GENETIC VARIABILITY, CORRELATION COEFFICIENT AND PATH ANALYSIS STUDIES IN FENUGREEK (*TRIGONELLA FOENUM-GRAECUM* L.)

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Abstacts: Fenugreek (*Trigonella foenum-graecum* L.) is an annul autogamous crop grown as seed spice in India. Hence, the present investigation was undertaken. With this objective an investigation was laid out in Randomized Block Design with three replications at the main experiment station of Department of Vegetable Science, Narendra Deva University of Agriculture and Technology, Kumarganj, Faizabad (U.P.) in India grown during winter. Thirty-one genotypes of fenugreek (*Trigonella foenum-graecum* L.) were assessed for a phenotypic coefficient of variance (pcv), genotypic coefficient of variance (gcv), heritability and genetic advance as percentage of mean for growth, yield attributes and yield. The results reveals that the higher magnitude of coefficient of variation at genotypic level was observed for number of pods per plant, number of branches per plot, number of seeds per pod, plant height, seed yield per plant, yield (q/ha), length of pod whereas at phenotypic level, number of pods/plant, number of branches per plant, number of seeds per pod, plant height, seed yield per plant yield (q/ha) and length of pod revealed high magnitude of coefficient of variation. The indicated possibility of obtaining very high selection response in respect of these traits. In this way, high values of genotypic and phenotypic coefficient of variation was also observed in fenugreek for plant height, days to flowering, branches per plant and test weight and low for pod length, when studied with 22 genotypes in field condition and high genotypic coefficient of variation for number of secondary branches, number of pods per plant and seed yield was observed in fenugreek [Banerjee and Kole, 2004 and Datta *et al.*, 2005]. It is also reported that high heritability for pods per plant, pod length and seed yield, while low heritability was observed for seeds per pod and test weight (Meena, 1994).

Kewwords: Genetic, Correlation, Fenugreek, *Trigonella foenum- graecum* L.

INTRODUCTION

Fenugreek (*Trigonella foenum-groecum* L.) is an annual autogamous crop grown as seed spice crop in India. Green leaves of fenugreek used for vegetable purpose. Apart from this, it is also used in different pharmaceutical preparations. Estimates of various parameters for assessment of genetic variability viz., mean range of variation, heritability, genetic advance and coefficients of variation help the plant breeders in devising suitable plant type by bringing improvement in quantitatively inherited traits. Correlations provide an estimate of the degree and direction of association among various components of yield. It is, therefore, essential to measure the contribution of various variables to the observed association and partition the correlation coefficient into the components of direct and indirect effects. Hence, the present investigation was undertaken.

MATERIAL AND METHODS

The experimental materials consisted of thirty one genotypes of fenugreek were grown in Randomized Block Design with three replications during *Rabi* 2005-06 at Main Experiment Station of Vegetable Research, N. D. University of Agriculture & Technology, Kumarganj, Faizabad. Each genotype were sown in a two row plot of 5 m long with inter and intra now spacing of 30×10 cm. Recommended package of practices were followed to raise healthy crop. Five competitive plants of each genotype were selected randomly in each replications for recording observations on nine quantitative characters *viz.* plant height (cm), number of branches per plant, number of pods per plant, length of pod (cm), number of seeds per pod, 1000-seed weight (g) and seed yield per plant (g). The observations on days to 50 per cent flowering and maturity recorded on progeny now basis. The mean data were subjected to statistical analysis of variance (Panse and Sukhatme, 1984), coefficient of variation and heritability (Burton and de Vane, 1953) and genetic advance in per cent of mean (Johnson *et al*. 1955). The correlation and path coefficient analysis were done according to method suggested be A1-Jibouri *et al*. (1958).

RESULTS AND DISCUSSION

The analysis of variance revealed significant differences among the genotypes for all the nine characters, thus paving way for further analysis. The mean values, range and estimates of different genetic parameters for various traits are given in Table 1. Wide range for all the traits indicates the existence of variation among the genotypes. The phenotypic coefficient of variation (PCV) was high for seed yield per plant followed by number of pods per plant, number of branches per plant and seeds per pod. The similar trend was observed for genotypic coefficient of variation (GCV). The results are in partial agreement with those reported by Banerjee and Kole (2004) and Dutta *et al*. (2005). Although GCV is an

indicative of the presence of high degree of genetic variation, the amount of heritable variation, can only be determined with the heritability estimates and genetic gain. High heritability was observed for all the characters except days to maturity. Though high heritability indicates the effectiveness of selection on the basis of phenotypic performance, it does not show any indication the amount of genetic progress for selecting the best individuals. The genetic advance (%) was high for number of pods per plant, number of branches per plant, number of seeds per pod, and seed yield per plant. Rest of the traits had low to moderate estimate of genetic advance. Number of pods per plant, number of branches per plant, number of seeds per pod and seed yield per plant showed high heritability coupled with high genetic advance indicating that these traits were under the additive gene control and simple selection can be used for further improvement in these traits in fenugreek. These results are in accordance with findings of Plant , Mehta *et al.* (1992) and Meena *et al.* (1994).Genotypic correlations were higher than the phenotypic correlations among all the combinations (Table 2) except number of branches per plant with number of pods per plant, length of pod, number of seeds per pod, 1000-seed weight and seed yields which would be due to masking or modifying effect of environments. Seed yield per plant was found significant and positively correlated with 1000-seed weight, number of branches per plant, number of pods per plant, length of pod and number of seeds per pod. 1000-seed weight showed significant and positive correlation with number of pods per plant, length of pods, number of branches per plant and number of seeds per pod. Number of seeds per pod was positively associated with number of pods per plant. Length of pod exhibited significant and positive association with number of branches per plant and number of pods per plant. Days to 50 per cent flowering showed significant and negative correlation with number of branches per plant. Similar relationship have also been reported earlier by Chandra *et al*. (2000) and Banerjee and Kole (2004). Path coefficient analysis showed that number of branches per plant (0.318) had the highest positive direct effect on seed yield per plant (Table 3) followed by length of pod (0.221), plant height (0.206) and number of seeds per pod (0.204) whereas, negative direct effect on seed yield was made by days to maturity (-0.275) and 1000-seed weight (-0.011). Number of pods per plant via number of seeds per pod, length of pod, 1000-seed weight and number of pods per plant via number of branches per plant had high order, indirect positive effects on seed yield. Indirect effect of plant height via number of branches per plant was negative. These findings are in agreement with those observed by Chandra *et al*. (2000), Banerjee and Kole (2004) and Dutta *et al.*

Table 1: Range, mean, phenotypic and genotypic coefficients of variation, heritability (bs) and genetic advance for different characters in fenugreek

Sl. No.	Characters	Range		General mean	PCV (%)	GCV (%)	Heritability (%) (bs.)	Genetic advance in per cent of mean
		Min.	Max.					
1.	Plant height (cm)	49.07	69.20	59.342	6.985	6.905	97.7	14.063
2.	Number of branches / plant	2.50	4.80	3.860	12.925	11.859	84.2	22.415
3.	Days to 50% flowering	60.60	66.27	65.041	1.111	1.038	87.4	2.00
4.	Number of pods/plant	21.27	38.00	31.242	13.267	13.009	97.0	26.398
5.	Length of pod (cm)	10.87	13.33	11.841	6.223	5.899	89.9	11.521
6.	Number of seeds / pod	12.80	18.47	14.759	10.333	10.036	94.0	18.845
7.	Days to maturity	136.33	147.27	145.286	0.768	0.627	66.7	1.055
8.	1000-sered weight (g)	4.47	7.96	7.735	1.601	1.41	77.7	2.561
9.	Seed yield / plant (g)	3.62	6.03	5.567	7.185	6.752	88.8	13.071

PCV = Phenotypic coefficient of variation; GCV = Genotypic coefficient of variation

Table 2: Estimates of genotypic and phenotypic correlation coefficients for 9 characters in Fenugreek

S.N.	Characters	Plant height (cm)	No. of branches/ plant	Days to 50% flowering	No. of pods/ plant	Length of pod (cm)	No. of seeds/ pod	Days to maturity	1000-seed weight (g)	Seed yield/ plant (g)
1.	Plant height (cm)	G	-0.073	-0.126	-0.207	0.005	-0.088	0.159	-0.003	0.090
		P	-0.065	-0.126	-0.202	0.004	-0.087	0.13	-0.012	0.084
2.	Number of branches/ plant	G		-0.430	-0.207	0.005	-0.088	0.159	-0.003	0.090
		P		-0.382*	0.399*	0.448**	0.240	-0.258	0.470**	0.498**
3.	Days to 50% flowering	G			-0.053	-0.323	0.044	0.018	-0.013	-0.005
		P			-0.043	-0.269	0.065	0.043	0.015	-0.013
4.	Number of	G				0.438	0.590	-0.284	0.707	0.498

	pods / plant	P				0.407*	0.571**	-2.202	0.612**	0.46*
5.	Length of pod (cm)	G					0.270	-0.024	0.686	0.486
		P					0.250	-0.022	0.563**	0.421*
6.	Number of seeds / pod	G						0.007	0.435	0.451
		P						-0.004	0.370*	0.393*
7.	Days to maturity	G							-0.219	-0.448
		P							-0.161	-0.384
8.	1000-seed weight (g)	G								0.526
		P								0.453**

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

Table 3: Estimates of direct (diagonal) and indirect (off diagonal) effects of different traits on yield in fenugreek

S.N.	Characters		Plant height (cm)	No. of branches/ plant	Days to 50% flowering	No. of pods/ plant	Length of pod (cm)	No. of seeds/ pod	Days to maturity	1000-seed weight (g)	Correlation with seed yield / plant
1.	Plant height	P	**0.206**	-0.201	-0.025	-0.023	0.001	-0.018	-0.037	0.0001	0.084
		G	**0.270**	-0.032	-0.042	-0.024	0.002	-0.024	-0.060	0.0006	0.090
2.	Number of branches/plant	P	-0.013	**0.318**	-0.076	0.046	0.108	0.049	0.071	-0.005	0.498**
		G	-0.0.20	**0.434**	-0.145	0.052	0.217	0.077	0.117	-0.133	0.60
3.	Days to 50% flowering	P	0.026	-0.12	**0.198**	-0.005	-0.060	0.013	-0.012	-0.0002	-0.013
		G	-0.034	-0.187	**0.337**	-0.006	-0.123	0.0122	-0.007	0.003	0.005
4.	Number of pods / plant	P	-0.042	0.127	-0.008	**0.114**	0.090	0.16	0.056	-0.007	0.446*
		G	-0.056	0.192	-0.018	**0.118**	0.167	0.163	0.107	-0.175	0.498
5.	Length of pod (cm)	P	0.001	0.15	-0.053	0.047	**0.221**	0.051	0.006	-0.006	0.421*
		G	0.001	0.248	-0.109	0.052	**0.380**	0.075	0.009	-0.170	0.486
6.	Number of seeds / pod	P	-0.019	0.077	0.013	0.065	0.055	**0.204**	0.001	-0.004	0.393*
		G	-0.024	0.121	0.015	0.070	0.103	**0.277**	-0.003	-0.108	0.451
7.	Days to maturity	P	0.028	-0.082	0.08	-0.023	-0.005	-0.001	**-0.275**	0.002	-0.348
		G	0.043	-0.135	0.006	-0.034	-0.009	0.002	**-0.375**	0.054	0.448
8.	1000-seed weight (g)	P	-0.003	0.149	-0.023	0.070	0.124	0.075	0.044	**-0.011**	0.453*
		G	-0.0007	0.232	-0.004	0.084	0.261	0.120	0.0520	**-0.248**	0.526

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

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