

EVALUATION OF THE EFFECTS OF NITROGEN ON GROWTH AND YIELD ATTRIBUTES OF FENUGREEK (*Trigonella foenum-graecum*) UNDER JATROPHA BASED AGROFORESTRY SYSTEM

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ABSTRACT: An experiment was carried out during 2015-2016 to study the effect of rhizobium and nitrogen levels on the growth and yield of Fenugreek (*Trigonella foenum-graecum*) in SHIATS, Allahabad-211007, U.P., India. Fenugreek seeds were treated with rhizobium and sown with different levels of Nitrogen and full dose of P and K. An experiment based on a Randomized Block Design with three replications was used. Nitrogen treatments included six levels with Control, traits including plant height, number of branches, number of pods/ plant, number of seeds/ pod, 1000 seed weight and seed yield were measured. The result revealed that growth parameters viz., plant height and number of branches were significantly better in T₄ [N₈₅+P₁₀₀+K₁₀₀+FYM]. Yield attributes was also highest in T₄ [N₈₅+P₁₀₀+K₁₀₀+FYM] Analysis of variance showed that they were statistically significant.

KEYWORDS: Fenugreek, Basal application, Rhizobium, Nitrogen, Urea.

Trees play an important role in ecosystem in all terrestrials and provide a range of products and services to rural and urban people. As natural vegetation is cut for agriculture and other types of development, the benefits that trees provide are best sustained by integrating trees into agricultural system a practice known as agroforestry. Farmers have practiced agroforestry since ancient times. Agroforestry focuses on the wide range of trees grown on farms and other rural areas. Among these are fertilizer trees for land regeneration, soil health and food security; fruit trees for nutrition; fodder trees for livestock; timber and energy trees for shelter and fuel wood; medicinal trees to cure diseases and trees for minor products viz. gums, resins or latex products. Many of these trees are multipurpose, providing a range of benefits. According to the 2001 report of the Forest Survey of India, the forest cover in the country is 675,538 sq.km, constituting 20.55% of its total geographical area. Out of this, dense forest constitutes 2.68% and open forest 7.87%. The forest cover in the hilly districts is only 38.34% compared with the desired 66% area. The National Agriculture Policy (2000) emphasized the role of agroforestry for efficient nutrient cycling, nitrogen fixation, organic matter addition and for improving drainage and underlining the need for diversification by promoting integrated and holistic development of rainfed areas on watershed basis through involvement of community to augment biomass production through agroforestry and farm forestry.

Fenugreek

Fenugreek is a self-pollinated small seeded annual legume, which is grown as vegetable, fodder and seed crop. Green leaves are good source of protein, mineral

and vitamin C, and seed contain high level of iron and dried plants are used as insect and pest repellent in grain storage (Billaud and Adrian, 2001). Fenugreek seed has been found beneficial in many diseases. Disrupted free radical metabolism in diabetic animals may be normalized by fenugreek seed supplementation in the diet (Ravikumar and Anuradha, 1999).

Jatropha

Jatropha belongs to the family Euphorbiaceae and botanical name, as *Jatropha curcas* L. has its economic importance as alternative fossil fuel. It is hardly regular bearing and having different medicinal properties which can be grown in different kinds of soil eg., loam, sandy loam, alluvial, sandy, gravelly, mild stonning undulated etc., which have no water logging condition. Cultivation of Jatropha is very important for alternative, fossil fuel for future transport. The Jatropha has very useful in ayurvedic medicines and several other industries. It has secured by annual production with involving low input depending upon source of irrigation and favourable agro-climatic conditions. This can help the farmer in regular income generation (Tandon, 2000; Karemull *et al.*, 2003).

Materials and Methods

The experiment was carried out in the School of Forestry and Environment, Department of Agroforestry, SHIATS, Allahabad-211007, India during the growing season of 2015- 2016. The soil characteristic of the experiment is shown in Table 1. An experiment based on Randomized Block Design with three replications was used. Treatments included six levels of Nitrogen with Control. Each replication

consisted of 7 plots. The net plot size was 2x2m. Fenugreek seeds were sown on November 18 manually and irrigation was done twice after sowing followed by hand weeding and also earthing up of the soil. Data were recorded for plant height, number of branches,

number of pods/ plant, number of seeds/ pod, 1000 seed weight and seed yield. Data collected were analysed statistically using ANOVA table. The means differences among the treatments were compared by least significant difference test (LSD) at 0.05 levels.

Table 1: Soil characteristics of the site

Sand (%)	Silt (%)	Clay (%)	Textural Class	Organic carbon (%)	Nitrogen (N) kg ha ⁻¹	Phosphorus (P) kg ha ⁻¹	Potassium (K) kg ha ⁻¹	Soil pH	EC (dSm ⁻¹)
52	28	20	Sandy loam	0.45	148	22.5	322	7.7	0.48

RESULTS AND DISCUSSION

The analysis of variance showed that Nitrogen levels significantly affect growth and yield components *i.e.*, plant height, number of branches, number of pods/ plant, number of seeds/ pod, 1000 seed weight and seed yield (Table 2). All the growth and yield parameters were recorded to be maximum in T₄ [N₈₅+P₁₀₀+K₁₀₀+FYM] and minimum was recorded in Control. From these findings it indicates clearly that maximum number of pods/ plant and number of seeds/ pod increased with the application of the above mentioned concentration of fertilizers. Khiriya *et al.* (2001), B. Dutta *et al.* (2005), found similar findings. Sharma *et al.* (2000), Jat and Shaktawat (2001) and Data and Verma (2000) also reported similar findings.

CONCLUSION

Soil application of fertilizers, marginally improved yield in fenugreek and the study shows that significantly highest seed yield was released with T₄ [N₈₅+P₁₀₀+K₁₀₀+FYM]. The said treatment, from the economic point of view also released highest benefit cost ratio. To arrive at final conclusion the investigation need to be conducted at multinational sites of the valley for sustaining productivity.

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Table 2: Effect of Nitrogen on the growth and yield components of Fenugreek (*Trigonella foenum-graecum*) during the cropping year (2015-2016)

Treatments	Plant height			No of branches per plant			Number of pods per plant	Number of seeds per pod	1000 seed weight (g)	Seed yield(q/ha)
	30 DAS	60 DAS	90 DAS	30 DAS	60 DAS	90 DAS				
T₀	5.42	12.81	19.71	3.20	6.96	9.27	21.93	14.07	10.67	10.97
T₁	7.49	16.05	20.69	3.33	10.45	12.67	32.27	16.67	11.87	20.52
T₂	6.41	14.86	22.08	3.13	10.68	14.00	36.40	16.60	11.99	20.77
T₃	7.28	16.75	23.27	3.73	12.23	14.13	37.07	16.53	11.69	23.09
T₄	6.88	19.33	23.35	4.40	12.71	13.70	41.93	17.60	11.72	24.28
T₅	6.01	13.97	19.75	3.33	9.34	11.90	29.87	15.73	11.31	17.34
T₆	4.86	12.85	20.35	3.53	9.43	11.77	27.67	15.40	11.30	14.97
F- test	S	S	S	S	S	S	S	S	S	S
S. Ed. (±)	0.644	1.097	1.965	0.497	1.095	1.238	4.84	0.651	0.3664	2.066
C. D.(P = 0.05)	1.402	2.391	4.281	1.082	2.385	2.697	10.56	1.419	0.7983	4.502

