

## Genetic variability in Fenugreek (*Trigonella foenum-graecum* L) as expressed under South Eastern region of Rajasthan State

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### Abstract

Fenugreek (*Trigonella foenum-graecum* L.) is an important seed spice of India. The state of Rajasthan contributes more than 50 % to the nation's annual production. The extent of genetic variability present in fenugreek is low for yield and yield contributing traits. A set of 16 fenugreek genotypes were tested in south eastern region of Rajasthan State. Pooled analysis of two years data for subject to variability studies, The estimates of GCV and PCV were high for pods per plant, number of secondary branches per plant, seeds per pod and seed yield. High to moderate heritability coupled with high to moderate genetic advance was observed for pods per plant, secondary branches per plant, seeds per pod and test weight. These traits can be given emphasis in performing selection in fenugreek for genetic improvement.

Fenugreek (*Trigonella foenum-graecum* L.) is an annual plant in the family *Fabaceae*, with leaves consisting of three small obovate to oblong leaflets. It is cultivated worldwide as a semiarid crop, and its seeds are a common ingredient in dishes from the Indian subcontinent. In the country state of Rajasthan account for more than 50 % of the national area *i.e.*, 55375 ha (2013-14) under fenugreek with production of 64101 tons (Spices Board, Gol statistics updates). It is an important seed spice crop of the country, it also possess high medicinal value. The present productivity level of the crop is low, the ongoing genetic improvement programmes are mainly focused on pureline selection and efforts are also going on using mutation breeding approach to create variability for commercial exploitation. The extent of genetic variability present in the crop is not much high, hence it's important to analyse the genetic variability present in a set of genotypes to design a better strategy for its genetic improvement.

A set 16 fenugreek genotypes was tested for yield and yield attributing traits for three year 2012-13 and 2014-15, the data of two years *i.e.*, 2012-13 and 2014-15 is considered for pooled analysis. These genotypes were tested under Co-ordinated Varietal Trial of AICRP on Spices. In these

genotypes ten traits were observed *viz.*, days to 50 % flowering, plant height (cm), number of primary branches, number of secondary branches, number of pods per plant, pod length (cm), seeds per pod, test weight (g), days to maturity and seed yield per plot (plot size was 4 x 2.4 m<sup>2</sup>). The crop was raised in the *rabi* season at Research Farm, Agricultural Research Station, Ummedganj, Agricultural University, Kota, Rajasthan. Recommended package of practices were followed for raising a healthy crop. The phenotypic and genotypic coefficients of variation were worked out as per Burton (1952) and heritability and genetic advance were determined following the methodology of Johnson *et al.* (1955).

The analysis of variance revealed significant differences among the genotypes for all the traits studied. The estimates of GCV and PCV were high for pods per plant (GCV:34.6; PCV:23.8), number of secondary branches per plant (GCV:20.8; PCV:25.2), seeds per pod (GCV:20.3; PCV:23.8) and seed yield (GCV:13.4; PCV:15.0), suggesting high amount of genetic variation for these traits, whereas for all the remaining traits the estimates were moderate to low (Table 1). These results are in agreement with earlier reports for Prajapati *et al.*, (2010) for pods per plant, branches per plant and

seed yield. The PCV values were higher than the corresponding GCV values for all the traits, high differences were observed for pods per plant, seed yield, plant height, secondary branches per plant, reflecting that these traits are highly influenced by environment effects. Low differences between PCV and corresponding GCV values were observed for days to test weight, days to flowering and primary branches per plant suggesting that these traits are least affected by environment effects. The results are in agreement with the earlier reports of Lodhi *et. al.*, (2015), Pant *et. al.*, (1984), Prajapati *et. al.*, (2010) and Verma and Korla (2003).

Broad sense heritability was found to be high (>70% ) for test weight (74.3) and seed per pod (72.8), whereas moderate values were recorded for secondary branches plant<sup>-1</sup> (68.2), pods plant<sup>-1</sup> (64.8), days to maturity (61.6), days to 50 % flowering (60.2) and pod length (45.2). Low heritability estimates were recorded for seed yield (39.8), primary branches plant<sup>-1</sup> (25.6) and plant height (24.2). The values of genetic advance and genetic advance as per cent of mean were calculated for all the traits, high to moderate genetic advance as per cent of mean was recorded for pods plant<sup>-1</sup> (57.4), followed by seed pod<sup>-1</sup> (35.8), secondary branches plant<sup>-1</sup> (35.5) test weight (20.2) and seed yield (17.5). Low estimates of genetic advance as per cent of mean were observed for rest of the traits. High to moderate heritability coupled with high to moderate genetic advance

was observed for pods per plant, secondary branches per plant, seeds per pod and test weight. The finding on heritability and genetic advance as per cent of mean are in agreement with the earlier reports of Prajapati *et. al.*, (2010), Verma and Korla (2003) and Lodhi *et. al.*, (2015). Emphasis should be given on selection based on the expression of traits like pods per plant, secondary branches per plant, seeds per pod and test weight. These traits also have significant association with yield, hence direct and indirect selection based on these traits may be rewarding in fenugreek genetic improvement.

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**Table 1.** Estimate of genetic variability parameters assessed in fenugreek

| Character                  | Mean  | Genotypic coefficient of variation(GCV) | Phenotypic coefficient of variation (PCV) | Heritability in broad sense (%) | Genetic advance | Genetic Advance as % of mean |
|----------------------------|-------|-----------------------------------------|-------------------------------------------|---------------------------------|-----------------|------------------------------|
| Days to 50 % Flowering     | 62.8  | 4.66                                    | 6.01                                      | 60.2                            | 4.6             | 7.45                         |
| Plant Height (cm)          | 86.9  | 4.23                                    | 8.61                                      | 24.2                            | 3.73            | 4.29                         |
| Primary Branches (no)      | 2.95  | 5.30                                    | 7.41                                      | 25.6                            | 4.20            | 5.24                         |
| Secondary Branches (no)    | 2.89  | 20.8                                    | 25.2                                      | 68.2                            | 1.02            | 35.5                         |
| Pods per plant (Nos)       | 14.4  | 34.6                                    | 43.0                                      | 64.8                            | 8.30            | 57.4                         |
| Pod Length (cm)            | 6.89  | 6.40                                    | 9.60                                      | 45.2                            | 0.61            | 8.96                         |
| Seed per pod (Nos)         | 14.9  | 20.3                                    | 23.8                                      | 72.8                            | 5.30            | 35.8                         |
| Test weight (g)            | 11.4  | 11.4                                    | 13.2                                      | 74.3                            | 2.30            | 20.2                         |
| Days to Maturity           | 127.9 | 1.98                                    | 2.50                                      | 61.6                            | 4.07            | 3.20                         |
| Seed Yield per Plot (q/ha) | 12.50 | 13.4                                    | 15.0                                      | 39.8                            | 2.90            | 17.5                         |

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