Journal of Spices and Aromatic Crops
Vol. 17 (1) : 33–35 (2008)

Indian Society for Spices

Correlation and regression analysis of yield components between F_3 and F_4 generations in fenugreek (*Trigonella foenum-graecum* L.)

M K Yadav & R S Raje

Department of Plant Breeding and Genetics
S K N College of Agriculture
Jobner–303329, Rajasthan, India
E-mail: mkyadavjobner@rediffmail.com

Received 20 January 2007; Revised 21 July 2007; Accepted 08 March 2008

Abstract

Evaluation of 21 F_4 progeny families and the corresponding F_3 parent families of fenugreek (*Trigonella foenum-graecum*) at Jobner (Rajasthan) indicated that the value of r_{op} (correlation between offspring and parents) and b_{op} (regression of offspring on parents) were low for primary branches plant^{-1}, when primary branches plant^{-1} was taken as selection criterion. Low r_{op} and b_{op} values were also recorded for pods plant^{-1} and seeds pod^{-1} when pods plant^{-1} and seeds pod^{-1} were taken as selection criterion. Whereas, highly significant r_{op} and b_{op} values were recorded for other parameters that were not taken as selection criterion for each of the three traits namely, pods plant^{-1}, primary branches plant^{-1} and seeds pod^{-1}. This indicated that there was more resemblance between parents and offsprings for these characters and selection did not have much effect on these characters.

Keywords: correlation coefficient, fenugreek, regression, *Trigonella foenum-graecum.*

Attempts to improve the genetic potential of fenugreek (*Trigonella foenum-graecum* L.*)* in India are limited primarily because of narrow range of genetic variability in respect of various characters (Shukla & Sharma 1978). Out of these characters, primary branches plant^{-1}, pods plant^{-1} and seeds pod^{-1} have been reported to have high heritability (Mehta *et al.* 1992; Arora & Lodhi 1993). In the present investigation, an attempt was made to evaluate the potential of pods plant^{-1}, primary branches plant^{-1} and seeds pod^{-1} as independent selection parameters in early segregating generation (F_3 generation) of a fenugreek cross UM-305 x RMt-143 to obtain information on correlation coefficient and regression between the performance of F_3 and F_4 generations.

The material for the investigation consisted of 21 F_3 families and the 21 selected F_4 families of a fenugreek cross UM-305 x RMt-143. F_2 generation plants of several crosses among diverse parents were evaluated during *rabi* 1998–99 at SKN College of Agriculture, Jobner (Rajasthan). All the F_2 plants were harvested individually to get F_3 families. Out of the total 315 F_3 families of the cross (UM-305 x RMt-143), 21 randomly selected families were evaluated along with parents and check variety in a randomized block design with 3 replications during *rabi* 1999–2000. Only half

the amount of seed of the total seed of each F_3 family was used in this experiment and remaining half was saved for further evaluation.

Seven superior F_3 plants were selected out of the total of 315 F_3 plants for each of the three seed yield components namely, primary branches plant^{-1}, pods plant^{-1} and seeds pod^{-1}. Thus for each of the selection criterion the proportion of the population retained was 2.2% with a selection intensity of 2.3. During *rabi* 2003–04 the selected 21 F_4 progeny families and the corresponding 21 F_3 parental families (remnant seeds of F_3 families) were evaluated at SKN College of Agriculture, Jobner, in paired rows in a compact family block design with 3 replications (Sharma 1998). The plot size was one row of 3 m length with a spacing of 30 cm x 10 cm. A family was represented by one row of 30 plants; 10 randomly selected plants in each F_3 and F_4 family were utilized for recording observations. The traits under study were days to 50% flowering, days to 50% maturity, plant height, primary branches plant^{-1}, pods plant^{-1}, pod length, seeds pod^{-1}, 100 seed weight and seed yield plant^{-1}. The parameters r_{op} (correlation coefficient between offspring and parents) and b_{op} (regression coefficient of offspring on parents) were calculated as per the procedure suggested by Sharma (1998).

The correlation coefficients were estimated between the offsprings (F_4 generation families) and parents (F_3 generation families)

Table 1. Correlation and regression analysis of yield components between F_3 and F_4 generations in fenugreek (*Trigonella foenum-graecum*)

Character	Primary branches plant^{-1} as selection criterion			Pods plant^{-1} as selection criterion			Seeds pod^{-1} as selection criterion		
	Correlation coefficient between offspring (F_4) and parents (F_3) r_{op}(G)	Correlation coefficient between offspring (F_4) and parents (F_3) r_{op}(G)	Regression of offspring (F_4) on parents (F_3) b_{op}	Correlation coefficient between offspring (F_4) and parents (F_3) r_{op}(G)	Correlation coefficient between offspring (F_4) and parents (F_3) r_{op}(G)	Regression of offspring (F_4) on parents (F_3) b_{op}	Correlation coefficient between offspring (F_4) and parents (F_3) r_{op}(G)	Correlation coefficient between offspring (F_4) and parents (F_3) r_{op}(G)	Regression of offspring (F_4) on parents (F_3) b_{op}
Days to 50% flowering	0.093	0.080	0.060	0.322	0.153	0.248	0.372	0.215	0.250
Days to 50% maturity	-0.190	-0.167	-0.147	0.243	-0.009	0.185	-1.229	-0.389	-0.546
Plant height	0.855	0.760*	0.804	0.934	0.857**	0.872	0.558	0.508	0.440
No. of primary branches	0.548	0.466	0.535	0.736	0.656	0.705	0.783	0.700	0.482
No. of pods plant^{-1}	0.914	0.341	0.801	0.903	0.747	0.880	0.992	0.768*	0.718
Pod length	0.989	0.848*	0.615	0.597	0.413	0.494	0.625	0.361	0.279
Seeds pod^{-1}	0.990	0.785*	0.808	0.839	0.561	0.449	0.549	0.556	0.334
100 seed weight	0.859	0.773*	0.867	0.971	0.920**	0.870	0736	0.605	0.464
Seed yield plant^{-1}	0.110	0.066	0.098	0.865	0.595	0.699	0.620	0.518	0.543

* Significant at P=0.05; ** Significant at P=0.01

at phenotypic and genotypic levels in order to know the degree of resemblance between parents and corresponding offsprings. High r_{op} (>0.5) indicates a closer relationship. However, in the context of generational resemblance under selection, r_{op} has to be interpreted in a different manner. Significant high value of r_{op} indicates a low realized response and vice versa (Sharma 1998). Similarly, offspring-parent regression (b_{op}) quantifies the relationship between parents and offspring. Its interpretation is similar to r_{op}.

In the present study, highly significant values of r_{op}, and high values of b_{op} indicated that the parents and offsprings have a high degree of resemblance and lower effect of selection and segregating F_4 population is meagre. Under primary branches plant^{-1} as selection criterion, highly significant r_{op} values and higher b_{op} values were recorded for pod length, seeds pod^{-1}, 100 seed weight and plant height (Table 1). Thus, there was more resemblance between parents and offsprings for these characters and selection did not have much effect on these characters in subsequent segregation generation. Whereas, for primary branches plant^{-1}, the values of r_{op} and b_{op} were low (Table 1). This was expected because this was the selection criterion for this group. Under selection criterion pods plant^{-1}, highly significant r_{op} values and higher b_{op} values were recorded for the characters namely, plant height and 100-seed weight (Table 1). Thus, for these characters there was not much change in the offsprings as compared to the parents. For the character pods plant^{-1}, the selection criterion under this group, the value of r_{op} was non-significant indicating that the differences were due to selection pressure for pods plant^{-1} (Table 1). Under the selection criterion seeds pod^{-1}, highly significant r_{op} and b_{op} values were recorded for pods plant^{-1} and seeds pod$^{-1.}$ The r_{op} and b_{op} values were low indicating that changes occurred for this character in the progeny (Table 1). Thus, it can be concluded that for those characters which showed highly significant values of r_{op}, high b_{op} for which high genetic variability and high heritability was present in F_4 generation, further selection in F_4 may be effective because selection for the primary seed yield components in F_3 generation had not brought significant changes in the F_4 generation for these characters. Therefore, selection for plant height in the F_4 families under primary branches plant^{-1} as selection criterion may be further carried out in F_4 generation. Similarly, selection for plant height in the F_4 families under the selection criterion pods plant^{-1} may be further carried out in F_4 generation.

References

Arora R N & Lodhi G P 1993 Genetic variability and heritability for grain yield and its components of fenugreek. Indian Cocoa Arecanut Spices J. 17: 6–8.

Mehta K G, Patel R H & Kachhadia B T 1992 Genetic variability and path analysis in fenugreek. Indian Cocoa Arecanut Spices J. 15: 114–117.

Sharma J R. 1998 Statistical and Biometrical Techniques in Plant Breeding. New Age. International Publishers, New Delhi.

Shukla G P & Sharma R K 1978 Genetic variability correlation and path analysis in fenugreek. Indian J. Agric. Sci. 48: 518–521.