

GENETIC VARIABILITY, HERITABILITY, GENETIC ADVANCE AND CORRELATION COEFFICIENT ANALYSIS IN FENUGREEK (*Trigonella foenum-graecum* L.)

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ABSTRACT : The results reveal that the higher magnitude of coefficient of variation at genotypic level was observed for number of pods per plant, number of branches per plant, number of seeds per pod, plant height, seed yield per plant, and 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, and length of pod revealed high magnitude of coefficient of variation. 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. High heritability coupled with high genetic advance in per cent of mean were observed for number of pods per plant, number of branches per plant, number of seeds per pod and plant height. 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

Keywords : Fenugreek, heritability, genetic advance, correlation coefficient.

Fenugreek (*Trigonella foenum-graecum* L.) is an annual autogamous crop grown as seed spice crop in India. Green leaves of fenugreek are 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.

MATERIALS AND METHODS

The experimental materials, consisted of thirty one genotypes of fenugreek were grown in Randomized Block Design with three replications during Rabi 2012-13 at Main Experiment Station of Krishi Vigyan Kendra, Pampoli, East Kameng, Arunachal Pradesh. Each genotype was 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 replication 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 basis. The mean data were subjected to statistical analysis of variance (Panse and Sukhatme, 7), coefficient of variation and heritability (Burton, 3) and genetic advance in per cent of mean.

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 (2) and Dutta *et al.* (5). Although GCV is an indication 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 Bahadur *et al.* (1), and Mehta *et al.* (6). Genotypic correlations were higher than the phenotypic correlations among all the combinations

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-seed 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 8 characters in fenugreek.

| S.No. | Characters | | 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 pods / plant | G | | | | 0.438 | 0.590 | -0.284 | 0.707 | 0.498 |
| | | 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 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.* (4) and Banerjee and Kole (2).

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