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Research Article

FEASIBILITY OF ORGANIC NUTRIENT MANAGEMENT IN FENUGREEK (*TRIGONELLA FOENUM GRAECUM* L.)

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Abstract: An investigation conducted on calcareous sandy loam soil at Anand (Gujarat) during *rabi* season of 2016-17 to study the effect of organic nutrient management in fenugreek (*Trigonella foenum graecum* L.). Among the different nutrient management practices, significantly higher plant growth parameters were reported under treatment T_3 (Vermicompost @ 1.0 t ha^{-1}) and similarly, application of Vermicompost @ 1.0 t ha^{-1} (T_3) secured highest grain yield (2245 kg ha^{-1}) however, it remained at par with treatment T_7 (2190 kg ha^{-1}) and T9 (2053 kg ha^{-1}). Straw yield was significantly highest in T_3 (4572 kg ha^{-1}) compared to the lowest straw producing treatment T_1 (3246 kg ha^{-1}).

Keywords: *Vermicompost, Grain yield, Organic sources, Nutrient and Bio NP*

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Introduction

India is renowned world over for its repository of spices and is popularly called as "The land of spices". India has been from ancient times, regarded as the home of cultivated spice crops. The seed spices are group, which denotes all those annuals whose dried fruit or seeds are used as spices. The seed spices are aromatic vegetable products of tropical region mostly used in pulverised state, primarily for seasoning or garnishing food and beverages. Gujarat and Rajasthan states have emerged as "Seed Spices Bowl" and together contribute more than 80 % of the total seed spices produced in the country. While other states where spices commonly grown are Haryana, Punjab, Madhya Pradesh, Maharashtra, Bihar, Uttar Pradesh, West Bengal, Orissa, Tamil Nadu and Karnataka. Fenugreek (*Trigonella foenum graecum* L.) commonly known as Methi, is one of the important seed spices of India. Fenugreek is an annual plant belonging to sub family Papillionaceae of the family Leguminaceae. The genus "*Trigonella*" comprises of 50 species, mostly of mediterranean and oriental origin. It is believed that the place of origin of fenugreek lies between Iran and North India. Fenugreek is the third highest important seed spice in India (after coriander and cumin). Fenugreek is cultivated as leafy vegetable, condiment and medicinal crop. Fenugreek is cultivated worldwide under semi-arid agro-climatic condition having potential to fix atmospheric nitrogen and tolerant to mild salinity. Its roots are endowed with mini factory to synthesize nitrogen for plant. Nutrient supply through organic manures can fulfil the need of crop as fenugreek required lower amount of nutrients. The application of organic sources of nutrients viz, castor cake, vermicompost, compost, Bio NP reduce the dependence on chemical inputs and it not only acts as a sources of nutrients but also provides micronutrient as well as modifies the soil physical behaviour and increases the efficiency of applied nutrients. Vermi-composting influences the physico-chemical and biological properties of the soil, in turn improve the fertility. Fertilizers cost is increasing day by day, therefore, the farmers are looking for alternate sources, which may lower down the cost of cultivation along with maintaining the fertility status of soil. The response of organic sources with or without chemical fertilizers on a large number of crops have been reported by several workers, however, the information available on the fenugreek crop is meager.

Materials and Methods

A field experiment was conducted at College Agronomy Farm, Anand Agricultural University, Anand to study the effects of "Nutrient management through organic sources in fenugreek (*Trigonella foenum graecum* L.)" during the year 2016-17. Ten treatments comprising of nutrient management *viz*., T_1: No manures (Control), T_2: Compost @ 2.0 t ha^{-1}, T3:Vermicompost @ 1.0 t ha^{-1}, T_4: Castor Cake @ 0.5 t ha^{-1} ,T_5: Bio NP (*Rhizobium* and PSB), T_6: Compost @ 1.5 t ha^{-1} + Bio NP (*Rhizobium* and PSB), T_7:Vermicompost @ 0.5 t ha-1 + Bio NP(*Rhizobium* and PSB), T_8: Castor Cake @ 0.25 t ha^{-1} + Bio NP (*Rhizobium* and PSB), T_9: Compost @ 1.5 t ha^{-1} + Vermicompost @ 0.5 t ha^{-1}, T_{10}: Compost @ 1.5 t ha^{-1} + Castor Cake @ 0.25 t ha^{-1} were tested in randomized block design with four replications. The soil of the experimental field was sandy loam (locally known as Goradu soil); slightly alkaline in nature (pH 7.89) with good drainage and fair moisture retention capacity. The experimental soil was low in organic carbon (0.48 %) and available nitrogen (210.50 kg ha^{-1}), medium in available phosphorus (32.57 kg ha^{-1}) and fairly high in available potassium (312.06 kg ha^{-1}). The disease free healthy seed of fenugreek cv. Gujarat fenugreek 2 was sown during 5th November, 2016. The plot size of experimental plot was 2.4 x 4.0 m with spacing of 30 cm between two rows. All the recommended package of practice was adopted to raise healthy crop. Observations on different growth and yield parameters were recorded on 5 plants selected randomly and data obtained were analyzed statistically.

Results and Discussion

Growth

Plant height recorded at 60 DAS and at harvest was significant influenced due to different nutrient management treatments. Significantly higher plant height of 57.45 and 83.67 was reported under treatment T_3 (Vermicompost @ 1.0 t ha^{-1}) at 60 DAS and at harvest, respectively. However, it remained at par with treatments of T_2 (Compost @ 2.0 t ha^{-1}), T_5 (Bio NP (*Rhizobium* and PSB) @ 1.0 lit ha^{-1}), T_7 (Vermicompost @ 0.5 t ha^{-1}+ Bio NP (*Rhizobium* and PSB) @ 1.0 lit ha^{-1}), T_8 (Castor cake @ 0.25 t ha^{-1}+ Bio NP (*Rhizobium* and PSB) @ 1.0 lit ha^{-1}) and T_9 (Compost @ 1.5 t ha^{-1} + Vermicompost @ 0.5 t ha^{-1}). The appraisal of the result revealed that treatment T_3 (Vermicompost @ 1.0 t ha^{-1}) had apparently higher number of branches plant^{-1} (6.65).

Table-1 *Influence of nutrient management on growth parameter of fenugreek*

Treatment	Plant height (cm)		Number of branches plant^{-1}	Dry weight of root nodules at 40 DAS (mg plant^{-1})
	60 DAS	At harvest		
T_1: No manures (Control)	43.37	75.15	5.37	67.05
T_2: Compost @ 2.0 t ha^{-1}	50.97	73.37	5.67	69.83
T_3: Vermicompost @ 1.0 t ha^{-1}	57.45	83.67	6.65	128
T_4: Castor cake @ 0.5 t ha^{-1}	50.75	77.15	5.55	90.15
T_5: Bio NP (*Rhizobium* and PSB) @ 1.0 lit ha^{-1}	51.8	78.55	5.85	125.13
T_6: Compost @ 1.5 t ha^{-1} + Bio NP (*Rhizobium* and PSB) @ 1.0 lit ha^{-1}	50.62	78.3	6.05	93.63
T_7: Vermicompost @ 0.5 t ha^{-1}+ Bio NP (*Rhizobium* and PSB) @ 1.0 lit ha^{-1}	54.27	81.72	6.55	115
T_8: Castor cake @ 0.25 t ha^{-1}+ Bio NP (*Rhizobium* and PSB) @ 1.0 lit ha^{-1}	50.97	77.05	6.25	100
T_9: Compost @ 1.5 t ha^{-1} + Vermicompost @ 0.5 t ha^{-1}	51.75	75.75	6.02	91.18
T_{10}: Compost @ 1.5 t ha^{-1}+ Castor cake @ 0.25 t ha^{-1}	44.35	72.85	5.75	86.25
SEm ±	2.3	2.21	0.19	4.84
CD at 5%	6.68	6.4	0.54	14.03

Table-2 *Influence of nutrient management on yield parameter of fenugreek*

Treatment	Number of pods plant^{-1}	Seed yield (kg ha^{-1})	Straw yield (kg ha^{-1})
T_1: No manures (Control)	24.25	1443	3246
T_2: Compost @ 2.0 t ha^{-1}	31.50	1524	3508
T_3: Vermicompost @ 1.0 t ha^{-1}	39.00	2245	4572
T_4: Castor cake @ 0.5 t ha^{-1}	31.50	1722	3780
T_5: Bio NP (*Rhizobium* and PSB) @ 1.0 lit ha^{-1}	31.00	1880	3849
T_6: Compost @ 1.5 t ha^{-1} + Bio NP (*Rhizobium* and PSB) @ 1.0 lit ha^{-1}	31.25	1914	4078
T_7: Vermicompost @ 0.5 t ha^{-1}+ Bio NP (*Rhizobium* and PSB) @ 1.0 lit ha^{-1}	36.50	2190	4322
T_8: Castor cake @ 0.25 t ha^{-1}+ Bio NP (*Rhizobium* and PSB) @ 1.0 lit ha^{-1}	36.00	2031	4069
T_9: Compost @ 1.5 t ha^{-1} + Vermicompost @ 0.5 t ha^{-1}	30.50	2053	4296
T_{10}: Compost @ 1.5 t ha^{-1}+ Castor cake @ 0.25 t ha^{-1}	31.50	1964	4060
SEm ±	1.17	70.45	163.07
CD at 5%	3.39	204	473

However, it remained at par with treatments barring T_7 (Vermicompost @ 0.5 t ha^{-1}+ Bio NP (*Rhizobium* and PSB) @ 1.0 lit ha^{-1}) and T_8 (Castor cake @ 0.25 t ha^{-1}+Bio NP (*Rhizobium* and PSB) @ 1.0 lit ha^{-1}). In the case of dry weight root nodules, treatment T_3 (Vermicompost @ 1.0 t ha^{-1}) had apparently higher dry weight of root nodules at 40 DAS (128 mg). However, it remained at par with treatment T_5 and T_7. This might be due to vermicompost provide good source of major as well as micro nutrients to the crop throughout the season which help to increase plant height of fenugreek crop and friable condition to root development and also it help to increase bacterial population in the soil. These are in conformity with the results of Dhayal *et al*. (2012) [1], Dubey et al. (2012) [2], Patel *et al*. (2014) [3] and Naidu *et al*. (2016) [4].

Yields

Data pertaining to number of pods plant^{-1} (Table 2) revealed significant impact of various nutrient management treatments on number of pods plant^{-1} of fenugreek. It was obvious from the data that significantly higher number of pods plant^{-1} (39.00) was recorded under treatment T_3 (Vermicompost @ 1.0 t ha^{-1}). However, it remained at par with treatment T_7 (36.50), T_8 (36.00).Significantly higher seed yield (2245 kg ha^{-1}) was recorded under treatment T_3 (Vermicompost @ 1.0 t ha^{-1}). However, it remained at par with treatment T_7 (2190 kg ha^{-1}) and T_9 (2053 kg ha^{-1}). Results shown almost similar trend as seed yield and treatment T_3 (Vermicompost @ 1.0 t ha^{-1}), being at par with T_7 and T_9, produced significantly higher straw yield (4572 kg ha^{-1}). Treatment T_3 secured 28.98 % higher straw yield compared to the lowest straw producing treatment T_1 (3246 kg ha^{-1}). The beneficial effect on yield attributes might be also due to increased supply of all the essential nutrients by vermicompost which might have resulted in higher assemble of food and its subsequent partitioning to sink. The findings of present investigation are supported by those of Godara *et al*. (2014) and Naidu *et al*. (2016) [5]. Application of vermicompost @ 1 t ha^{-1} along with bio NPK significantly increased yield attributes and yield. Bio-fertilizers add nutrients through the natural processes of nitrogen fixation and stimulating plant growth through synthesis of growth promoting substances and might have positively influenced on the crop yield. The beneficial role of supplemented organic manures and bio-fertilizers in improving soil physical, chemical and biological role is well known, which in turn helps in better nutrient absorption by plants and resulting higher yield demonstrated similar results were published by Prabu *et al*. (2002)[6], Patel *et al*. (2010)[7] and Kumar *et al*. (2014)[8]. Application of vermicompost @1t ha^{-1} significantly enhanced the seed yield. The significant improvement in seed yield with the addition of vermi compost might be due to its positive influence on maintaining balanced source and sink relationship throughout growing season.

Conclusion

On the basis of concluded experiments, it could be concluded that growth and yield attributes of fenugreek can be increased with application of Vermicompost @ 1.0 t ha^{-1} (T_3) compare to other treatments.

Application of research: Study of response of different organic source of nutrient on fenugreek

Research Category: Agronomy

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Study area / Sample Collection: College Agronomy Farm, Anand Agricultural University, Anand

Cultivar / Variety name: Fenugreek - *Trigonella foenum graecum* L.

Conflict of Interest: None declared

Ethical approval: This article does not contain any studies with human participants or animals performed by any of the authors.
Ethical Committee Approval Number: Nil

References

[1] Dhayal L.R., Choudhary R., Choudhary R.S. and Sharma S.R. (2012) *Green Farming* 3 (6), 680-682.

[2] Dubey P.K.., Pandey C.S., Khanday A.S. and Mishra G. (2012) *International Journal of Food, Agriculture and Veterinary Science*, 2 (1), 12.

[3] Godara A.S., Gupta U.S., Lal G., & Singh R. (2014) *Int J Seed Spice*, 4 (2), 77-80.

[4] Jat N.L., Jain N.K., Choudhary G.R. (2006) *Indian Journal of Agronomy*, 51 (4), 331-333.

[5] Kumar R., Singh M.K., Kumar V., Verma R.K., Kushwah J.K. & Pal M. (2015) *Indian J Agric Res*., 49 (3), 278-281.

[6] Naidu M., Rao D.V., Sarkar D.K., Reddy K.C. and Shiva Shankar A. (2016) *Journal of Agroecology and Natural Resource Management*, 3 (1), 33-36.

[7] Patel B.S., Patel S.G., Patel S.P. and Amin A.U. (2010) *Journal of Spices and Aromatic Crops*, 19 (1 & 2), 68-70.

[8] Patel D.M., Patel G.N. and Patel J.C. (2014) *Research on Crops*, 15 (2), 526-531.

[9] Prabu T., Narwadkar P.R., Sajindranath A.K. and Rathod N.G. (2002) *South Indian Horticulture*, 50 (4-6), 680-684.