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Evaluation of Fenugreek (*Trigonella foenum–graecum*) Cultivars in Relation to Herbage and Seed Yield in Prayagraj Agro-climatic Condition

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A B S T R A C T

Fenugreek (*Trigonella foenum-graecum L.*) is a widely cultivated annual herb. The leaves and seeds of fenugreek are commonly used for flavouring and as a spice in curries due to their strong flavour and aroma. The present experiment was carried out during August to December 2019 at the Research Field of Department of Horticulture, Sam Higginbottom University of Agriculture, Technology and Sciences, Prayagraj. The experiment was conducted in Randomized Block Design (RBD), with Fifteen varieties, replicated thrice. Based on the present investigation it is concluded that the variety V1 (Pusa Early Bunching) was found the best variety for more herbage growth parameters like plant height (cm), number of leafs per plant and number of branches per plant of fenugreek while V1 (Pusa Early Bunching) was found best in terms of Herbage yield like Number of pods per plant, Pod length (cm), Herbage yield (gm), Herbage yield per plot, Herbage yield(q/ha), Number of seeds per plot, Seed yield per plot and Seed yield (q/ha) (15.33q) of fenugreek.

Introduction

Horticulture plays a significant role in Indian agriculture. The changed economic order in contest of globalization and liberalization of world trade in agriculture has opened up new vistas of growth spices sector is on of the key areas in which India has an inherent strength to dominant the global market. The world's romance with Indian spices continues unabated.

India is a largest, producer, consumer and exporter of spices. India's share of world spices is estimated as 40-50% by volume and 25 percent by value. The present annual production of spices in our country is 3.0 million tonnes of over 2.5 million hectares.

The lion's share 90% of the spices produced in India are absorbed in the domestic market and 10% is exported to 150 countries. About 8.5% of India's export earning from agriculture and allied product come from spices which constitute 1.2% of total export earnings during 2000 (The Hindu Survey 2000).

Fenugreek (*Tigonellafoenum-graecum*) commonly known as Methi is cultivated throughout India and other part of world for leafy vegetable, spices, medicinal purposes. Being a leguminous crop, it increases fertility of soil by fixing atmospheric Nitrogen. It has been estimated that each year fenugreek fixed about 283 kg Nitrogen per hectare (Saxena and Ahmed, 1983).

Although fenugreek is a dual purpose crop but in our country it is mainly cultivated as seed spices crops. The total area occupied by seed spices in our country is 84.77 lakh hectares. Out of this fenugreek is cultivated in about 0.30-lakh hectare of land producing 30,000 tonnes of seed. Out of which 3,000 tonnes are exported to countries like Saudi Arabia, Japan, Sri Lanka and U.K. Peter (1999) reported that an income of Rs12 crore from export of fenugreek product.

Seeds of fenugreek are used against various digestive disorders, prevents constipation, removes indigestion and stimulated spleen (Yadav, 1994). The seed of fenugreek also have anti-fertility and diuretic action (Sharma, 1993). In industries seeds of fenugreek are used as dye and for extraction for steroids.

In spite of the great importance of this multi use crop very little research work has been done to bring about effective improvement in its herbage and seed yield potential. Further at present various products being produced in our country do not confirm to standard prescribed by major importing countries. Therefore popularization of improved agro-techniques and cultivation of specific varieties for table and processing purpose for export need emphasis.

Experimental evidences of the suitability of varieties have been already carried out at NBPGR Regional research centre, Jodhpur (2003). Similarly evaluation trail of twelve fenugreek cultivars was carried by Sharma and Bhatia (1987).

Fenugreek is regarded as the oldest known medicinal plant in recorded history (Lust 1986). Its seed and leaves have medicinal value, and have been used to reduce blood sugar and lower blood cholesterol in humans and animals (Dahanukar *et al.*, 2000). In parts of Asia, the young plants are used as "pot herbs" and the seed as a spice or herbal medicine. Fenugreek has many features that will benefit Canada's agri-food industry, one of them being its potential for use as a forage crop. The crop is adapted to rain-fed growing conditions and should grow well within the semi-arid regions of western Canada. It is a legume and can be incorporated into short term crop rotations.

Materials and Methods

Department of Horticulture, Naini Agricultural Institute, SHUATS, Prayagraj, falls under the humid subtropical zone. Maximum rainfall received during the period between July to the end of September. However, occasional showers are also very common in the month of June, December and January. The winter month will usually cool and dry. The summer is hot and dry western hot winds start from April and end at onset of monsoon.

The study was conducted in the Research Field, Department of Horticulture, Naini Agriculture Institute, SHUATS, Prayagraj, located between 25.87° North latitude 81.15° East latitude. The altitude is 78 meters above the mean sea level during the season of 2019. The soil was sandy loam in texture having moderate water holding capacity with a pH of 7.0 to 8.0. Fifteen Fenugreek Farmer's varieties were evaluated for using Randomized Block Design (RBD).

Prayagraj is situated at an elevation of 78 meters above sea level at 25.87 degree North latitude and 81.15 degree E longitude. This region has a sub-tropical climate prevailing in the south-east part of U.P. with both the extremes in temperature, i.e. the winter and the summer. In cold winters, the temperature sometimes is as low as 32°F in December – January and very hot summer with temperature reaching up to 115°F in the months of May and June. During winter, frosts and during summer, hot scorching winds are also not uncommon. The average rainfall is around 1013.4 mm, with maximum concentration during July to September months with occasional showers in winter. The average monthly rainfall, relative humidity, minimum and maximum temperature recorded during experimental period.

Results and Discussion

Analysis of variance showed significant differences among the varieties for the different characters studied at 0.1% and 5% significance. Different parameters were analyzed statistically and significance of result was verified. The results obtained with respect to the various yield related traits have been presented and discussed with possible explanations and evidence in this chapter with a view to find out the cause and effect relationship among different treatments, for sorting out the information of practical value.

The increase in production of vegetables spices is the result of sum total reactions of various factors such as genetic, climatic or environmental (light, temperature, relative humidity); management practices (spacing, nutrition, irritation, plant protection) and cultivation of specific varieties of crops. Wide genetic variations in quantitative production of vegetables and spices have been observed among the cultivars of some species. The interaction between genotypes, climatic factors and management practices play a dominant role in the expression of characters associated with the production of more quantity of vegetables and spices. In other words adoption of improved agro-techniques and cultivation of specific varieties of crops for table and processing purpose is very important tasks for increasing yield/ha.

Keeping in view, the above facts 'Fenugreek' varieties were evaluated and critically assessed in the light of parameters in order to bring effective improvement in its seed yield potential. The result obtained are presented and discussed in the light of current information available.

V_1 (P.E.B) gained maximum plant height (27.34cm). The other varieties *viz*. V_4 (26.81cm), V_9 (26.38cm) and V_8 (26.29cm) were also statistically at par to the variety (V_1) while V_{11} (Farmer's variety (Anantapur)) recorded minimum plant height (21.69cm). The variation in plant height might be due to specific genetic makeup of different cultivars and prevailing environmental condition.

V_1 (P.E.B) gained maximum No. of leaves (61.21). The other cultivars *viz*. V_4 (57.28) and V_3 (55.85) were also statistically at par to the variety (V_1) while V_{11} (Farmer's variety (Anantapur)) recorded less No. of leaves (44.11). The difference in number of leaves in different genotypes may be due to difference in genetic makeup.

V_1 (P.E.B) gained highest Number of branches (20.89). The other cultivars *viz*. V_{10} (19.73) and V_4 (19.23) were also statistically at par to the variety (V_1) while V_7 (control) recorded lowest

Number of branches (15.24). The variation in Number of branches might be due to specific genetic makeup of different cultivars and prevailing environmental condition.

Maximum Number of pods/ plant (13.65) was with the cultivar V_1 (P.E.B). The other cultivars *viz*. V_{15} (12.61), V_{13} (12.34) and V_5 (12.15) were also statistically at par to the variety (V_1) while V_{12} (Farmer's variety (Vishakapatnam)) attained minimum Number of pods/ plant (7.95). The difference in Number of pods/ plant of different genotypes may be due to difference in genetic makeup and flowering duration.

Maximum Herbage yield (q/ha)(63.36q) was with the cultivars V_1 (P.E.B). The other cultivars *viz*. V_{14} (60.48 q), V_9 (59.16 q) and V_{13} (58.80 q) were also statistically at par to the variety (V_1) while V_{11} (Farmer's variety (Anantapur)) attained minimum Herbage yield (q/ha)(45.12 q). The difference in Herbage yield (gm) in different cultivars may be due to difference in their genetic makeup and also due to their adaptability for Prayagraj agro climatic conditions.

Table.1

variety	Plant height	Number of leaves	Number of Branches	Number of Pods/plant	Pod length	Herbage yield(kg)	Herbage yield(q)	Number of Seeds/pod	Seed yield(g)	Seed yield(q)
V1PusaEarly Bunching	27.34	61.21	20.89	13.65	12.26	0.88	63.36	18.55	185.93	15.33
V2 Farmer's variety (Bhuvaneswar)	25.12	53.65	17.85	11.64	9.13	0.68	49.20	14.52	145.51	8.25
V3Farmer'svariety (Karnataka)	24.26	55.85	16.79	10.52	8.43	0.73	52.56	14.51	145.47	7.84
V4 Farmer's variety (Hyderabad)	26.81	57.28	19.23	7.97	11.12	0.67	48.12	15.60	156.40	10.08
V5 Farmer's variety (pune)	23.85	55.13	17.85	12.34	9.22	0.73	52.32	14.41	144.44	7.39
V6 Farmer's variety (Rangareddy)	2.67	50.95	18.51	11.35	11.31	0.69	49.56	17.27	173.07	13.70
V7 Farmer'svariety (Garla)	24.47	51.38	15.24	10.34	8.70	0.74	53.16	16.39	164.32	12.20
V8 Farmer's variety (Prayagraj)	26.29	53.83	16.88	10.73	10.13	0.76	54.84	15.74	157.77	11.41
V9 Farmer's variety (vijayawada)	26.38	52.91	15.35	11.19	8.48	0.82	59.16	14.85	148.88	8.57
V10Farmer'svariety (Guntur)	24.30	53.34	19.73	10.21	8.32	0.78	55.92	15.21	152.45	10.64
V11 Farmer's variety (Anantapur)	21.69	44.11	16.54	9.47	6.57	0.63	45.12	13.48	135.15	7.16
V12 Farmer's variety (Vishakapatnam)	23.66	53.25	18.36	7.95	7.35	0.67	47.88	17.61	176.51	14.25
V13 Farmer's variety (Srikakulam)	25.36	54.65	17.84	12.15	8.77	0.82	58.80	16.54	165.75	12.68
V14 Farmer's variety (Vizianagaram)	25.92	53.17	17.69	11.13	7.75	0.84	60.48	17.18	172.17	13.07
V15 Farmer's variety (Anandapuram)	22.99	53.92	18.82	12.61	8.53	0.78	55.80	15.32	153.59	8.99
F test	**S**	S	S	S	S	S	S	S	S	S
CD @5%	**0.47**	2.70	1.66	0.49	0.90	0.03	2.30	0.20	2.00	1.13
SE(d)	**0.23**	1.32	0.81	0.24	0.24	0.02	1.12	0.10	0.98	0.55

Significantly highest seed yield per hectare was recorded with Pusa Early Bunching (15.33q) which was on par with V_{12} Farmer's variety (vishakapatnam) (14.25q) and V_6 Farmer's variety (Rangareddy) (13.70q). The lowest seed yield Farmer's variety (Prayagraj) per hectare was recorded in V_{11} Farmer's variety (Anantapur) (7.16q). The higher yield

is reflected by better growth and environmental conditions under which the crop is raised.

By considering the findings of present investigation, it is concluded that the variety of fenugreek V_1 (Pusa Early Bunching) was found the best variety for more herbage growth parameters like plant height (cm), number of leafs per plant and number of branches per plant of fenugreek while V_1 (Pusa Early Bunching) was found best in terms of Herbage yield like Number of pods per plant, Pod length (cm), Herbage yield (gm)**,** Herbage yield per plot, Herbage yield (q/ha)**,** Number of seeds per plot, Seed yield per plot and Seed yield (q/ha) (15.33q) of fenugreek. So variety V_1 (Pusa Early Bunching) can be recommend to eastern U.P. growers by few more conjunctive trials at different locations.

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