonella foenum-graecum*). Growth and yield attributes as well as seed and straw yields of fenugreek were significantly influenced by INM treatments. Application of recommended dose through inorganic form with phosphate solubilizing bacteria @ 5 kg ha⁻¹ gave higher growth and yield attributes and was at par with recommended dose of fertilizer + *Azotobacter* sp. @ 5 kg ha⁻¹ + 5 t farm yard manure ha⁻¹ and recommended dose of nitrogen + phosphate solubilizing bacteria @ 5 kg ha⁻¹ which were significantly superior to other treatments except test weight. This treatment also recorded significantly the highest grain and straw yields. The maximum net realization and benefit:cost ratio were obtained when the crop was fertilized with full dose of nitrogen and phosphorus with phosphate solubilizing bacteria @ 5 kg ha⁻¹.

Keywords: fenugreek, integrated nutrient management, *Trigonella foenum-graecum*.

Use of fertilizers, bio-fertilizers and farm yard manure (FYM) in an integrated manner not only reduces the fertilizer requirement and cost of crop production but also improves soil health, yield and quality of produce. Therefore, the present experiment was conducted to assess the effectiveness of FYM and bio-fertilizers (*Azotobacter* sp. and phosphate solubilizing bacteria (PSB)) alone or in combination with chemical fertilizers on growth and yield of fenugreek (*Trigonella foenum-graecum* L.).

The field experiment was conducted during the winter season of 2002-03 to 2004-05 at Centre for Research on Seed Spices, Jagudan

(Gujarat). The soil was loamy sand in texture, neutral in soil reaction, low in organic carbon, medium in available phosphorus and potassium. The experiment comprising of 12 treatments was laid out in a randomized block design with 4 replications (Table 1). The crop was sown in lines 30 cm apart by using a uniform seed rate of 20 kg ha⁻¹. FYM was applied at the time of land preparation, recommended dose of fertilizer (20-40 kg NP ha⁻¹) as basal dose and bio-fertilizers (*Azotobacter* sp. and PSB) were incorporated into soil at the time of sowing. The crop was sown during the second week of November and harvested in the first week of March. All the recommended package of practices was followed during the crop period.

Table 1. Influence of integrated nutrient management on growth and yield attributes, yield and economics of fenugreek (pooled data of 3 years)

Treatment	Plant height at harvest (cm)	No. of branches plant ⁻¹	Length of pod (cm)	No. of pods plant ⁻¹	No. of seeds pod ⁻¹	Test weight (g)	Grain yield (kg ha ⁻¹)	Straw yield (kg ha ⁻¹)	Net returns (Rs. ha ⁻¹)	Benefit: Cost Ratio
T ₁ RDN (100%) + Azo 5 kg ha ⁻¹ + 5 t FYM ha ⁻¹	62.58	5.02	8.98	36.5	17.25	14.795	2025	4414	27,620	2.50
T ₂ RDN (75%) + Azo 5 kg ha ⁻¹ + 5 t FYM ha ⁻¹	59.95	4.85	8.75	33.0	16.43	13.752	1899	4177	25,160	1.96
T ₃ RDN (50%) + Azo 5 kg ha ⁻¹ + 5 t FYM	58.12	4.77	8.50	30.8	15.45	13.678	1774	4100	22,920	1.78
T ₄ FYM 5 t ha ⁻¹ + Azo 5 kg ha ⁻¹	56.38	4.93	8.25	30.4	14.67	13.566	1694	3926	21,240	1.68
T ₅ FYM 5 t ha ⁻¹ alone	56.15	4.85	7.88	29.9	15.53	13.349	1622	4035	19,940	1.60
T ₆ FYM 10 t ha ⁻¹ + Azo 5 kg ha ⁻¹	59.42	4.95	8.67	30.4	16.15	13.751	1972	4167	24,800	1.69
T ₇ FYM 10 t ha ⁻¹ alone	59.75	4.93	8.62	31.6	16.07	13.799	1827	4202	22,040	1.52
T ₈ Azo 5 kg ha ⁻¹ alone	55.07	4.47	7.83	28.4	15.30	13.152	1580	3943	21,460	2.12
T ₉ RDF	61.17	5.02	8.80	33.1	16.05	13.725	1894	4219	26,260	2.26
T ₁₀ RDN (100%) + PSB 5 kg ha ⁻¹	56.65	4.97	8.30	30.2	15.78	13.816	1871	4133	26,530	2.44
T ₁₁ RDN (100%) + P (50%) + PSB 5 kg ha ⁻¹	62.08	5.47	8.93	35.1	16.50	14.250	1955	4296	27,770	2.45
T ₁₂ RDF + PSB 5 kg ha ⁻¹	63.75	5.48	9.25	36.3	17.30	14.620	2164	4495	31,510	2.68
SEm±	1.23	0.18	0.17	1.1	0.29	0.34	48	10.1	-	-
C D (P=0.05)	3.45	0.49	0.47	3.1	0.81	0.96	135	28.3	-	-
C V %	7.35	11.88	6.84	11.62	6.11	9.13	9.49	8.73	-	-

Azo = *Azotobacter* sp.; FYM = Farm yard manure; PSB = Phosphate solubilizing bacteria; RDF = Recommended dose of fertilizer; RDN = Recommended dose of nitrogen

Growth and yield attributes

The performance of fenugreek was better under recommended dose of nitrogen (RDN) with FYM and bio-fertilizer. Application of recommended dose of fertilizers (RDF) + PSB @ 5 kg ha⁻¹ recorded the highest plant height, number of branches plant⁻¹, length of pod and number of seeds pod⁻¹ and was significantly superior over rest of the treatments except RDN + *Azotobacter* sp. @ 5 kg ha⁻¹ + 5 t FYM ha⁻¹, RDF and RDN + P (50%) + PSB @ 5 kg ha⁻¹. Significantly the highest number of pods plant⁻¹ and test weight (1000-seed weight) were recorded under RDN + *Azotobacter* sp. @ 5 kg ha⁻¹ + 5 t FYM ha⁻¹. The results were similar with the earlier findings of Jat & Shaktawat (2001) and Jat *et al.* (2006).

Yield

All the treatments influenced the grain and straw yields of fenugreek appreciably (Table 1). The highest seed and straw yields were recorded with the application of RDF + PSB @ 5 kg ha⁻¹, which was significantly higher than all other treatments. The lowest grain yield was recorded with application of *Azotobacter* sp. @ 5 kg ha⁻¹ alone. The results

are in close conformity with the findings of Jat & Shekhawat (2001).

Economics

The highest net returns of Rs. 31,510 ha⁻¹ and benefit:cost ratio of 2.68 were obtained when the crop was fertilized through RDF with PSB @ 5 kg ha⁻¹.

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