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Genetic variability, correlation and path co-efficient analysis studies in fenugreek (*Trigonella foenum-graecum* L.)

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ABSTRACT : Genetic variability, correlation and path co-efficient analysis between yield and its component traits were carried out in 30 genotypes of fenugreek (*Trigonella foenum-graecum* L.) at Faizabad (U.P.).Highly significant differences between genotypes were recorded for all the characters studied. High estimates of PCV along with GCV as well as heritability and genetic advance (GA) were observed for seed yield per plant. High heritability along with moderate genetic advance was recorded for test weight. High heritability along with low genetic advance was recorded for pods per plant, plant height, length of pod and seeds per pod. Moderate heritability accompanied with high genetic advance was recorded for branches per plant. Plant height showed positive and highly significant correlation association with number of branches per plant, test weight and seed yield per plant. Path co-efficient analysis revealed that test weight, number of seeds per pod, number of pods per plant and plant height had positive and direct effect on seed yield. It was concluded that improvement in the seed yield of fenugreek is possible through selection for test weight, number of seeds per pod, number of pods per plant.

KEY WORDS : Fenugreek, Heritability, Variability, Yield

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Fenugreek (*Trigonella foenum- graecum*) 2n=16 popularly known by its vernacular name "Methi" is an important spice crop of India particularly in the state of Rajasthan, Gujarat, Tamil Nadu, Andhra Pradesh, Uttar Pradesh, Himachal Pradesh, Madhya Pradesh and Haryana. It is mainly a condiment crop and grown both for seed as well as for fodder purpose. The dry fruits are also considered to be of medicinal value. Although, its importance in Indian economy is well realized, the improvement work done in this crop is very scanty and very few references are available. 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. The present investigation was to evaluate the germplasm and unveil the genetic variability and correlation studies for yield and yield attributing traits as such information forms the basis for designing breeding strategies to improve the yield potential.

RESEARCH METHODS

Thirty genotypes of fenugreek including check *viz*., Hishar Sonali, obtained from different geographical areas of the country were evaluated in Randomized Block Design (RBD) with three replications at Main Experiment Station (MES) of Department of Vegetable Science, Narendra Deva University of Agriculture and Technology, Kumarganj, Faizabad during *Rabi* 2008-2009. Each entry was sown in plots of size 1.5 m x 1 m having 30 cm and 10 cm distance between rows and plants, respectively. All the recommended agronomic practices were adopted for raising a good crop. The data on days to 50 % flowering and days to maturity was recorded on plot basis, while ten randomly selected plants

from each of entry in each replication were tagged for recording the observations on plant height (cm), number of branches per plant, number of pods per plant, number of seeds per pod, test weight (g) and seed yield per plant (g). The experimental data were compiled by taking the mean values of thirty germplasm entries for all the three replications subjected to the statistical and biometrical analyses. The genotypic and phenotypic co-efficients of variability were worked out as per Burton (1952) and heritability and genetic advance was computed according to Johnson *et al*. (1955). Phenotypic and genotypic correlation co-efficients for grain yield were calculated fallowing Al-Jibouri *et al*. (1958) while path co-efficient analysis was determined following Dewey and Lu (1959).

RESEARCH FINDINGS AND DISCUSSION

Analysis of variance indicated highly of significant differences among the genotypes for all the nine characters studied. Partitioning of the total variance into its components revealed that genotypic effects accounted for an appreciable portion of this variability (Table 1). High estimates of PCV were recorded for the characters *viz*., number of branches per plants, plant height (cm) and moderate to low for number of pods per plant, seed yield per plant (g), test weight (g) and low in days to maturity. Whereas high estimates of GCV was recorded for the characters *viz*., plant height (cm), number

Table 1 : Range, general mean, genotypic and phenotypic coefficient of variation, heritability h^2 (b.s.), genetic advance, genetic advance in per cent of mean and coefficient of variation for 10 characters of fenugreek germplasm

Sr. No.	Characters	Range		General mean	Genotypic coefficient of variation	Phenotypic coefficient of variation	Heritability (%)	Genetic advance	Genetic advance in per cent of mean
		Min.	Max						
		1	2	3	7	8	9	10	11
1.	Plant height (cm)	49.77	73.33	59.01	11.40	11.53	97.74	2.01	3.41
2.	Days to 50% flowering	63.67	66.67	65.47	1.06	1.40	56.79	1.17	1.78
3.	Number of branches plant^{-1}	3.37	5.01	4.02	11.01	13.63	65.25	1.34	33.45
4.	Number of pods plant^{-1}	25.37	36.50	32.08	8.85	8.90	98.84	2.03	6.34
5.	Length of pod (cm)	11.00	13.69	12.13	6.39	6.44	98.50	2.02	16.73
6.	Number of seeds pod^{-1}	12.40	16.62	14.63	6.94	7.02	97.57	2.01	13.73
7.	Days to maturity	142.00	148.33	144.92	1.05	1.22	74.56	1.53	1.06
8.	1000-seed weight (g)	6.00	8.67	7.70	7.609	7.63	99.21	2.03	26.55
9.	Seed yield plant^{-1} (g)	4.47	6.13	5.43	8.08	8.09	99.25	2.05	37.66

Table 2 : Estimates of phenotypic and genotypic correlation coefficient among nine characters of fenugreek germplasm

Sr. No.	Characters		Plant height (cm)	Days to 50% flowering	Number of branches plant^{-1}	Number of pods plant^{-1}	Length of pod (cm)	Number of seeds pod^{-1}	Days to maturity	1000-seed weight (g)	Seed yield plant^{-1}(g)
			1	2	3	4	5	6	7	8	9
1.	Plant height (cm)	rp	1	-0.200	0.974**	0.351*	0.254	0.238	-0.180	0.484**	0.452**
		rg	1	-0.200	0.974	0.352	0.254	0.238	-0.180	0.484	0.452
2.	Days to 50% flowering	rp		1	-0.170	-0.091	-0.00	0.009	0.631**	-0.201	-0.122
		rg		1	-0.178	-0.091	-0.00	0.009	0.631	-0.201	-0.122
3.	Number of branches plant^{-1}	rp			1	0.514**	0.186	0.128	-0.301	0.479**	0.407*
		rg			1	0.514	0.186	0.128	-0.301	0.479	0.407
4.	Number of pods plant^{-1}	rp				1	0.398*	0.429*	-0.278	0.869**	0.857**
		rg				1	0.398	0.429	0.278	0.869	0.857
5.	Length of pod (cm)	rp					1	0.973*	-0.412*	0.412*	0.399*
		rg					1	0.973	-0.412	0.412	0.399
6.	Number of seeds pod^{-1}	rp						1	0.400	0.400*	0.429*
		rg						1	-0.400	0.400	0.429
7.	Days to maturity	rp							1	-0.170	-0.152
		rg							1	-0.170	-0.152
8.	1000-seed weight (g)	rp								1	0.968**
		rg								1	0.962

* and ** significance of values at P=0.05 and 0.01, respectively; Upper diagonal shows phenotypic (p) and lower diagonal shows genotypic (g) correlation

Table 3 : Estimate of path coefficient showing direct and indirect effects on seed yield per plant at phenotypic level fenugreek germplasms

Sr. No.	Characters	Plant height	Days to 50% flowering	Number of branches per plant	Number of pods per plant	Length of pod (cm)	Number of seeds per pod	Days to maturity	1000-seed weight	Correlation with seed yield per plant (g)
		1	2	3	4	5	6	7	8	9
1.	Plant height	0.072	-0.007	-0.078	0.028	-0.086	0.080	0.004	0.429	0.443
2.	Days to 50% flowering	-0.011	0.046	0.014	-0.006	0.000	0.001	-0.011	-0.139	-0.097
3.	Number of branches per plant	0.055	-0.006	-0.103	0.035	-0.052	0.036	0.004	0.346	0.316
4.	Number of pods per plant	0.024	-0.003	-0.044	0.083	-0.136	0.146	0.006	0.771	0.847
5.	Length of pod (cm)	0.018	-8.9E	-0.015	0.033	-0.344	0.328	0.009	0.363	0.392
6.	Number of seeds per pod	0.016	0.001	-0.010	0.035	-0.327	0.345	0.008	0.353	0.422
7.	Days to maturity	-0.011	0.020	0.018	-0.019	0.128	-0.109	-0.026	-0.128	-0.128
8.	1000-seed weight	0.034	-0.007	-0.039	0.071	-0.140	0.136	0.003	0.895	0.955

Residual effect = -010067

Note: Bold underline values denote direct effects

of branches per plant and moderate to low in number of pods per plants, seed yield per plant (g) and test weight, lowest GCV was recorded in days to maturity. Similar findings were also recorded for seed yield by Singh (2000), Chandra *et al.* (2000) Rakesh and Korla (2003) and for pod per plant by Raje *et al.* (2003). Genetic advance expressed in percentage of mean was found to be higher for the character namely seed yield per plant (g), number of branches per plant, test weight (g) and moderate to low for rest of the characters. Thus, it appears that the degree of heritability and variance together determine the genetic advance. Similar results were recorded by Singh (2000) and Chandra *et al.* (2000). Association analysis (Table 2) revealed a positive and significant correlation of plant height with number of branches per plant, test weight, and seed yield per plant were also observed.

The correlation depends upon the environment in which the material and the environment was evaluated, therefore, difference in the statements of correlations are expected between different studies. In present investigation, the inter-correlations among different traits has shown that seed yield per plant had significant positive correlation with test weight, number of pods per plant, plant height, number of seeds per pod and number of branches per plant whereas negative and non significant with days to 50 % flowering and days to maturity as reported by Meena *et al.* (2010). In breeding programme, we are often concerned with improvement in yield, which depends on a number of morphological physiological attributes. Such characters are often inter-related; hence, there effect on yield is also modified by the others. Path analysis helps in separating the direct effect of the component character on yield as well as indirect effects via other traits. The path analysis (Table 3) revealed that test weight, number of seeds per pod, and number of pods per plant, and plant height exerted high positive direct effect on seed yield per plant. The correlation of these traits with seed yield was also positive. The results are in agreement with earlier reports of Singh (2000) and Chandra *el al.* (2000), test weight and number of seeds per pod showed positive direct effect on seed yield. It may thus be concluded that in fenugreek plant height, test weight, number of seeds per pod, number of pods per plant are the three most important traits which directly or indirectly influence seed yield. Thus selection programme should, therefore, be based on these traits. Based upon the mean performance, the genotypes NDM-42, NDM-38 and NDM-45 were found to be top yielders for seed yield as well as other morphological traits. These genotypes may be used as parents in hybridization programme.

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REFERENCES

Al-Jibouri, N.A., Miller, P.A. and Robinson, H.R. (1958). Genotypic and environmental variances and co-variance in an upland cotton cross of inter-specific origin. *Agron. J.*, **50** (10) : 633-636.

Burton, G.W. (1952). Quantitative inheritance in grasses. Proceedings, 6th International Grassland Congress, **1** : 277-285.

Chandra, K., Sastry, E.V.D. and Singh, D. (2000). Genetic variation and character association of seed yield and its components characters in fenugreek (*Trigonella foenum-graceun* L). *Agric. Sci. Digest*, **20** (2) : 93-95.

Dewey, D.R. and Lu, K.H. (1959). A correlation and path co-efficient analysis of component of crested wheatgrass seed production. *Agron. J.*, **51** (9) : 515-518.

Johnson, H.W., Robinson, H.F. and Comstock, R.E. (1955). Estimation of genetic and environmental variability in soybeans. *Agron. J.*, **47** (7) : 314-318.

Meena, R.S., Kakani, R.K., Anwer, M.M. and Panwar, Alka (2010). relationship among seed yield characters and selection criteria for yield improvement in fenugreek. In: Abstract, National Consultation on Seed Spices Biodiversity and Production for Export-Perspective, Potential, Threats and their Solutions (p.10), 7 July 2010 National Research Centre for Seed Spices, Ajmer.

Raje, R.S., Singhania, D.L. and Singh, D. (2003). Evaluation of early generation progenies (F_2) of fenugreek (*Trigonella foenum-graceun* L) crosses for seed yield and yield related characters. *J. Spices Arom. Crops*, **12**:127-134.

Rakesh, V. and Korla, B.N. (2003). Genetic variability in fenugreek (*Trigonella foenum-graceun* L) grown under mid-hills of Himachal Pradesh. *J. Spices Arom. Crops*, **12** : 60-62.

Singh, A. (2000). Estimation in fenugreek for seed yields and its component characters in fenugreek (*Trigonella Foenum-graceun* L) M.Sc. (Ag) Thesis, Rajasthan Agricultural University, Bikaner (RAJASTHAN) INDIA.