Journal of Pharmacognosy and Phytochemistry

Available online at www.phytojournal.com

**E-ISSN:** 2278-4136
**P-ISSN:** 2349-8234
JPP 2018; 7(4): 93-96
Received: 23-05-2018
Accepted: 27-06-2018

**Pawan Kumar**
Department of vegetable Science, CCS, Haryana Agricultural University, Hisar, Haryana, India

**SK Phor**
Department of vegetable Science, CCS, Haryana Agricultural University, Hisar, Haryana, India

**SK Tehlan**
Department of vegetable Science, CCS, Haryana Agricultural University, Hisar, Haryana, India

**Amit Kumar Mathur**
Division of vegetable Science, Indian Agricultural Research Institute, New Delhi, India

**Correspondence**
**Pawan Kumar**
Department of vegetable Science, CCS, Haryana Agricultural University, Hisar, Haryana, India

# Effect of seed rate and row spacing on growth and yield of fenugreek (*Trigonella foenum-graecum*)

**Pawan Kumar, SK Phor, SK Tehlan and Amit Kumar Mathur**

**Abstract**
A field experiment was conducted at Chaudhary Charan Singh Haryana Agricultural University, Hisar to evaluate the effect of seed rate and row spacing on growth and yield of fenugreek (*Trigonella foenum-graecum*) cv. Hisar Sonali. The treatment comprised of three rows spacing (20, 30 and 40 cm) in main plot and five seed rate (16, 18, 20, 22 and 24 kg/ha). Ten competitive plants are selected randomly from each plot to record data on various parameters. The maximum number of seeds per pod was observed with seed rate of 16 kg/ha and row spacing 40 cm. The treatment combination of seed rate 24kg/ha and row spacing 40cm was found to be best. The seed rate 20kg/ha and 40cm row spacing shows significantly higher yield than other.

**Keywords:** fenugreek, seed rate, row spacing

## Introduction
Fenugreek (*Trigonella foenum-graecum* L.) is an annual legume crop belongs to family Leguminaceae. In India during 2014-15, the crop covered an area of 123.40 million hectares with total production of 130.80 million tonnes. Out of which, more than 65% area i.e. 81.70 million hectares with total production of 84.20 million tonnes is produced by Rajasthan alone. In Haryana during 2014-15, the crop was grown in 4.80 million hectare with seed production of 8.70 million tonnes (Anonymous, 2015) [1]. Due to its low water requirement, it is being grown profitably in south western districts of Haryana mainly Hisar, Bhiwani, Rohtak, Sirsa, Mohindergarh and Rewari where both soil and climatic conditions are favourable for its growth and development (Anonymous, 2015) [1].
Being an important spice crop, maintaining optimum plant population per unit area is considered very essential, therefore not only maximizing the productivity but also securing the highest net returns from a unit area are prerequisite. Seeds are the foundation of agriculture but without a steady supply of high-quality seed, yields and crop quality would be greatly affected. However, very little research work has been carried out on spacing and seed rate of fenugreek seed crop. Hence, there is a considerable scope of increasing the productivity of this commercial crop by adopting the improved management practices along with optimum seed rate and spacing.

## Materials and Methods
The present study entitled "Effect of seed rate and row spacing on growth and yield of fenugreek (*Trigonella foenum graecum* L) was carried out at Research Farm of the Department of Vegetable Science, CCS Haryana Agricultural University, Hisar during the winter season of 2016-17 by following Randomized block design with fifteen treatment combination and three replications.
Experimental Details
Total plots: 45
Variety: Hisar Sonali (The variety Hisar Sonali was a Pureline selection from a local germplasm. The experimental material was procured from department of vegetable science CCSHAU, Hisar)
Plot Size: 4.0 m x 2.4 m
Date of sowing: 27 November, 2016
Details of treatment:
A. Seed rate (kg/ha)
S1 = 16(kg/ha), S2 = 18(kg/ha), S3 = 20(kg/ha), S4 = 22(kg/ha), S5 = 24(kg/ha)
B. Row spacing (line to line in cm)
R1 = 20 cm, R2 = 30 cm, R3 = 40 cm

**Treatment combinations**
R1S1: Seed rate 16 kg/ha at 20 cm row spacing
R2S1: Seed rate 16 kg/ha at 30 cm row spacing
R3S1: Seed rate 16 kg/ha at 40 cm row spacing
R1S2: Seed rate 18 kg/ha at 20 cm row spacing
R2S2: Seed rate 18 kg/ha at 30 cm row spacing
R3S2: Seed rate 18 kg/ha at 40 cm row spacing
R1S3: Seed rate 20 kg/ha at 20 cm row spacing
R2S3: Seed rate 20 kg/ha at 30 cm row spacing
R3S3: Seed rate 20 kg/ha at 40 cm row spacing
R1S4: Seed rate 22 kg/ha at 20 cm row spacing
R2S4: Seed rate 22 kg/ha at 30 cm row spacing
R3S4: Seed rate 22 kg/ha at 40 cm row spacing
R1S5: Seed rate 24 kg/ha at 20 cm row spacing
R2S5: Seed rate 24 kg/ha at 30 cm row spacing
R3S5: Seed rate 24 kg/ha at 40 cm row spacing

**Observations recorded**
During the course of experimentation, the observations were recorded for the following growth and seed yield parameters:

**1. Plant height at maturity (cm)**
Ten plants in each replication were randomly selected and height of these plants were measured with the help of metre scale in centimetres from base of the plant to apex of main shoot at harvesting time and average was computed.

**2. Number of branches per plant**
The numbers of primary branches of ten randomly selected plants were recorded from each replication at maturity and the value was averaged to get number of branches per plant.

**3. Days to 50% flowering**
The number of days taken from the date of sowing to flowering in 50 percent plant under each treatment was recorded and averaged.

**4. Number of pods per plant**
The pods of ten randomly selected plants from each plot were counted at harvest and average numbers of pods per plant were recorded.

**5. Pod length (cm)**
The length of ten pods from randomly selected plants from each plot was measured and average length per pod was recorded in centimetre.

**6. Number of seeds per pod**
The seeds of ten pods from each randomly selected plant from each plot at the time of threshing were counted and the mean was recorded as average number of seeds per pod.

**7. Seed yield per plot (kg)**
The plants were harvested separately in each plot. The harvested plants were left in the field for few days to sun dry, and later, they were threshed. After cleaning, the weight of seed per (kg) plot was recorded separately.

**8. Seed yield (q/ha)**
The seed yield calculated from each plot was later converted into quintal per hectare.

**9. Biological yield (kg/plot)**
The total above ground biomass of all the plants, which were left in their respective plots after harvesting for sun drying, was weighed and the values are expressed in g/plot and later converted into the kilogram per plot.

**10. Harvest index**
The harvest index was calculated by dividing the economic yield (seed yield per plot) with the total biological yield and expressed as percentage (Donald and Hamblin, 1976) [7].
Harvest index = Economic yield X 100/Biological Yield

**Results and Discussion**
The data present in Table 1 indicate that all treatments differed significantly from each other with respect to plant height, no. of branches/plant, days to 50% flowering, no. of pods/plant, pod length.

**Table 1:** Effect of seed rate and row spacing on growth of fenugreek cv. Hisar Sonali

| Treatments | No. of Treatments | Plant Height(cm) | No. of branches/plant | Days to 50% flowering | No. of pods/plant | Pod length (cm) |
|---|---|---|---|---|---|---|
| Row Spacing (R) | $R_1$(20 cm) | 91.95 | 10.69 | 88.35 | 82.07 | 8.19 |
| | $R_2$(30 cm) | 90.22 | 11.11 | 85.97 | 86.03 | 8.49 |
| | $R_3$(40 cm) | 87.76 | 11.42 | 84.08 | 91.00 | 8.63 |
| | C.D. (P=0.05) | 0.35 | 0.15 | 0.26 | 0.72 | 0.09 |
| Seed Rate (S) | $S_1$(16kg/ha) | 83.24 | 12.27 | 83.40 | 92.88 | 9.42 |
| | $S_2$(18kg/ha) | 85.34 | 11.48 | 84.62 | 87.61 | 8.71 |
| | $S_3$(20kg/ha) | 90.23 | 11.08 | 86.19 | 85.67 | 8.40 |
| | $S_4$(22kg/ha) | 93.12 | 10.60 | 87.52 | 83.81 | 8.01 |
| | $S_5$ (24kg/ha) | 97.93 | 9.94 | 88.94 | 81.86 | 7.63 |
| | C.D. (P=0.05) | 0.45 | 0.19 | 0.34 | 0.93 | 0.12 |
| Interaction (S X R) | $S_1$ X $R_1$ | 85.67 | 11.50 | 85.40 | 86.30 | 9.07 |
| | $S_1$ X $R_2$ | 83.77 | 12.37 | 83.33 | 93.77 | 9.50 |
| | $S_1$ X $R_3$ | 80.30 | 12.93 | 81.47 | 98.57 | 9.70 |
| | $S_2$ X $R_1$ | 86.37 | 11.27 | 87.43 | 82.70 | 8.50 |
| | $S_2$ X $R_2$ | 85.27 | 11.40 | 83.93 | 87.73 | 8.70 |
| | $S_2$ X $R_3$ | 84.40 | 11.77 | 82.50 | 92.40 | 8.93 |
| | $S_3$ X $R_1$ | 91.60 | 10.77 | 88.53 | 81.53 | 8.20 |
| | $S_3$ X $R_2$ | 90.50 | 11.07 | 86.23 | 85.57 | 8.40 |
| | $S_3$X $R_3$ | 88.60 | 11.40 | 83.23 | 89.90 | 8.60 |
| | $S_4$ X $R_1$ | 96.47 | 10.30 | 89.53 | 81.33 | 7.67 |
| | $S_4$X $R_2$ | 92.93 | 10.70 | 87.47 | 82.77 | 8.07 |
| | $S_4$ X $R_3$ | 89.97 | 10.80 | 85.57 | 87.33 | 8.30 |

| | | | | | | |
|---|---|---|---|---|---|---|
| | $S_5$ X $R_1$ | 99.63 | 9.60 | 90.87 | 78.47 | 7.53 |
| | $S_5$ X $R_2$ | 98.63 | 10.03 | 88.93 | 80.30 | 7.77 |
| | $S_5$ X $R_3$ | 95.53 | 10.20 | 87.03 | 86.80 | 7.60 |
| | C.D.(P=0.05) | 0.77 | 0.33 | 0.59 | 1.60 | 0.21 |

The value of plant height ranged from 80.30 to 99.63 cm. The plant height of fenugreek at harvest improved markedly with increase in seed rate, showing affirmation with results of Kanwar and Saimbhi (1989) [8]. The obtained result for plant height reduction with the increase in row spacing validates the results of Baswana and Pandita (1989) [2], Pandita and Randhava (1994) [11] and (Singh *et al*., 2005) [5]. The number of branches per plant confirms the results of Brar *et al*., (1993a) and Deora *et al*., (2009) [6] as branches per plant reduced significantly with increase in seed rate whereas increase positively with row spacing in contrast of Brar *et al*., (2005) [5] and Singh *et al*., (2005) [5]. The maximum number of branches resulted with seed rate of 16 kg/ha with row spacing of 40 cm (12.27). The data recorded for days to 50% flowering ranges from 81.47 to 90.87 and showed significant increase with increase in seed rate while reduced as row spacing increases in contrast to Pandita and Randhawa (1994) [11]. The treatment combination with seed rate 16kg/ha and 40 cm spacing took significantly minimum number of days to attain 50% flowering. The highest number of pods per plant observed with seed rate of 16kg/ha and row spacing of 40 cm (98.57), while minimum number of pods observed with seed rate of 24kg/ha and row spacing of 20 cm. The number of pods per plant had inverse relationship with seed rate confirming the result of Sharma (2000) [12] while direct relation with row spacing showing similarity with the results of Nandal *et al*., (2007) [10].

The data present in Table 2 indicate that all treatments differed significantly from each other with respect to number of seeds/pod, seed yield/plot, biological yield and harvest index.

**Table 2:** Effect of seed rate and row spacing on yield of fenugreek cv. Hisar Sonali

| Treatments | No. of Treatments | No. of seeds/pod | Seed Yield/plot | Seed Yield/ha | Biological Yield | Harvest Index |
|---|---|---|---|---|---|---|
| Row Spacing (R) | $R_1$(20 cm) | 13.32 | 1.96 | 20.27 | 4.14 | 47.30 |
| | $R_2$(30 cm) | 13.83 | 2.12 | 21.96 | 4.41 | 47.98 |
| | $R_3$(40 cm) | 14.25 | 2.24 | 23.18 | 4.59 | 48.56 |
| | C.D. (P=0.05) | 0.14 | 0.02 | 0.17 | 0.03 | 0.39 |
| Seed Rate (S) | $S_1$(16kg/ha) | 15.60 | 1.74 | 18.03 | 3.92 | 44.42 |
| | $S_2$(18kg/ha) | 14.96 | 1.85 | 19.15 | 4.14 | 44.47 |
| | $S_3$(20kg/ha) | 13.81 | 2.45 | 25.43 | 5.06 | 48.44 |
| | $S_4$(22kg/ha) | 13.02 | 2.32 | 23.98 | 4.59 | 50.26 |
| | $S_5$ (24kg/ha) | 11.61 | 2.16 | 22.41 | 4.17 | 51.84 |
| | C.D. (P=0.05) | 0.18 | 0.02 | 0.22 | 0.04 | 0.22 |
| Interaction (S X R) | $S_1$ X $R_1$ | 15.17 | 1.70 | 17.59 | 3.89 | 43.65 |
| | $S_1$ X $R_2$ | 15.70 | 1.74 | 18.03 | 3.91 | 44.46 |
| | $S_1$ X $R_3$ | 15.93 | 1.78 | 18.47 | 3.95 | 45.15 |
| | $S_2$ X $R_1$ | 14.67 | 1.80 | 18.70 | 4.12 | 43.86 |
| | $S_2$ X $R_2$ | 14.93 | 1.86 | 19.24 | 4.13 | 45.11 |
| | $S_2$ X $R_3$ | 15.27 | 1.88 | 19.52 | 4.16 | 45.34 |
| | $S_3$ X $R_1$ | 13.33 | 2.15 | 22.26 | 4.51 | 47.67 |
| | $S_3$ X $R_2$ | 13.90 | 2.58 | 26.74 | 5.30 | 48.65 |
| | $S_3$X $R_3$ | 14.20 | 2.63 | 27.29 | 5.37 | 49.01 |
| | $S_4$ X $R_1$ | 12.50 | 2.14 | 22.17 | 4.30 | 49.68 |
| | $S_4$X $R_2$ | 12.80 | 2.28 | 23.56 | 4.54 | 49.97 |
| | $S_4$ X $R_3$ | 13.77 | 2.53 | 26.22 | 4.94 | 51.12 |
| | $S_5$ X $R_1$ | 10.93 | 1.99 | 20.62 | 3.85 | 51.63 |
| | $S_5$ X $R_2$ | 11.80 | 2.15 | 22.23 | 4.15 | 51.71 |
| | $S_5$ X $R_3$ | 12.10 | 2.35 | 24.38 | 4.50 | 52.17 |
| | C.D.(P=0.05) | 0.32 | 0.04 | 0.37 | 0.60 | 0.21 |

The value of pod length ranges from 7.53 to 9.70cm. The pod length showed considerable inverse relation with seed rate confirming the result of Taneja *et al*., (1985) [14] and direct relation with row spacing validates the result of Kanwar and Saimbhi (1989) [8]. The least number of seeds per pod (11.6) were obtained with seed rate of 24kg/ha while highest number of seeds (14.25) obtained at spacing of 40cm. The decrease in number of seeds per pod with increase in seed rate confirms the result of Bommi *et al*., (2010) [3] and increased seed number per pod with increase in row spacing shows contrast with the result of Singh *et al*., (2005) [5]. The data provided the considerable variation among different seed rates in contrast to seed yield per plot as well as per hectare. The treatment *vis-à-vis* seed rate of 20kg/ha gave the maximum mean seed yield per plot (2.45kg) and seed yield per ha (25.43q) while the seed rate with 16kg registered the minimum seed yield per plot. The seed yield shows a positive correlation with the row spacing and also confirmed the results of Meena *et al*., (2003) [9]. The interaction of different seed rates and row spacing showed visible variation with respect to seed yield per plot and per hectare.

## Conclusion

Based on the computed results, it can be accomplished that the various seed rates has positive impact on the growth, yield and quality of fenugreek seeds. Seed rate of 20 kg/ha with row spacing of 40 cm was found best to get higher seed yield whereas seed rate of 24 kg/ha with row spacing of 40 cm was best to get better growth and quality characteristics under semi arid conditions of Hisar (Haryana).

**References**


1. Anonymous Spice Board Annual Report 2014-15. Ministry of commerce and Industry, Government of India, 2015.
2. Baswana KS, Pandita ML. Effect of time of sowing and row spacing on seed yield of fenugreek. Seed Research. 1989; 17:109-112.
3. Bommi PV, Jinturkar SP, Barkule SR, Bhosale AM, Noor S. Effect of graded levels of nitrogen and seed rate on yield and yield parameters of fenugreek (*Trigonella foenum-graecum* L.) cv. RMt-1. Asian Journal of Horticulture. 2010; 5(2):469-471.
4. Brar RS, Yadav BD, Joon RK. Response of fenugreek genotypes to row spacing and seed rate. Forage Research. 1993b; 19(2):148-150.
5. Brar DS, Singh SP, Buttar GS, Singh S. Effect of different date of sowing and row spacing on yield of fenugreek (*Trigonella foenum-graecum* L.). Journal of Medical and Aromatic Plant Sciences. 2005; 27(4):629-630.
6. Deora NS, Singh J, Reager ML. Studies on nutrient management and seed rate on growth and herbage yield of fenugreek (*Trigonella corniculata* L.) cv. Kasuri in Rajasthan. Journal of Spices and Aromatic Crops. 2009; 18(1):19-21.
7. Donald CM, Hamblin J. The biological yield and harvest index of cereals as agronomic and plant breeding criteria. Advances in Agronomy. 1976; 28:361-405.
8. Kanwar JS, Saimbhi MS. Effect of plant spacing and seed rate on seed yield of fenugreek. Vegetable Science. 1989; 16(1):75-77.
9. Meena BR, Jat NL, Meena RP. Varietal response of fenugreek (*Trigonella foenum-graecum* L.) to row spacing and phosphorus nutrition in relation to growth attributes and yield. Annals of Agriculture Biology of Research. 2003; 8(2):201-204.
10. Nandal JK, Dahiya MS, Gupta V, Singh D. Response of sowing time, spacing and cutting of leaves on growth and seed yield of fenugreek. Haryana Journal of Horticultural Sciences. 2007; 36(3-4):374-376.
11. Pandita VK, Randhawa KS. Row spacing and leaf cutting in relation to seed production of fenugreek (*Trigonella corniculata* L.) cv. Pusa Kasuri. Seed Research. 1994; 22(2):127-129.
12. Sharma SK. Response of nitrogen and spacing on fenugreek seed production. Horticultural Journal. 2000; 13(2):39-42.
13. Singh D, Sani SS, Salaria A, Gill BS. Agronomic manipulations for maximum production of *Trigonella foenum-graecum* L. in Punjab. Indian Journal of Arecanut, Spices and Medicinal Plants. 2005; 7(2):69-71.
14. Taneja KD, Gill PS, Rana DS. Effect of sowing time, row spacing and seed rate on seed production of methi (*Trigonella foenum-graecum* L.). Forage Research. 1985; 11(1):33-36.