

Correlation Coefficient and Path Analysis Studies in Fenugreek (*Trigonella foenum-graecum* L.)

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Abstract

A field experiment was conducted with thirty -one genotypes of fenugreek (*Trigonella foenum-graecum* L.) to assess the association different characters with seed yield, their relationship and direct and indirect effect of different characters on seed yield per plant to identify the superior genotype for the further crop improvement programme. The genotypic correlation generally similar in nature the corresponding phenotypic ones. A very strong positive correlation of seed yield per plant at genotypic and phenotypic level was observed with number of branches per plant. The path coefficient analysis carried out a genotypic and phenotypic level revealed that number of branches per plant followed by length of branches per plant followed by length of pod, plant height, number of grains per pod, days to 50% flowering and number of pods per plant had positive direct effect on seed yield per plant at phenotypic level. However, number of branches per plant followed by length of pod, days to 50% flowering, number of grains per pod, plant height and number of pods per plant had exerted positive direct effect on seed yield per plant at genotypic level.

Key words : Fenugreek, Genotype, Correlation coefficient, Path coefficient.

Fenugreek (*Trigonella foenum-graecum* L.) is an important spice in India. Besides seed production it is also grown for green leaves and forage. Apart from this, it is also used in different pharmaceutical preparations. Despite being an economically important one, the crop has received little or any concerted efforts at its important. Hence, estimates of various parameters for assessment of path analysis studies and correlation 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. Therefore, with a view to access the character association and to study the cause and effect relationship among various characters an investigation was undertaken by the correlation and path analysis studies in fenugreek.

Methods

The experimental materials consisted of thirty one genotype of fenugreek were grown in randomized block design with three replications during *rabi*

season at Main Experiment, Faizabad. Each genotype were sown in a two row plot of 5 m long with inter and intra row 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% flowering and maturity recorded on progeny basis. All the recommended agronomical practices and plant protection measures were followed timely to grow successful crop. Genotypic and phenotypic correlations and path analysis were worked out by AL-Jibouri et al. (1) and Dewey and Lu (2) respectively.

Results and Discussion

Correlation Coefficient

Correlation coefficients were worked out at phenotypic and genotypic levels for nine different traits

Table 1. Estimates of phenotypic and genotypic correlation coefficients for nine characters. G = Genotype, P = Phenotype. *, **Significant at 5 and 1% levels, respectively.

Characters	Plant height	No. of branches per plant	Days to 50% flowering	No of pods/plant	Length of pod (cm)	No. of grains/pod	Days to maturity	1000-seed weight	Correlation with seed yield/plant (g)
1	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	0.133	-0.012	0.084
2	G		-0.430	-0.207	0.005	-0.088	0.159	-0.003	0.090
	P		-0.382*	0.399*	0.488**	0.240	-0.258	0.470**	0.498**
3	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	G				0.438	0.590	-0.284	0.707	0.498
	P				0.407*	0.571**	-0.202	0.612**	0.446*
5	G					0.270	-0.024	0.686	0.486
	P					0.250	-0.022	0.563**	0.421*
6	G						0.007	0.435	0.451
	P						-0.004	0.370*	0.393*
7	G							-0.219	-0.448
	P							-0.161	-0.348
8	G								0.526
	P								0.453**

in fenugreek (Table 1). In general, genotypic correlations were higher than phenotypic ones in magnitude for all the characters in fenugreek. plant height exhibited non-significant and association all the characters. Highly significant and positive genotypic or phenotypic correlation of number of branches per plant was estimated with yield per plant (0.498), length of pod (0.488) and 1000-seed weight (0.470). Whereas, number of pods (0.399) was positive and significantly correlated and days to 50% flowering (-0.382) showed significant but negative association with this character. Rests of the characters association were non-significant. Days to 50% flowering exhibited non-significant correlation with all the characters. No. of pods showed highly significant and positive correlation with the thousand seed weight (0.612) and number of grains pod (0.571) but yield per plant (0.446) and length of pod (0.407) has significant and positive association and with remaining characters it was non-significant. This finding is in accordance with the finding of

Singh et al. (3), Shade et al. (4) and Chandra et al. (5).

Path Coefficient Analysis

The path coefficient analysis was carried out by using genotypic as well as phenotypic correlation coefficient between nine characters to estimate direct and indirect effects of different characters on seed yield per plant. The direct and indirect effects of different characters on seed yield per plant estimated by Path coefficient analysis using the phenotypic and genotypic correlation coefficients (Table 2).

At phenotypic level number of branches per plant (0.318) followed by length of pod (0.221), plant height (0.206), number of grains per pod (0.204) exerted high positive direct effect on seed yield per plant. In addition the high direct contribution to seed yield made by days to 50% flowering (0.198) and number of pods per plant (0.114) contributing substantial direct effect (Table 2). The very low value of direct effects (pheno-

Table 2. Direct and indirect effects of different characters on seed yield/plant at phenotypic level in fenugreek. Bold under line values denoted direct effects.

Characters	Plant height	No. of branches per plant	Days to 50% flowering	No. of Pods/plant	Length of pod (cm)	No. of grains/pod	Days to maturity	1000-seed weight	Correlation with seed yield/plant (g)
1 Plant height	0.206	-0.021	-0.025	-0.023	0.001	-0.018	-0.037	0.0001	0.084
2 Number of branches per plant	-0.013	0.318	-0.076	0.046	0.108	0.049	0.071	-0.005	0.498
3 Days of 50% flowering	0.026	-0.122	0.198	-0.005	-0.060	0.013	-0.012	-0.0002	-0.013
4 No. of pods/plant	-0.042	0.127	-0.008	0.114	0.090	0.116	0.056	-0.007	0.446
5 Length of pod (cm)	0.001	0.155	-0.053	0.047	0.221	0.051	0.006	-0.006	0.421
6 No. of grains/pod	-0.019	0.077	0.013	0.065	0.055	0.204	0.001	-0.004	0.393
7 Days to maturity	0.028	-0.082	0.008	-0.023	-0.005	-0.001	-0.275	0.002	-0.348
8 100-seed weight	-0.003	0.149	0.003	0.070	0.124	0.075	0.044	-0.011	0.453

typic level) recorded in negative direction for 1000-seed weight (-0.011) and days to maturity (-0.275), indicated that direct contribution of these traits was too low to be considered of any consequences. The remaining estimates of indirect effects in the analysis were too low to be considered important. This finding is in accordance with the finding of Pant et al. (6), Khattab et al. (7) and Chandra et al. (5).

Path coefficient analysis computed on the basis of genotypic correlation is given in Table 3. The highest positive direct contribution to seed yield per plant at genotypic level was recorded by number of branches per plant (0.434) followed by length of pod (0.380). In addition to direct contribution made by days to flowering (0.337), plant height (0.270) and number of pods per plant (0.118) also showed considerable direct and positive contribution toward

seed yield. The very low value of direct effects (genotypic level) recorded in negative direction for days to maturity (-0.375) and 1000-seed weight (-0.248). 1000-seed weight (0.261) via length of pod, length of pod (0.248) and 1000-seed weight (0.232) via number of branches per plant has high positive indirect genotypic contribution towards seed yield. The remaining estimates of indirect effect in the analysis were too low to be considered important. These findings very closely similar to earlier reporters, Berwal et al. (8) Shukla and Sharma (9) and Chandra et al. (5).

Conclusion

Thus it can be concluded that very strong positive correlation of seed yield per plant at genotypic and phenotypic level was observed with number of

Table 3. Direct and Indirect effects of different characters on seed yield plant⁻¹ at genotypic level in fenugreek. Bold under line values denoted direct effects.

Characters	Plant height	No. of branches per plant	Days to 50% flowering	No. of Pods/plant	Length of pod (cm)	No. of grains/pod	Days to maturity	1000-seed weight	Correlation with seed yield/plant (g)
1 Plant height	0.270	-0.032	-0.042	-0.024	0.002	-0.024	-0.060	0.0006	0.090
2 Number of branches per plant	-0.020	0.434	-0.145	0.052	0.217	0.077	0.117	-0.133	0.600
3 Days to 50% flowering	-0.034	-0.187	0.337	-0.006	-0.123	0.0122	-0.007	0.003	0.005
4 No. of pods/plant	-0.056	0.192	-0.018	0.118	0.167	0.163	0.107	-0.175	0.498
5 Length of pod (cm)	0.001	0.248	-0.109	0.052	0.380	0.075	0.009	-0.170	0.486
6 No. of grains/pod	-0.024	0.121	0.015	0.070	0.103	0.277	-0.003	-0.108	0.451
7 Days to maturity	0.043	-0.135	0.006	-0.34	-0.009	0.002	-0.375	0.054	0.448
8 100-seed weight	-0.0007	0.232	-0.004	0.084	0.261	0.120	0.0820	-0.248	0.526

branches per plant. The path coefficient analysis carried out a genotypic as well as phenotypic level. The most desirable genotypes identified for specific characters other than seed yield per plant were NDM-15 for plant height, Hissar Sonali for No. of branches per plant, No. of pods per plant, length of pod, 1000-seed weight and yield (q/ha), NDM-12 for days to 50% flowering and no. of grains per pod, NDM-30 for days to maturity. These identified traits should be taken into account while formulating selection strategies in fenugreek.

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