

## Genetic variability in fenugreek (*Trigonella foenum-graecum* L.) grown under mid-hills of Himachal Pradesh

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### Abstract

Thirty nine accessions of fenugreek (*Trigonella foenum-graecum* L.) were collected from different parts of the country and evaluated under mid-hill conditions of Himachal Pradesh. The coefficient of variation was high for economic yield and biological yield in these accessions. Heritability in broad sense was high for plant height, seed vigour and pods plant<sup>-1</sup> while moderate for 1000-seed weight, branches plant<sup>-1</sup>, total seedling length and germination percentage. Economic yield, biological yield and pod length exhibited low heritability. Genetic advance as percentage of mean was comparatively high for biological yield, economic yield and pods plant<sup>-1</sup>.

**Key words:** genetic variation, fenugreek, *Trigonella foenum-graecum*

Fenugreek (*Trigonella foenum-graecum* L.) is an important spice and vegetable crop in India. The crop is gaining importance among seed spices because of its demand in the international market. As per 2001-2002, India exported 8848 MT of fenugreek and earned foreign exchange worth Rs. 1845.56 lakhs (Anonymous 2002). The knowledge on the magnitude of variation, heritability and genetic advance is a pre-requisite for planning a sound breeding programme for the improvement of yield. In this regard, an attempt was made in the present study by way of collecting genotypes from different fenugreek growing areas/states of the country and evaluating these under mid-hill conditions of Himachal Pradesh. The information derived on the nature and extent of variability, heritability and genetic advance for various characters is presented in this paper. Thirty nine genotypes, including check (IC-

74) obtained from different fenugreek growing states like Rajasthan, Tamil Nadu, Haryana, Uttar Pradesh and Bihar were raised in a Randomised Block Design with three replications at the experimental farm of Department of Vegetable Crops, Dr. Y.S. Parmar University of Horticulture and Forestry, Nauni-Solan during winter 2000-01. Each genotype was sown at a spacing of 30.0 x 7.5 cm in a plot size of 2.0 x 1.5 m. Observations were recorded on biological yield, seed/economic yield, 1000-seed weight, plant height, pods plant<sup>-1</sup>, pod length, branches plant<sup>-1</sup>, germination, total seedling length and seed vigour. Two lines in each plot were used for recording biological yield and economic yield while the observations for other characters were recorded on ten randomly selected plants from each plot in each replication. These observations were statistically analyzed (Gomez & Gomez 1983). The geno-

Table 1. Estimates of parameters of variability in *Trigonella foenum-graecum* L. for various characters

Character	Mean±SE	Range	Variance		Coefficient of variability (%)		Heritability (%)	Genetic advance	Genetic advance as percentage of mean
			Genotypic	Phenotypic	Genotypic	Phenotypic			
Biological yield (g)	477.35±91.39	266.67-883.33	10703.94	35762.49	21.67	39.62	29.93	116.60	24.43
Economic yield (g)	192.31±40.55	116.67-383.33	1715.60	6649.81	21.54	42.40	25.80	43.34	22.54
1000-seed weight (g)	14.47±0.46	12.27-16.33	0.59	1.22	5.31	7.63	48.36	1.10	7.60
Plant height (cm)	53.92±0.67	48.33-62.33	12.27	14.13	6.63	6.97	90.38	6.99	12.98
Pods plant <sup>-1</sup>	16.27±0.61	14.00-21.33	2.69	3.80	10.08	11.98	70.79	2.84	17.47
Pod length (cm)	11.83±0.39	10.33-13.00	0.60	0.76	4.61	7.35	78.90	1.40	11.90
Branches plant <sup>-1</sup>	3.85±0.27	3.00-5.00	0.19	0.41	11.32	16.63	46.34	0.61	15.88
Germination (%)	86.68±0.60	80.17-90.00	7.20	17.04	3.10	4.76	42.25	3.60	4.14
Root length (cm)	5.98±0.15	3.90-7.40	0.57	0.61	12.63	13.06	93.44	1.50	25.14
Shoot length (cm)	9.22±0.11	8.60-10.00	0.13	0.15	3.91	4.20	86.67	0.69	7.50
Total seedling length (cm)	15.20±0.19	12.90-17.20	0.58	1.30	4.99	7.50	44.23	1.04	6.83
Seed vigour	1507.21±24.08	1227.10-1685.60	8567.15	9726.32	6.14	6.54	88.08	178.94	11.87

typic and phenotypic coefficients of variability, heritability in broad sense and genetic advance were worked out as suggested by Burton & De Vane (1953).

The analysis of variance showed significant differences for different characters under study indicating variability in the materials, thus its amenability to selection. The wider range of variability was observed for biological yield, economic yield, branches plant<sup>-1</sup>, pods plant<sup>-1</sup> and total seedling length (Table 1). It is apparent that the values for phenotypic and genotypic coefficients of variation ranged from low to moderate for different characters and phenotypic coefficients of variability were higher in magnitude than genotypic coefficients of variability for all the traits. However, larger differences in their magnitude were observed for characters like biological yield, economic yield, pods plant<sup>-1</sup>, branches plant<sup>-1</sup> and total seedling length. These characters also exhibited wider range, thus indicating that variability in the material was largely influenced by the environmental factors. Smaller values of genotypic and phenotypic coefficients of variability with larger differences in their magnitude for different characters have also been reported by Shukla & Sharma (1978) and Hariharan & Vijayakumar (1997). However, the characters viz. 1000-seed weight, plant height, pod length, germination and seed vigour not only gave narrow range but also low estimates of phenotypic and genotypic coefficients of variability. The little difference in the magnitude of phenotypic and genotypic coefficients of variability suggests that these are largely controlled by genetic factors but the narrow range or low variability will create problems in selection.

The heritability estimates were high for plant height, seed vigour and pods plant<sup>-1</sup> while they were moderate for 1000-seed weight, branches plant<sup>-1</sup>, total seedling length and germination percentage. Economic yield, biological yield and pod length exhibited low heritability indicating that selection for these traits may be difficult as the genetic variability would be modified by environmental fluctuation.

**Table 2.** Performance of top five genotypes for yield and its attributes

Genotype	Source	Biological yield (g)	Economic yield (g)	Pods plant <sup>-1</sup>	1000-seed weight (g)	Plant height (cm)
Rmt-143	RAU, Jobner	883.33	383.33	21.33	16.33	62.33
HM-271	HAU, Hisar	800.00	350.00	20.33	15.67	61.00
Rajendra kranti	RAU, Sabour	733.33	266.67	19.00	15.50	60.00
Co-2	TNAU, Coimbatore	500.00	266.67	19.00	15.50	60.00
PEB	IARI, New Delhi	766.67	250.00	18.67	15.13	56.00

tuations. Moderate to high heritability estimates for plant height, pods plant<sup>-1</sup>, 1000-seed weight and branches plant<sup>-1</sup> have also been reported earlier by Raguhuvanshi & Singh (1982), Pant *et al.* (1984) and Berwal *et al.* (1996). Low heritability estimates for economic yield and pod length have also been reported by Shukla & Sharma (1978) and Hariharan & Vijayakumar (1997).

The genetic advance as percentage of mean was comparatively high for biological yield, economic yield and pods plant<sup>-1</sup>. Earlier workers also reported high genetic gain for seed yield (Kohli *et al.* 1988) and pods plant<sup>-1</sup> (Pant *et al.* 1984). Burton & De Vane (1953) reported that high genotypic coefficients of variability and heritability give best picture of the genetic advance to be predicted from selection while Johnson *et al.* (1955) were of the opinion that high heritability along with high genetic advance are more useful in predicting the genetic advance than heritability alone. In the present study, these estimates do not corroborate for most of the characters indicating that selection will not be effective. The large influence of environmental factors is expected to some extent as majority of the genotypes used in the study are adapted to the environments entirely different from the mid-hills of Himachal Pradesh. Thus to harvest good results through selection, the environmental influences are to be reduced and the characters like pods plant<sup>-1</sup>,

plant height, branches plant<sup>-1</sup>, 1000-seed weight, biological yield and seed vigour may prove useful in evaluating the seed yield of methi.

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