

## PERFORMANCE OF SOME FENUGREEK GENOTYPES IN SUBHUMID SUBTROPICAL RED LATERITIC BELT OF EASTERN INDIA

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### ABSTRACT

Thirty genotypes of fenugreek were grown during winter seasons of 2009-10 and 2010-11 in subhumid subtropical red lateritic belt of Eastern India. The performance of the genotypes was assessed for eight agronomic characters, viz. plant height, days to flowering, branches per plant, pods per plant, pod length, seeds per pod, test weight and seed yield per plant. Analysis of variance pooled over the seasons revealed that the mean squares due to seasons for all the characters except branch number were highly significant indicating considerable differences between the test seasons. The mean squares due to genotypes for all the above characters were highly significant which indicated presence of variation among the genotypes. The significant mean squares due to genotype × season interaction for all the above characters indicated differential performance of the genotypes with the change in growing conditions. The variability was highest in seed yield per plant followed by pods per plant, branches per plant and seeds per pod. On the basis of performance of the genotypes for important characters including yield, the genotypes JF-14, JF-15, JF-17 and JF-21 could be considered for cultivation as seed spice of fenugreek in subhumid subtropical red lateritic belt of eastern India.

**Key words:** Fenugreek, Genotypic performance, Seed spice, Quantitative characters

### INTRODUCTION

Fenugreek (*Trigonella foenum-graecum* L.), commonly known as 'methi', is native to South-east Europe and West Asia. It is now cultivated in India, Argentina, Egypt and Mediterranean countries like Southern France, Morocco, Algeria, Ethiopia and Lebanon. It has been considered to be the third important seed spice in India. Fenugreek seeds are exported from India to different foreign countries. The major international markets for fenugreek seeds are Saudi Arabia, Japan, Srilanka, Korea and the United Kingdom.

In different part of the world, seeds and young seedlings of fenugreek are often used as curries, dyes, medicines and as a vegetable (Rajagopalan, 1998; Rajagopalan, 2001; Sharma, 1990; Al-Habori and Raman, 2002; Basch *et al.* 2003; Acharya *et al.* 2006). Fenugreek can be a very useful annual legume crop for incorporation into short-term rotation (Moyer *et al.* 2003), for hay and silage

(livestock) making and for fixation of atmospheric nitrogen into soils.

In India, the productivity of fenugreek is very low (about 1225 Kg/ha) in comparison to other fenugreek growing countries. Unavailability of suitable high yielding varieties for various agro-climatic regions, cultivation in the marginal lands, poor crop husbandry, and inadequate plant protection measures are the main reasons behind the low productivity. Cultivation of fenugreek in subhumid subtropical red lateritic belt of West Bengal, a province in eastern part of India, is limited and systematic research on the possibility of commercial cultivation of this crop in this region is very scanty. Therefore, the present investigation was undertaken to study the agronomic performance of 30 genotypes of fenugreek grown under subhumid subtropical red lateritic belt of West Bengal.

### MATERIALS AND METHODS

The experimental materials comprised 30 di-

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verse genotypes of fenugreek, collected from different parts of India. The genotypes of UM series and Rmt-1 were collected from All India Coordinated Spices Improvement Project, SKN College of Agriculture, Jobner, Rajasthan. The genotypes of JF series and GJ-1 were collected from Main Spices Research Station, Jagudan, Gujarat, whereas Sonali was collected from Hissar, Harayana, and IC series were obtained from National Bureau of Plant Genetic Resources (NBPGR), New Delhi. Punjab-6 was collected from Vinayak Seeds, Kanpur, and Kalmi was collected from a market in Varanasi, Uttar Pradesh. The genotypes were grown during winter season for two consecutive years 2009-2010 and 2010-2011 at the Agricultural Farm of Institute of Agriculture (23° 39' N latitude and 87°42' E longitude with an average altitude of 58.9 metres above mean sea level), Visva-Bharati University, West Bengal. The farm is situated under sub-humid, subtropical,

## RESULTS AND DISCUSSION

Analysis of variance pooled over the seasons (Table 1) revealed that the mean sums of squares due to seasons for all the above characters except branch number were highly significant indicating considerable differences between the test seasons. The mean sums of squares due to genotypes for all the above characters were highly significant which indicated presence of variation among the genotypes. The significant mean sums of squares due to genotype  $\times$  season interaction for all the above characters indicated differential performance of the genotypes with the change in growing conditions. Significant genotype  $\times$  environment interactions in fenugreek for plant height, pod length, pods per plant and seed yield at Mandor, Rajasthan, India (Sharma *et al.* 1995), days to flowering, plant height, pods per plant, seeds per pod and seed yield per plant at Udaipur, Rajasthan, India (Mathur *et al.* 1998)

**Table 1: Analysis of variance for eight quantitative characters in fenugreek**

Source	df	Mean sum of Square							
		Plant height	Days to flowering	Branch number	Pod number	Pod length	Seeds per pod	Test weight	Seed yield per plant
Season (S)		5021.37**	2318.43**	0.24	1775.96**	10.27**	38.36**	60.32**	55.70**
Replication (R)	2	28.59	6.09	1.35	5.73	0.71	3.63	2.13	0.53
S $\times$ R	2	18.94	0.53	0.43	13.21	0.25	0.14	0.21	0.28
Genotype (G)	29	155.53**	200.19**	28.64**	169.21**	2.10**	9.92**	11.70**	1.23**
G $\times$ S	29	40.54**	27.23**	4.54**	78.24**	0.86**	5.04**	1.67**	0.94**
Error	116	12.71	1.96	0.91	19.60	0.32	1.87	0.64	0.168

\*, \*\*: Significant at P=0.05 and 0.01, respectively.

lateritic belt of West Bengal, a province in eastern part of India. In each season, the date of sowing was 1<sup>st</sup> week of November with a spacing of 25  $\times$  7.5 cm., fertilizer dose of 30:60:60 (N:P:K) kg ha<sup>-1</sup> and need based crop management practices like proper time of thinning, weeding, hoeing, irrigation etc. were adopted. The genotypes were grown in a randomized block design with 3 replications. Each plot consisted of 6 rows of 3-meter length. Data were recorded on 5 randomly selected plants from middle rows for eight agronomic characters, viz. plant height, days to flowering, branches per plant, pods per plant, pod length, seeds per pod, test weight and seed yield per plant. Data were subjected to statistical analysis following standard procedure.

and pods per plant, seeds per pod, test weight and seed yield per plant at Sriniketan, West Bengal, India (Kole, 2005) have been reported earlier.

The mean performance of 30 genotypes for eight agronomic characters (Table 2) was as follows:

**Plant height:** Plant height varied from 32.67 to 52.63 cm with a grand mean of 40.63 cm. The tallest genotype was JF -17 and shortest genotype was Sonali. In general, JF series had taller plant height.

**Days to flowering:** Variation due to days to flowering was 52.33-74.50 days. The earliest flowering genotype was JF-22 whereas IC-143875 was the last flowering genotype. The grand mean value for this character was 57.44 days. The IC genotypes were very late flowering, which may render them misfitting in mul-

types could be considered for use as vegetables and/or fodder.

**Pods per plant:** The range of variability observed for this character was 14.83 to 32.87 with a mean value of 23.04. Among the genotypes, UM-128 was the lowest pod bearer

**Table 2: Mean performance of thirty genotypes for eight quantitative characters in fenugreek**

Genotypes	Plant height (cm)	Days to flowering	Branch number	Pod number	Pod length (cm)	Seeds per pod	Test weight (g)	Seed yield plant <sup>-1</sup> (g)
GJ-1	43.00	54.33	4.42	21.18	8.42	10.65	11.78	1.93
JF-5	47.48	54.83	6.47	21.53	7.27	10.82	12.81	2.10
JF-6	47.02	55.67	5.97	24.87	6.30	9.30	11.11	2.27
JF-8	47.53	53.33	6.78	23.52	7.10	10.30	10.96	1.98
JF-9	46.73	55.67	5.97	27.23	7.38	8.78	11.72	2.82
JF-14	42.27	53.50	6.12	31.22	7.90	10.85	11.27	3.01
JF-15	47.50	55.83	6.62	31.73	8.00	11.58	10.92	3.21
JF-17	52.63	54.83	6.25	32.87	7.62	11.62	10.68	2.94
JF-18	43.78	55.83	6.48	28.45	7.48	12.17	11.06	2.53
JF-21	47.03	54.83	6.98	27.20	7.32	11.15	10.90	2.62
JF-22	39.33	52.33	4.80	23.63	8.85	11.62	11.18	2.35
UM-32	39.87	56.83	3.67	21.33	7.05	10.05	11.75	2.00
UM-34	40.80	56.33	4.75	20.80	6.48	8.57	10.43	1.81
UM-116	37.67	56.83	5.23	18.27	7.77	10.22	10.90	1.76
UM-117	36.93	56.33	4.02	17.47	7.00	10.00	11.70	1.83
UM-118	40.75	56.50	3.67	16.67	7.15	10.52	11.88	1.71
UM-127	33.68	55.50	4.47	19.78	6.47	9.12	11.73	1.76
UM-128	34.50	56.33	3.70	14.83	6.98	10.22	12.54	1.56
UM-129	35.68	55.00	4.97	15.48	6.90	9.48	11.72	1.75
UM-144	33.82	56.17	3.78	15.40	6.37	8.43	13.55	1.71
UM-301	38.83	55.50	4.73	17.27	6.72	8.92	12.52	1.83
UM-302	36.77	57.33	3.80	22.28	7.50	10.13	11.68	2.49
UM-304	38.97	56.50	4.60	16.98	7.08	11.52	11.22	1.53
RMT-1	39.13	56.67	4.42	21.60	5.82	6.83	11.89	1.75
Sonali	32.67	56.17	3.33	22.30	6.90	10.03	10.93	1.72
IC-143823	40.58	74.00	11.10	26.67	7.72	13.22	8.35	2.31
IC-143867	35.47	74.00	11.37	31.23	6.23	10.03	6.72	1.90
IC-143875	36.48	74.50	11.53	29.65	6.82	11.42	7.65	1.91
Punjab-6	38.28	56.00	5.22	23.35	7.40	10.12	10.90	2.23
Kalmi	43.52	55.83	5.80	26.50	7.48	9.28	10.89	2.21
Range	32.67-52.63	52.33-74.50	3.33-11.53	14.83-32.87	6.23-8.85	6.83-13.22	6.72-13.55	1.53-3.01
Grand mean	40.63	57.44	5.70	23.04	7.15	10.21	11.11	2.12
CV	8.78	2.44	16.78	19.20	7.97	13.40	7.22	19.32
CD at 5%	4.04	1.59	0.45	2.06	0.26	0.64	0.37	0.19

tiple cropping programmes, if grown as seed spice.

**Branches per plant:** The range of variance for this character was 3.33 to 11.53 with a mean value of 5.70. The genotype Sonali had the minimum number of branches and the genotype IC-143875 had the maximum number of branches. The IC genotypes had profuse branching, almost twice the number of branches of JF series. Therefore, these geno-

types could be considered for use as vegetables and/or fodder.

**Pod length:** Variability in pod length ranged from 5.83 cm to 8.85 cm with a mean value of 7.15 cm. RMT-1 had the shortest pod length, while JF-22 had the longest pod length.

**Seeds per pod:** The range of variation for this character was 6.83 to 13.22 and the grand mean was 10.21. The genotypes RMT-1 and IC-143823 showed lowest number of seeds

per pod and the highest number of seeds per pod, respectively.

**Test weight:** The range of variability observed in this character was 6.72 g in IC-143867 to 13.55 g in UM-144 with a grand mean of 11.11 g.

**Seed yield per plant:** The seed yield per plant varied from 1.53g in UM-304 to 3.21 g in JF-15 with the grand mean of 2.12 g. The genotypes JF-14, JF-15, JF-17, JF-18, JF-21 showed seed yield significantly higher than 2.5g.

From the values of coefficient of variation, it was observed that the variability was highest in seed yield per plant followed by pods per plant, branches per plant and seeds per pod. Therefore, there is scope for selection of genotypes for combining desirable component characters in cross-breeding programme. Considerable amount of variability for pod and seed characters and seed yield per plant (Saha and Kole, 2001; Verma *et al.* 2003; Banerjee and Kole, 2004; Gangopadhyay *et al.* 2009; Prajapati *et al.*, 2010, Ahari *et al.* 2011) has been reported earlier.

Considering the performance of the genotypes for important characters, including yield, the genotypes JF-14, JF-15, JF-17 and JF-21 could be considered for cultivation as seed spice of fenugreek in subhumid subtropical red lateritic belt of eastern India.

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