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Genetic Variability Analysis for Seed Yield and Its Attributes in Fenugreek (*Trigonella foenum-graecum* L.)

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ABSTRACT

Genetic variability analysis for seed yield and its component traits were carried out in 40 genotypes of fenugreek (Trigonella foenum graecum) at College Farm, N. M. College of Agriculture, Navsari Agricultural University, Navsari during Rabi 2015-16. Highly significant differences between genotypes were recorded for all the characters studied. High phenotypic and genotypic coefficient of variation was observed for total oil content, secondary branches per plant, seed yield, primary branches per plant, pods per plant, harvest index and green biomass per plant, indicating the importance of additive gene effects, so selection could be effective for improvement of such yield attributes. High heritability coupled with high genetic advance was found in primary branches per plant, secondary branches per plant, seed yield, 1000 seed weight, pods per plant, pod length, harvest index, green biomass per plant, seed protein and total oil content. These traits can be given emphasis in performing selection in fenugreek for genetic improvement.

Key words: *Fenugreek, variability, selection, Heritability, Yield.*

INTRODUCTION

Fenugreek (*Trigonella foenum-graecum* L.), occupies a prime position among the seed spices. However the productivity of fenugreek is low due to non availability of suitable high yielding varieties for various agro-climatic regions. In order to make this crop more productive and resistant to diseases and insect pests, an intensive breeding programme is required for incorporating an array of variability. Hence, an attempt was made to study the genetic variability, by determining the magnitude of genetic coefficient of variation, heritability estimates and expected genetic advance of different biometric traits in 40 genotypes of fenugreek.

Yield is a complex character is influenced by several genetic factors interacting with environment. Therefore, direct relation for this character is not much effective, therefore, study of simply inherited characters which are less affected by environment is required to construct suitable selection indices for improvement of complex characters.

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MATERIAL AND METHODS

The preliminary trial conducted on fourty genotypes of fenugreek obtained from diverse eco-geographical regions of India, and the collection maintained at department of Genetics and Plant Breeding, N. M. College of Agriculture, NAU, Nasari. The materials were evaluated in Randomized Block Design with three replication during the *rabi* season of 2015-16. The results were evaluated using descriptive statistics and analysis of variance (ANOVA). Data observed on 14 traits were subjected to statistical and biometrical analysis and the manifests have been demonstrated *viz.*, analysis of variance, estimation of variability, estimation of heritability and genetic advance. Analysis of variance was carried out using standard procedure prescribed by Panse & Sukhatme[6]. Variability among accessions was estimated using range, mean, least significant difference, phenotypic and genotypic variance and coefficient of variability according to Burton & Dorane[1]. Broad sense heritability, genetic advance and genetic advance as per cent of the mean were analyzed according to Johnson *et al*[5].

RESULTS AND DISCUSSION

Analysis of variance revealed significant differences among genotypes for all the fourteen traits studied indicating presence of significant variability in the materials (Table 1). Partitioning of the total variance into its components revealed that genotypic effects accounted for an appreciable portion of this variability.

The highest genotypic and phenotypic coefficient of variation in the present study was observed for secondary branches per plant (35.96,38.26) followed by total oil content (34.38,34.78), primary branches per plant (25.89,29.25), pods per plant (24.74,27.62), seed yield (24.02,25.80), harvest index (23.58,27.48), and green biomass per plant (20.91,24.48). The results indicated the presence of wide variation for these characters under study to allow further improvement by selection of the individual traits. The PCV in general, was higher than the GCV for all the characters. This indicates considerable effect of environment on the expression of these characters. Similar observations were also made by Gangopadhyay *et al.*[3], Dashora *et al.*[2], and jain *et al.*[4].

Genetic advance expressed as percentage of mean was found high for total oil content, secondary branches per plant, primary branches per plant, seed yield, pods per plant, harvest index, seed protein, green biomass per plant, pod length and 1000 seed weight. Thus, it appears that the degree of heritability and variance together determine the genetic advance.

Heritability estimates along with genetic advance are more useful than heritability alone in predicting the resultant effect on selecting best individuals. In present investigation, high heritability coupled with high genetic advance was found in primary branches per plant, secondary branches per plant, seed yield, 1000 seed weight, pods per plant, pod length, harvest index, green biomass per plant, seed protein and total oil content. Similar findings were earlier reported Gangopadhyay *et al.*[3], Prajapati *et al.*[7], Dashora *et al.*[2], and Verma *et al.*[8].

High heritability with high genetic advance indicated that this character governed by additive gene action. Hence, there are good chances of improvement of this trait through direct selection in the present material.

Table 1 : Analysis of variance for fourteen different traits of fenugreek

Sources of variation	d.f.	Plant height (cm)	Primary branches per plant	Secondary branches per plant	Days to 50% flowering	Days to maturity	Seed yield (kg/ha)	1000 seed weight (g)
Replication	2	27.4360	0.09	0.42	1.39	3.51	15514.26	1.79
Genotypes	39	64.9942**	1.71**	3.68**	50.87**	89.32**	106472.49**	37.31**

Error	78	26.9239	0.14	0.16	2.79	9.17	5185.34	3.54
S. Em.		2.9958	0.22	0.23	0.96	1.75	41.57	1.09
C.D. at 5 %		8.4346	0.62	0.64	2.71	4.92	117.05	3.06
C.V. %		10.4740	13.62	13.09	3.80	3.11	9.42	7.15

Sources of variation	**d.f.**	**Pods per plant**	**Grains per pod**	**Length of pod (cm)**	**Harvest Index (%)**	**Green biomass per plant (g)**	**Seed protein (%)**	**Total oil content (%)**
Replication	2	17.33	1.79	0.41	23.93	19.74	0.45	0.63
Genotypes	39	122.98**	8.49**	11.28**	149.04**	100.05**	36.71**	47.49**
Error	78	9.32	1.82	0.77	15.90	11.02	0.40	0.37
S. Em.		1.76	0.78	0.51	2.30	1.92	0.36	0.35
C.D. at 5 %		4.96	2.19	1.42	6.48	5.40	1.02	0.99
C.V. %		12.27	10.27	7.63	14.12	12.74	3.24	5.27

* , ** Significant at 5 % and 1 % level, respectively

Table 2 : Genotypic and phenotypic coefficients of variation, heritability, genetic advance as per cent of mean for fourteen different characters of fenugreek

Characters	**GCV %**	**PCV %**	**Heritability (Broad Sense %)**	**Genetic advance**	**Genetic advance % of mean**
Plant height (cm)	7.19	12.70	32.0	4.15	8.38
Primary branches per plant	25.89	29.25	78.3	1.32	47.21
Secondary branches per plant	35.96	38.26	88.3	2.10	69.60
Days to 50% flowering	9.11	9.87	85.2	7.61	17.31
Days to maturity	5.30	6.15	74.5	9.19	9.43
Seed yield (kg/ha)	24.02	25.80	86.7	352.42	46.08
1000 seed weight (g)	12.75	14.62	76.1	6.03	22.91
Pods per plant	24.74	27.62	80.3	11.36	45.66
Grains per pod	11.36	15.32	55.0	2.28	17.36
Length of pod (cm)	16.32	18.01	82.1	3.49	30.45
Harvest Index (%)	23.58	27.48	73.6	11.77	41.69
Green biomass per plant (g)	20.91	24.48	72.9	9.58	36.78
Seed protein (%)	17.95	18.24	96.8	7.05	36.38
Total oil content (%)	34.38	34.78	97.7	8.07	70.01

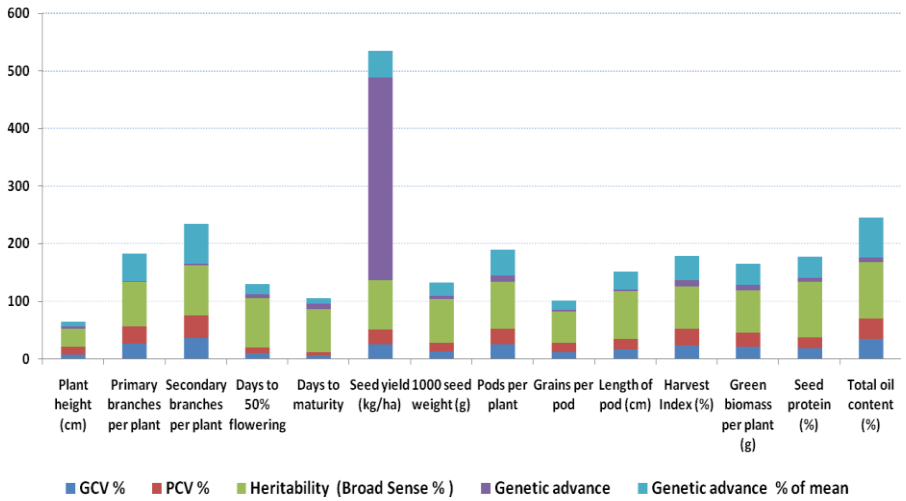

Fig. 1: PCV, GCV, h^2(b), GA and GAM for fourteen quantitative characters in fenugreek

CONCLUSION

The final conclusion that can be obtained from the variability study is that 1000 seed weight, grains per pod, harvest index, pods per plant, pod length, and green biomass per plant are the most important component characters for seed yield, hence these traits should be considered as selection criteria for seed yield improvement in fenugreek.

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