ORIGINAL ARTICLE

Influence of dates of sowing on growth and yield dynamics of fenugreek (*Trigonella foenum-graecum* L.)

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Abstract

Aim: To identify the best date of sowing and irrigation to get the highest seed production under Gangetic old alluvial plains of West Bengal. **Materials and Methods:** An investigation on the effect of date of sowing in fenugreek *(Trigonella foenum-graecum L)* was carried out at the Malda Krishi Vigyan Kendra, Uttar Banga Krishi Viswavidyalaya, Ratua, Malda, West Bengal during the year 2014-2015 in the months of November to March. The fenugreek was shown in five different dates, namely, D_1, D_2, D_3, D_4, and D_5 at different days interval. The respective dates were 2nd November, 9th November, 16th November, 23rd November, and 28th December. Sowing date had significant effects on seed yield and its components. The experiment was laid out in factorial RBD replicated twice. **Results and Discussion**: The results obtained from the study showed a significant variation with different dates of sowing. Projected seed yield/hectare was maximum (1.4 t/ha) on 2nd November. **Conclusion**: It was evident from the results that the date of sowing had a significant influence on phenology, growth, and yield of fenugreek. It may be concluded from the results that to obtain higher seed yield fenugreek should be sown earlier at 2nd November.

Key words: Fenugreek, growth, sowing, time, yield

INTRODUCTION

Trigonella foenum-graecum L. is a plant derived from the Fabaceae family with chromosome number 2 n = 16. It is one of the important seed spices occupying a prime position throughout the globe to add taste and flavor in various food items. The leaves and fruits have a pleasant aromatic odor. The fresh fenugreek leaves are bitter in taste and are recognized as a powerful herb. The leaves have considerably gained attention in stabilizing the insulin, blood sugar, hemoglobin levels, and condition of diabetes.[1] Fenugreek is a tropical crop and generally sown in the winter season for seed production. Dry and cold weather during the early stage favors better vegetative growth whereas dry and relatively high temperature promotes seed production.[2] Time of sowing is crucial for the vegetative growth and ultimate expressions of yield. Any early or late sowing may hamper the growth, yield as well as quality of the crop. In case of fenugreek, early sowing leads to early flowering but may be vulnerable to damage in case of extreme cold and frost.[3] In general, the crop requires cool climate during vegetative growth and warm dry climate during maturity. During rabi season, sowing in the month of October is recommended both for seed and leaf production. On the other hand, late sowing affected the growth as well as yield and quality in an adverse way.[4] Keeping in view the above, the present experiment was undertaken to identify the best date of sowing affect the growth and development of fenugreek so that farmers get proper yield and reduce the crop damage due to late sowing or too early sowing.

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MATERIALS AND METHODS

The experiment was conducted at Malda Krishi Vigyan Kendra, Ratua, Uttar Banga Krishi Viswavidyalaya, Malda, West Bengal during the year 2014-2015 in the months of November to March. Geographically, experimental site situated at 23.5° North latitude, 89° East, having an average altitude of 9.75 m above mean sea level. The experimental site (Ratua) is located in subtropical humid climate with Gangetic old alluvial soil, sandy clay loam texture, good water holding capacity, well drained and with acidic to neutral reaction, and moderate fertility status. The experiment was conducted in Factorial Randomized Block Design with two replications. Fifteen treatment combinations comprising five dates of sowing, namely, D_1 (2nd November), D_2 (9th November), D_3 (16th November), D_4 (23rd November), and D_5 (28th November). Seeds were sown in five different dates at seven-day interval. The dimension of plot was 2.0 m × 1.5 m with spacing of 20 cm × 10 cm at a depth of 2-3 cm in line sowing. Recommended practices were followed. Thinning and hoeing were done 21 days after germination along with the first weeding to loosen the soil and maintain the plant spacing. After the first weeding, it was done at 15 days interval or as per necessity.

Data Collection and Statistical Analysis

The parameters studied during the course of experimentation included growth parameters, yield and yield attributing parameters, phonological parameters, moisture availability at different depth at different stages, and volumetric moisture in relation to different days after sowing. The data on various characters were analyzed statistically by following the methods of Gomez and Gomez[5] using Software SPSS 16, and relevant graphs were prepared using software MS Excel. Means were compared using Duncan multiple range test ($P \leq 0.05$).

RESULTS AND DISCUSSION

Growth Parameters

The date of sowing had a significant influence on plant height. The height of fenugreek plants was recorded periodically at 30, 45, 60, 75, 90, and 105 days after sowing (DAS), respectively. Plant height was found maximum with 2nd November sown crops (38.33, 48.17, 57.46, and 62.54 cm, respectively, in 2014-15 at 60, 75, 90, and 105 DAS, respectively). Dutta *et al*.[6] also found an increase in plant height in black cumin with the advancement of sowing time up to 15th November, and thereafter, it decreased gradually [Table 1].

Similarly, the same date was found superior in producing a maximum number of leaf (173, 206, 270, and 280, at 60, 75, 90, and 105 DAS, respectively). 2nd November sown crops were also found to produce highest numbers of leaf. Gowda *et al*.[7] had recorded a similar kind of observation in fenugreek in relation with the date of sowing [Table 2].

In case of dates of sowing, the maximum number of branches was recorded on 21st November sown crop having at least

Table 1: Effect of date of sowing on plant height (cm) of fenugreek

DOS	30 DAS	45 DAS	60 DAS	75 DAS	90 DAS	105 DAS
D_1	14^{b}±0.59	22.9^{a}±1.03	38.33^{a}±3.92	48.17^{a}±7.36	57.46^{a}±6.20	62.54^{b}±7.02
D_2	14.40^{b}±0.19	21.25^{a}±0.59	29.11^{c}±3.51	38.98^{c}±5.078	49.20^{b}±4.9	53.53^{c}±3.31
D_3	14.5^{b}±0.58	23.67^{a}±2.44	34.74^{b}±2.54	43.68^{b}±0.84	49.76^{b}±3.2283	52.99^{c}±4.42
D_4	13.32^{b}±1.35	25.18^{a}±3.54	33.07^{b}±2.94	37.86^{c}±2.68	42.81^{c}±2.59	53.53^{c}±3.31
D_5	13.78^{cb}±0.66	24.01^{a}±3.60	32.58^{b}±2.99	35.56^{c}±3.79	41.82^{c}±3.65	52.99^{c}±4.42
Mean	14.11±0.86	23.57±2.38	33.57±4.27	40.85±6.22	47.06±7.00	56.35±6.61

Values are mean±SD; values of the same column followed by the same letter are not statistically different (P<0.05) as measured by Duncan's test. SD: Standard deviation, DAS: Days after sowing, DOS: DOS: Date of sowing

Table 2: Effect of date of sowing on leaf number of fenugreek

DOS	30 DAS	45 DAS	60 DAS	75 DAS	90 DAS	105 DAS
D_1	27.33^{b}±1.96	46^{c}±0.89	173^{a}±24.6251	206^{b}±7.37	270.83^{a}±26.94	280^{b}±11.73
D_2	25.66^{c}±0.81	44.5^{c}±1.22	82^{c}±26.0921	187.5^{b}±21.71	229.66^{b}±13.23	230.83^{c}±13.3479
D_3	27.83^{b}±1.47	55.83^{b}±12.49	128.5^{b}±17.4899	188.33^{b}±27.51	228.83^{b}±26.32	235.5^{c}±18.00
D_4	33.5^{a}±2.25	63.66^{a}±8.54	133.5^{b}±16.2080	181.66^{b}±25.64	198.33^{c}±16.71	235.5^{c}±18.00
D_5	26.66^{cb}±3.07	44.83^{c}±8.42	94.5^{c}±13.0805	134.33^{c}±17.02	162.66^{d}±14.73	235.5^{c}±18.00
Mean	28.2±3.38	50.96±10.58	122.3±37.5647	179.56±31.34	218.06±41.27	238±26.61

Values are mean±SD; values of the same column followed by the same letter are not statistically different (P<0.05) as measured by Duncan's test. SD: Standard deviation, DAS: Days after sowing, DOS: DOS: Date of sowing

Table 3: Effect of date of sowing on branch number of fenugreek

DOS	30 DAS	45 DAS	60 DAS	75 DAS	90 DAS	105 DAS
D_1	3.16^{cb}±0.4082	$5.1b^{a}$±1.1690	10.3^{b}±1.6329	11^{a}±1.4142	12.3^{c}±1.8618	
D_2	2.83^{c}±0.7527	4^{c}±0.8944	6.8^{c}±1.1690	9.5^{cb}±0.8366	11.3^{c}±1.7511	11.3^{c}±1.3662
D_3	3^{cb}±0	4.3^{cb}±1.0327	8^{c}±1.0954	9.6^{cb}±2.0655	11.3^{c}±1.9663	12^{c}±1.4142
D_4	3.5^{b}±0.5477	5.8^{a}±0.7527	7.3^{c}±1.0327	9^{c}±1.0954	11.6^{c}±1.5275	11.3^{c}±1.3662
D_5	2.66^{c}±0.5163	5.1^{ba}±0.7527	8^{c}±1.4142	10.5^{ba}±1.5165	11.3^{c}±1.5275	11.3^{c}±1.3662
Mean	3.03±0.5560	4.9±1.0938	8.1±1.7090	9.9±1.5297	11.6±1.6891	11.9±1.7128

Values are mean±SD; values of the same column followed by the same letter are not statistically different (P<0.05) as measured by Duncan's test. SD: Standard deviation, DAS: Days after sowing, DOS: DOS: Date of sowing

Table 4: Effect of date of sowing on yield and yield attributing characters of fenugreek

DOS	Pod/plant	Seed/pod	Seed weight/ pod	Seed weight/ plot (g)	Projected yield per hectare (tonnes)	Test seed weight (g)
D_1	36.33^{a}±16.0831	15.66^{ba}±2.4221	0.329^{a}±0.0326	525^{p}±44.7213	1.4±0.1176	17.9^{p}±0.6899
D_2	19b±4.1952	14.66^{b}±2.7325	0.286^{c}±0.0534	507^{pq}±39.465	1.35±0.1067	17.4^{pq}±0.6985
D_3	24.33^{b}±3.3862	$15b^{a}$±2.4494	0.296^{cb}±0.0375	480^{qr}±45.6526	1.28±0.1208	16.91^{qr}±1.0323
D_4	23.83b±4.1673	16.66^{a}±2.4221	0.318^{cba}±0.0514	466^{r}±48.0277	1.24±0.1278	16.38^{rs}±1.1303
D_5	22^{b}±3.8470	$16.16b^{a}$±3.3115	0.326^{ba}±0.0347	431^{s}±7.0710	1.15±0.1723	15.51^{s}±1.2448
Mean	25.1±9.5605	15.63±2.6061	0.311±0.0432	482.3±56.5797	1.28±0.1503	16.82±1.2414

Values are mean±SD; values of the same column followed by the same letter are not statistically different (P<0.05) as measured by Duncan's test. SD: Standard deviation, DOS: DOS: Date of sowing

4 branches, respectively, (10.3, 11, and 12.3 at 60, 75, and 90 DAS). Dutta *et al*.[6] also found increasing trend in a number of primary and secondary branches per plant in at early sown plants in black cumin [Table 3].

Yield and Yield Attributing Parameters

Among the yield and yield attributing parameters, pods/ plant was maximum on 2nd November (36.33). Highest seeds/pod (16.66) and seed weight/pod (0.318 g) on 23rd November seed weight/plot on 2nd November (525 g), seed test weight, projected seed yield/hectare (1.4 t/ha) on 2nd November (17.9 g). Pan *et al*.[8] (2003) also supported [Table 4].

Phenological Characters

The result obtained from phenological characters showed that the germination of fenugreek seed was minimum (9.6 days) on 2nd November and 50% flowering was in minimum on 28nd November (42.5 days) and fruit maturity was found minimum on 28nd November (78.83 days). Results showed that the germination of seed was only affected by maximum temperature, minimum temperature, and minimum relative humidity. The findings are in conformity with result found by Pan *et al*.[8] and Korla and Saini[9] also found this in black cumin [Table 5].

Table 5: Effect of date of sowing on phenological characters of fenugreek

DOS	Days to germination	50% flowering	Maturity
D_1	9.6^{a}±0.8164	45.33^{ba}±7.1460	88.16^{a}±16.6663
D_2	10^{ab}±2.1908	45.6^{a}±6.3140	88.16^{a}±16.6663
D_3	10.1^{ab}±1.3291	45.33^{ba}±7.2295	86.83^{a}±14.1762
D_4	11.6^{bc}±0.8164	44.16^{b}±5.0365	81.33^{b}±13.4263
D_5	12.3^{c}±0.5163	42.5^{c}±5.7879	78.83^{c}±12.9833
Mean	10.7±1.5905	44.6±6.0206	84.66±14.5373

Values are mean±SD; values of the same column followed by the same letter are not statistically different (P<0.05) as measured by Duncan's test. SD: Standard deviation, DOS: DOS: Date of sowing

CONCLUSION

It was evident from the results that the date of sowing had a significant influence on phenology, growth, and yield of fenugreek. It may be concluded from the results that to obtain higher seed yield fenugreek may be sown earlier at 2nd November which may be given higher yield and the highest growth. The season is delayed the negative effect on yield has also been quantified in respect of different parameters. However, the limitation of the study was as the experiment was done a particular agro-climatic condition, so the result may be vary in different agro-climatic condition.

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