

## International Journal of Advanced Biochemistry Research



ISSN Print: 2617-4693  
 ISSN Online: 2617-4707  
 IJABR 2024; SP-8(2): 541-543  
[www.biochemjournal.com](http://www.biochemjournal.com)  
 Received: 15-11-2023  
 Accepted: 25-01-2024

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## Effect of time of sowing and seed rate on seed yield and economics of fenugreek

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DOI: <https://doi.org/10.33545/26174693.2024.v8.i2Sg.638>

### Abstract

The field research experiment was carried out on medium deep black soil at the Horticulture Research and Extension Station, Devihosur, Haveri, Karnataka for four years (2017, 2018, 2019, and 2020) during *rabi* seasons. The interaction effect of November I fortnight sowing with seed rate 15 kg per ha recorded significantly higher fenugreek seed yield of 1476 kg per ha. With respect to economic returns, November I fortnight sowing with 15.0 kg per ha seed rate recorded significantly highest gross returns and net returns (Rs. 81,180 and Rs. 62,560, respectively). However, it was on par with the interaction effect of November I fortnight sowing with 12.5 kg per ha seed rate and November II fortnight sowing with 12.5 kg per ha seed rate for gross returns and net returns.

**Keywords:** Fenugreek, seed rate, time of sowing and economics

### Introduction

A perennial plant noted for its flavor, curry powder, and spice is fenugreek (*Trigonella foenum-graecum* L., family: Leguminosae) (Betty, 2008) [3]. The crop was originated from Southeast Asia and West Asia. India, Egypt, Argentina, China, and America are among the countries where it is now commonly grown. As vegetables, food supplements and fodder, both seeds and green leaves are utilized in South and Central Asian nations (Petropoulos, 2002) [9]. In America, fenugreek is cultivated for green manuring. Due to their hypoglycemic, antilipidemic, anticarcinogenic and cholagogic qualities, fenugreek seeds are widely used in human medicine to treat hypercholesterolemia, cancer and diabetes mellitus (Meghwal and Goswami, 2012) [8]. Because it has a short growing season, fenugreek can be grown in various cropping systems. Fenugreek is cultivated as a *rabi* crop just after the primary *kharif* crops, such as cotton, paddy, and chillies, are harvested. Among the different factors, the seed rate and planting date will directly affect the fenugreek plant's growth and yield. The growth, yield, and quality of the crop are all negatively impacted by the monsoon's variability, which has caused the planting period to be postponed (Abou Shleel, 2014) [1]. Due to its low water requirements, the crop does well in the cropping system in semi-arid and rain-fed conditions. Because it is cultivated on marginal lands with low fertility, the productivity is still relatively low despite its economic significance (Deora *et al.*, 2009) [5]. The lack of sophisticated production technologies is the main reason. Consequently, an experiment was conducted to ascertain the optimal timing to sow the seeds and the optimum quantity required in order to attain the maximum yield during Karnataka's winter season.

### Materials and Methods

During the *rabi* season, a field research experiment was carried out on medium deep black soil at the Horticulture Research and Extension Station, Devihosur, Haveri, Karnataka for four years (2017, 2018, 2019, and 2020). Haveri local variety was the used. The experiment was laid out in split plot design with three main and four subplot treatments were replicated thrice. The main plot treatments were time of sowing *viz.*, T<sub>1</sub>: II fortnight of October, T<sub>2</sub>: I fortnight of November and T<sub>3</sub>: II fortnight of November and subplot treatments comprises of the seed rate *viz.*, S<sub>1</sub>: 10.0 kg/ha, S<sub>2</sub>: 15.0 kg/ha, S<sub>3</sub>: 20 kg/ha and S<sub>4</sub>: 25 kg/ha.

All other necessary crop husbandry practices were taken up to raise the crop. The cost of cultivation, gross return and net returns were worked out based on the four years average local market price of the inputs and output. The fenugreek powdery mildew disease intensity as per the scale (Rathi and Tripathi, 1994) <sup>[10]</sup> mentioned below were selected from each replication.

#### Scale Disease intensity

- 0: 00-05%  
1: 06-20%  
2: 21-40%  
3: 41-60%  
4: 61-80%  
5: > 80%

### Results and Discussion

#### Yield

The four year pooled data (2017, 2018, 2019 and 2020) of the fenugreek experiment revealed that, (Table 1) the significant differences were noticed with the time of sowing. Fenugreek seed sown in the first fortnight of November yielded a significantly higher seed yield of 1368 kg/ha and the second fortnight's sowing yield was 1283 kg/ha. With October II fortnight sowing, the significantly lowest seed yield (981 kg/ha) was recorded. The seed rate of 15.0 kg per ha produced a fenugreek seed yield of 1305 kg per ha, which was significantly greater than the other seed rates. A seed rate of 10.0 kg per ha resulted in a noticeably reduced seed yield (1056 kg/ha). The interaction of time of sowing and seed rate differed significantly for seed yield. The interaction effect of November I fortnight sowing with seed rate 15 kg per ha recorded significantly higher seed yield of 1476 kg per ha. The next best interaction was noticed with the sowing in November II fortnight seed rate of 12.5 kg per ha has recorded the seed yield of 1450 kg per ha. The significantly lower seed yield (785 kg/ha) was recorded with October II fortnight sowing with rate 10.0 kg per ha. Similar findings were also noticed by Arora *et al.* (1971) <sup>[2]</sup> and Kurubetta *et al.* (2010) <sup>[7]</sup> in cowpea.

The increased fenugreek seed yield with interaction of November I fortnight was mainly due to the congenial weather conditions favourable for the growth and development of the crop. The increased yield was also

supported by the increased contribution of growth and yield parameters. Similar results were also noticed in cowpea by Yadav (2003) <sup>[11]</sup>.

#### Economics

Significantly highest gross return of Rs. 75, 240 per ha was recorded with fenugreek sown during I fortnight of November (Table 2) which was followed by fenugreek sown in II fortnight of November and II fortnight of October (Rs. 70,565 an Rs. 53,955 per ha, respectively). The similar trend was also noticed with respect to net returns *i.e* significantly highest net return of Rs. 57,120 per ha and B:C ratio of 4.2 was observed with November I fortnight sowing compared to other time of sowings. Among the different seed rates, the significantly highest gross returns, net returns and B:C ratio (Rs. 71,775, Rs. 53,155 and 3.9, respectively) were recorded with the seed rate 15.0 kg per ha as compared to others.

Among the interaction effects, the November I fortnight sowing with 15.0 kg per ha seed rate recorded significantly highest gross returns and net returns (Rs. 81,180 and Rs. 62,560, respectively). However, it was on far with the interaction effect of November I fortnight sowing with 12.5 kg per ha seed rate and November II fortnight sowing with 12.5 kg per ha seed rate for gross returns and net returns. The findings are in conformity with the Deepa *et al.* (2017) <sup>[4]</sup> and Kakani *et al.* (2021) <sup>[6]</sup>. Significantly highest B:C ratio (4.5) was noticed with interaction effect of November II fortnight sowing with 12.5 kg per ha, however it was found on par with the interaction of T<sub>2</sub>S<sub>1</sub>, T<sub>2</sub>S<sub>2</sub> and T<sub>2</sub>S<sub>3</sub>.

#### Powdery mildew Disease

The incidence of powdery mildew disease (PDI) was found to be significantly less (Table 2) with fenugreek sown in II fortnight of November (3.5) however it was found on par with November I fortnight sowing. Among the different seed rates significantly least incidence of powdery mildew disease (4.1) was noticed with the seed rate of 10.0 kg per ha. However, it was found at par with the seed rate of 12.5 kg and 15.0 kg per ha. Among the interaction effects least incidence of powdery mildew disease (3.0) was noticed with November I fortnight sowing with 12.5 kg per ha seed rate. However, it was it was found on par with T<sub>3</sub>S<sub>1</sub>, T<sub>3</sub>S<sub>2</sub>, T<sub>2</sub>S<sub>1</sub> and T<sub>2</sub>S<sub>3</sub>.

**Table 1:** Effect of time of sowing and seed rate on seed yield, gross returns and cost of cultivation of fenugreek

Time of Sowing (T)	Seed Yield (kg/ha)					Gross return (Rs.)					Cost of cultivation (Rs.)				
	Seed rate (S) (kg/ha)														
	S <sub>1</sub> -10.0	S <sub>2</sub> -12.5	S <sub>3</sub> -15.0	S <sub>4</sub> -17.5	Mean	S <sub>1</sub> -10.0	S <sub>2</sub> -12.5	S <sub>3</sub> -15.0	S <sub>4</sub> -17.5	Mean	S <sub>1</sub> -10.0	S <sub>2</sub> -12.5	S <sub>3</sub> -15.0	S <sub>4</sub> -17.5	Mean
T <sub>1</sub> : October II Fortnight	785	873	1067	1199	981	43175	48015	58685	65945	53955	16620	17620	18620	19620	18120
T <sub>2</sub> :November I Fortnight	1265	1409	1476	1322	1368	69575	77495	81180	72710	75240	16620	17620	18620	19620	18120
T <sub>3</sub> :November II Fortnight	1118	1450	1371	1193	1283	61490	79750	75405	65615	70565	16620	17620	18620	19620	18120
Mean	1056	1244	1305	1238	1211	58080	68420	71775	68090	66605	16620	17620	18620	19620	18120
	S.Em <sub>±</sub>		C.D @ 5%			S.Em <sub>±</sub>		C.D @ 5%			S.Em <sub>±</sub>		C.D @ 5%		
Main (T)	17.3		70.0			1065.9		4200							
Sub (S)	12.51		33.0			772.4		2703							
Interaction (TXS) at same levels	26.23		58.0			1620.3		NS							
Interaction (TXS) at diff. levels	28.48		105.0			1758.8		5223							

**Table 2:** Influence of time of sowing and seed rate on net returns, benefit cost ratio and powdery mildew incidence in fenugreek

Time of Sowing (T)	Net return (Rs.)					B:C Ratio					Powdery Mildew (PDI)				
	Seed rate (S) (kg/ha)														
	S <sub>1</sub> -10.0	S <sub>2</sub> -12.5	S <sub>3</sub> -15.0	S <sub>4</sub> -17.5	Mean	S <sub>1</sub> -10.0	S <sub>2</sub> -12.5	S <sub>3</sub> -15.0	S <sub>4</sub> -17.5	Mean	S <sub>1</sub> -10.0	S <sub>2</sub> -12.5	S <sub>3</sub> -15.0	S <sub>4</sub> -17.5	Mean
T <sub>1</sub> : October II Fortnight	26555	30395	40065	46325	35835	2.6	2.7	3.2	3.4	3.0	6.4	6.3	5.2	6.7	6.2
T <sub>2</sub> : November I Fortnight	52955	59875	62560	53090	57120	4.2	4.4	4.4	3.7	4.2	3.7	3.0	3.7	4.4	3.7
T <sub>3</sub> : November II Fortnight	44870	62130	56785	45995	52445	3.7	4.5	4.0	3.3	3.9	2.2	3.0	4.5	4.4	3.5
Mean	41460	50800	53155	48470	48485	3.5	3.9	3.9	3.5	3.7	4.1	4.1	4.5	5.2	4.5
	S.Em <sub>±</sub>		C.D @ 5%			S.Em <sub>±</sub>		C.D @ 5%			S.Em <sub>±</sub>		C.D @ 5%		
Main (T)	964.5		3800			0.08		0.3			0.53		2.1		
Sub (S)	698.9		2446			0.06		0.2			0.39		1.0		
Interaction (TXS) at same levels	1465.9		NS			0.12		NS			0.81		NS		
Interaction (TXS) at diff. levels	1591.3		4726			0.13		0.4			0.88		2.3		

## Conclusion

The study on fenugreek cultivation has illuminated the significant impact of sowing time and seed rate on both yield and economic returns, as well as disease management. The findings conclusively demonstrated that sowing in the first fortnight of November, especially at a seed rate of 15.0 kg per ha, leads to the highest seed yield and economic returns. This optimal timing and seed rate benefit from favorable weather conditions conducive to the crop's growth and development, enhancing both growth and yield parameters.

Economically, the early November sowing, particularly with a seed rate of 15.0 kg per ha, produced the highest gross and net returns, showcasing the profitability of this cultivation strategy. These results align with previous studies, reinforcing the importance of strategic timing and seed density in maximizing agricultural income.

Furthermore, the study highlights the relevance of sowing time and seed rate in managing powdery mildew disease incidence. The lower disease prevalence associated with specific sowing times and seed rates underscores the potential for integrated pest management strategies that incorporate cultural practices.

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