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Studies on the influence of nitrogen levels and herb harvests on the growth and yield of fenugreek (*Trigonella foenum-graecum* L.) cv. Ajmer fenugreek-1

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Abstract

The present experiment was conducted to determine Studies on the influence of nitrogen levels and herb harvests on the growth and yield of fenugreek (*Trigonella foenum-graecum* L.) Cv. Ajmer Fenugreek-1 under Southern Telangana agro-climatic conditions in the Department of Plantation, spices, medicinal and aromatic crops, was conducted during *kharif* season (August 2017 to December 2017) at the Department of Plantation, Spices, Medicinal and Aromatic crops section, College of Horticulture, Hyderabad. The laboratory experiment was conducted in Factorial Randomized Block Design with three replications and Nitrogen was applied at three levels (30, 45 and 60 kg/ha). Application of nitrogen at different levels had a significant impact on growth and yield parameters of fenugreek recorded during the course of investigation different treatments. The result reveals that application of nitrogen at 60 kg per hectare improved and recorded maximum values for all the growth and yield parameters such as plant height, number of branches per plant, fresh and dry weight per plant, fresh and dry herb yield, number of pods per plant, pod length, number of seeds per pod, test weight of seeds, seed yield, biological yield, harvest index, NPK content and uptake. However, there was significant delay in flowering and maturity with 60 kg nitrogen per hectare. Among the harvesting practices (single, double and no herb harvest), the uncut plants showed maximum plant height, early flowering and maturity.

Keywords: fenugreek, nitrogen levels, factorial randomized block design, NPK content.

Introduction

Indian spices are adding flavour, taste, aroma, colour and pungency to the world food. Indian spices have earned high reputation in the international market and India is the largest seed spice producing and exporting country in the world. Among the 63 spices grown in the country, 17 are seed spices.

Fenugreek (*Trigonella foenum-graecum* L.) commonly known as *Greekayes* and also *Methi* is an annual legume seed spice. It is a multi-purpose crop, where, leaves are used as vegetable, seeds as spice and flavouring agent, besides having number of medicinal uses. Its fresh and tender leaves are rich in iron, calcium, protein, vitamins and essential amino acids.

In fenugreek, both herb and seeds are the economic parts. In North India, the crop is grown for seed, while in South India, it is a green leafy vegetable. Among different nutrient elements required by the plants for their growth and development, nitrogen is most important and has direct role in the nutrient metabolism and photosynthesis process. It plays a key role in the growth and seed yield of the crop. An adequate supply of nitrogen to fenugreek will also improve source to sink relationship leading to higher productivity.

Keeping in view the vital role of nitrogen in improving the herbage and seed yield of crops, the present study was taken up to explore the possibility of raising fenugreek as a dual purpose crop in Hyderabad with one or two herb harvests and ultimately leaving it for seed with varied levels of nitrogen. Though research data is available on nutrient management of fenugreek especially in the traditional fenugreek growing areas such as Rajasthan and Gujarat, the systemic research on the nitrogen requirements and raising it as a dual purpose crop under the Hyderabad condition is not taken up so far.

Material and Methods

The present study entitled Studies on the influence of nitrogen levels and herb harvests on the growth and yield of fenugreek (*Trigonella foenum-graecum* L.), Cv. Ajmer Fenugreek-1 was conducted during *kharif* season (August 2017 to December 2017) at the Department of plantation, Spices, Medicinal and Aromatic crops section, College of Horticulture, Hyderabad.

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Details of methods followed and material used in the experiment are detailed below.

Location

The experiment will be conducted at the Department of Plantation, Spices, Medicinal and Aromatic crops section, College of Horticulture, Hyderabad

Experimental Site

The site of experiment plot is located at an elevation of 543.2 meters or 1782.2 feet above MSL at 17° 33' latitude and 78° 41' longitude.

Details of Treatment

Factor-1:

Nitrogen Levels-3

N₁: 30 kg nitrogen per hectare

N₂: 45 kg nitrogen per hectare

N₃: 60 kg nitrogen per hectare

Factor-2:

Herb harvests-3

C₀: No cut

C₁: Single cutting at 30 Days after sowing (DAS)

C₂: Double cuts at 30 and 60 DAS

Treatment combinations

T₁: N₁C₀- 30: 40: 20 Kg/ha NPK+ without herb harvest

T₂: N₁C₁- 30: 40: 20 Kg/ha NPK+ herb harvest at 30 DAS

T₃: N₁C₂- 30: 40: 20 Kg/ha NPK +herb harvests at 30 and 60DAS

T₄: N₂C₀- 45: 40: 20 Kg/ha NPK+ without herb harvest

T₅: N₂C₁- 45: 40: 20 Kg/ha NPK+ herb harvest at 30 DAS

T₆: N₂C₂- 45: 40: 20 Kg/ha NPK+ herb harvests at 30 and 60DAS

T₇: N₃C₀- 60: 40: 20 Kg/ha NPK+ without herb harvest

T₈: N₃C₁- 60: 40: 20 Kg/ha NPK+ herb harvest at 30 DAS

T₉: N₃C₂- 60: 40: 20 Kg/ha NPK+ herb harvests at 30 DAS and 60DAS

Results and Discussion

Fresh herb yield (kg/ha)

Various levels of nitrogen and harvesting practices had a significant impact on cumulative herb yield (kg/ha) of fenugreek (Table 1).

Application of 60 kg per hectare of nitrogen resulted in maximum cumulative herb yield of 1578.67 kg per hectare (N₃), which was followed by nitrogen at 45 kg per hectare recording 1503.0 kg cumulative herb yield. While, the minimum cumulative herb yield (1239.42 kg/ha) was recorded with nitrogen application at 30 kg per hectare per plant (N₁). With regard to cutting practices, double cut at 60 DAS resulted in maximum cumulative herb yield (1794.44 kg/ha) followed by the single cut recording a fresh herb yield of 1086.28 kg per hectare.

The interaction of nitrogen levels and harvest practices had a significant influence on cumulative herb yield of fenugreek. The treatment combination of nitrogen at 60 kg per hectare with double cut (N₃C₂) recorded maximum cumulative herb yield (1958.0 kg/ha) while, the minimum cumulative herb yield (932.83 kg/ha) was recorded in the plants which received nitrogen at 30 kg per hectare and harvested only once (N₁C₁).

Dry herb yield (kg/ha)

Application of different nitrogen levels and harvesting practices had a significant impact on cumulative dry herb yield (kg/ha) of fenugreek (Table 1).

Significantly maximum cumulative dry herb yield (346.17 kg/ha) was recorded with highest level of nitrogen at 60 kg per hectare (N₃) followed by nitrogen at 45 kg per hectare recording 333.28 kg cumulative dry herb yield per hectare. Whereas, minimum cumulative dry herb yield (291.08 kg/ha) was recorded with lowest level of nitrogen application at 30 kg per hectare per plant (N₁). Similarly, double cut at 60 DAS resulted in maximum cumulative dry herb yield (449.83 kg/ha) followed by the single cut recording a fresh herb yield of 197.19 kg per hectare.

The combination of nitrogen levels and harvest practices had a significant influence on cumulative dry herb yield. In the plants applied with nitrogen at 60 kg per hectare with double cut (N₃C₂) noticed the highest cumulative dry herb yield (467.57 kg/ha), while, the minimum cumulative dry herb yield (162.0 kg/ha) was recorded in the plants which received nitrogen at 30 kg per hectare and harvested once (N₁C₁).

Table 1: Fresh herb yield (kg/ha) and Dry herb yield (kg/ha) of fenugreek (*Trigonella foenum-graecum* L.) as influenced by different levels of nitrogen and herb harvest

Treatment	Fresh herb yield (kg/ha)			Dry herb yield (kg/ha)		
	C ₁	C ₂	Mean	C ₁	C ₂	Mean
N ₁	932.83	1546.00	1239.42	162.00	420.17	291.08
N ₂	1126.67	1879.33	1503.00	204.80	461.77	333.28
N ₃	1199.33	1958.00	1578.67	224.77	467.57	346.17
Mean	1086.28	1794.44		197.19	449.83	
	S.Em±	C.D (5%)		S.Em±	C.D (5%)	
N	11.402	34.210		2.766	8.300	
C	13.969	41.910		3.386	10.160	
NXC	19.755	59.270		4.790	14.370	

Legend:

Nitrogen Levels

N₁: 30 kg nitrogen per hectare

N₂: 45 kg nitrogen per hectare

N₃: 60 kg nitrogen per hectare

Herb harvests

C₀: No cut

C₁: Single cutting at 30 Days after sowing (DAS)

C₂: Two cuttings at 30 and 60 DAS

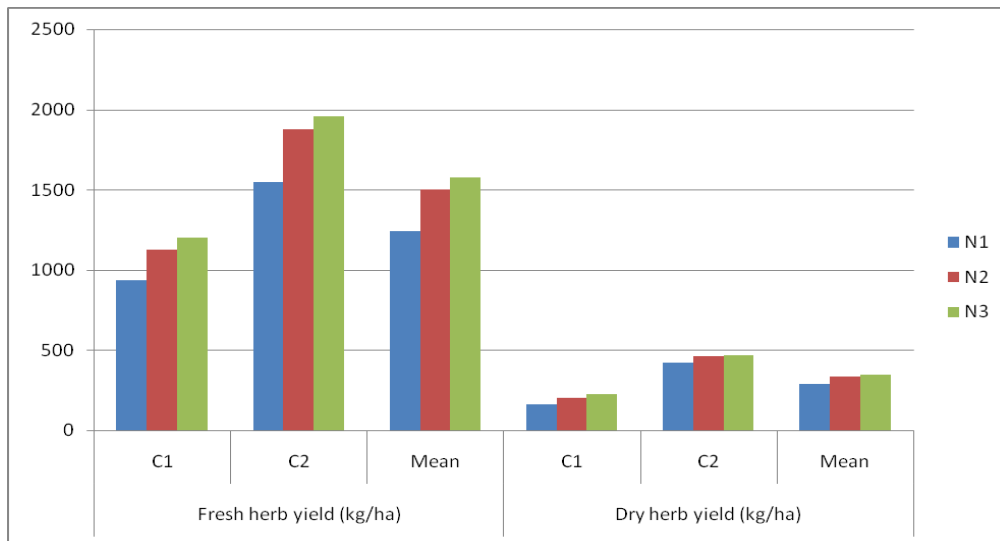
**Legend:****Nitrogen Levels**N₁: 30 kg nitrogen per hectareN₂: 45 kg nitrogen per hectareN₃: 60 kg nitrogen per hectare**Herb harvests**C₀: No cutC₁: Single cutting at 30 Days after sowing (DAS)C₂: Two cuttings at 30 and 60 DAS

Fig 1: Fresh herb yield (kg/ha) and Dry herb yield (kg/ha) of fenugreek (*Trigonella foenum-graecum* L.) as influenced by different levels of nitrogen and herb harvest:

Seed yield (kg/ha)

Seed yield of fenugreek as influenced by varied levels of nitrogen and herb harvests have been presented in the table 2, which clearly indicates the significant impact of nitrogen levels in all the various treatments. Similarly, the harvesting practices and their interactions also had a significant influence on seed yield.

Maximum seed yield of 1003.44 kg/ha was recorded with highest level of nitrogen at 60 kg per hectare (N₃) followed by nitrogen at 45 kg per hectare recording 991.56 kg per hectare seed yield. Whereas, the minimum seed yield (958.33 kg/ha) was recorded with plants applied with nitrogen at 30 kg per hectare (N₁). Similarly single cut plants resulted in maximum seed yield (1173.0 kg/ha) which was *at par* with uncut recording a seed yield of 972.22 kg per hectare. The lowest seed yield (808.11 kg/ha) was recorded in the plants subjected to double leaf harvest.

With regard to treatments combination, nitrogen levels and harvest practices had a significant influence on seed yield. The interaction of nitrogen at 60 kg per hectare with single cut plants (N₃C₁) caused for the maximum seed yield of 1186.67 kg per hectare, while it was *at par* in the plants applied with 60 kg per hectare and uncut plants (N₃C₀) weighting 1007.0 kg per hectare of seeds. The minimum seed

yield (791.33 kg/ha) was noticed in the treatment which received nitrogen at 30 kg per hectare and harvested twice (N₁C₂) for leaf.

Straw yield

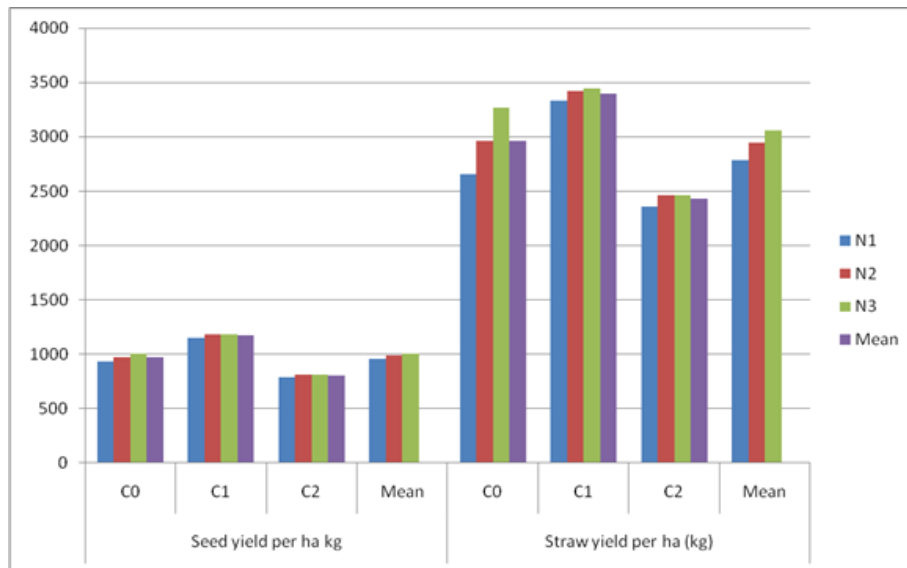
Various levels of nitrogen and harvesting practices had a significant impact on straw yield of fenugreek (Table 2).

Application of nitrogen at 60 kg per hectare (N₃) produced maximum straw yield of 3058.56 kg per hectare. While plants supplied with nitrogen at 45 kg per hectare resulted in 2946.56 kg per hectare of straw yield. The lowest straw yield (2781.56 kg/ha) was recorded with nitrogen application at 30 kg per hectare (N₁). Similarly, single cut at 30 DAS resulted in maximum straw yield (3397.67 kg/ha) which was followed by the uncut plants producing a straw yield of 2960.44 kg per hectare. The minimum straw yield (2428.56 kg/ha) was recorded in (C₂).

Varied levels of nitrogen levels and herb harvests combination had a significant impact on straw yield of fenugreek. The combination of nitrogen at 60 kg per hectare with single cut (N₃C₁) recorded maximum straw yield (3442.67 kg/ha), while, the minimum straw yield (2359.67 kg/ha) was recorded in the treatment which received nitrogen at 30 kg per hectare and harvested twice (N₁C₂) for leaf.

Table 2: Seed and straw yield (kg/ha) of fenugreek (*Trigonella foenum-graecum* L.) as influenced by various nitrogen levels and leaf harvests:

Treatment	Seed yield per ha kg				Straw yield per ha (kg)			
	C ₀	C ₁	C ₂	Mean	C ₀	C ₁	C ₂	Mean
N ₁	936.33	1147.33	791.33	958.33	2653.33	3331.67	2359.67	2781.56
N ₂	973.33	1185.00	816.33	991.56	2959.67	3418.67	2461.33	2946.56
N ₃	1007.00	1186.67	816.67	1003.44	3268.33	3442.67	2464.67	3058.56
Mean	972.22	1173	808.11		2960.44	3397.67	2428.56	
	S.Em±		C.D (5%)		S.Em±		C.D (5%)	
N	1.03		3.11		6.12		18.38	
C	1.03		3.11		6.13		18.38	
NXC	1.79		5.38		10.61		31.83	

**Legend:****Nitrogen Levels**N₁: 30 kg nitrogen per hectareN₂: 45 kg nitrogen per hectareN₃: 60 kg nitrogen per hectare**Herb harvests**C₀: No cutC₁: Single cutting at 30 Days after sowing (DAS)C₂: Two cuttings at 30 and 60 DAS**Fig 2:****Reference**

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