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Correlation and Regression Studies in Niger

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ABSTRACT

Regression analysis made on 35 varieties of niger (*Guizotia abyssinica* Cass.) revealed that the 4 variables days to maturity, number of branches, number of capitula and seeds per capitulum accounted for 84.4% variability of total variation in yield. For increasing the efficiency of selection, an index based on these variable is suggested.

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INTRODUCTION

One of the chief objective of every breeding programme is to obtain increased yield. As this character is determined by complex gene action, selection of such character must be based on combination of characters related to it. Moreover, continuous selection for a character may result in loss of other characters which may be of equal importance (Hazel, 1983). Since selection based on number of characters not only reduces the possibilities of loss of character/characters, but also increases the efficiency of selection and higher genetic gain. Selection indices based on discriminant functions are helpful in determining the combination of characters. Niger which is a minor oilseed crop, has such information very limited. The present study was therefore conducted on selection indices based on regression analysis in niger.

MATERIALS AND METHODS

35 indigenous niger varieties representing all important niger growing states were planted in randomised block design with three repeats at Rajasthan College of Agriculture, Udaipur, in 1981 by following usual crop production practices. Data on 5 randomly selected plants were recorded for days to flower, days to maturity, number of branches, plant height, number of seed per capitulum, number of capitula and seed yield per plant. Correlations were computed as per Panse and Sukhatme (1967) and their phenotypic values were used for constructing selection indices which were arrived by discriminant function technique (Smith, 1936). Characters which had high direct/indirect positive affect along with positive correlations with yield, were considered for computing 'b' values which were analysed by Robinson *et al.* (1957) method. Finally the multiple regression equation was fitted by substituting the 'b' values which was as under :

$$YB=b_1 \times 1 + b_2 \times 2 + b_3 \times 3 + b_4 \times 4$$

RESULTS AND DISCUSSION

A high significant difference was noted among varieties for all the characters studied. Yield was found to be significantly and positively associated (Table 1) with number of

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TABLE 1

Correlation and path analysis in niger.

Character	Plant height	Days to flower	Days to maturity	Number of branches	Number of capitula	Seeds/ capitula	Seed yield	Herita-bility (h^2)
Plant height		0.307*	0.353*	0.916**	0.924**	-0.163	-.360*	9.20
	(-2.085)	(-1.540)	(1.833)	(0.870)	(1.466)	(-0.180)		
Days to flower			0.930**	0.547**	0.194	0.070	0.067	98.32
	(-0.640)	(-5.016)	(4.829)	(0.520)	(0.308)	(0.066)		
Days to maturity				0.720**	0.260	-0.176	0.684**	99.26
	(-0.736)	(-4.664)	(5.192)	(0.675)	(0.412)	(-0.195)		
Number of branches					0.423**	0.341	0.277	52.64
	(-1.910)	(-2.743)	(3.686)	(0.950)	(0.671)	(0.377)		
Number of capitula						0.488**	0.979**	66.34
	(-1.926)	(-0.973)	(1.350)	(0.402)	(1.586)	(0.540)		
Seeds per capitulum							0.682**	63.71
	(0.340)	(0.301)	(-0.914)	(-0.324)	(0.774)	(1.107)		

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

Figures in parenthesis are path coefficient values.

capitule per plant, days to maturity, seeds per capitulum and plant height, whereas weak but positive with days to flower and number of branches. The correlations among these characters were also significant and positive. The pattern of phenotypic correlations was similar to genotypic correlations, however the later was larger in magnitude. Importance of these characters was further realised by determining their direct/indirect effects on seed yield which indicated that days to maturity, number of branches, number of capitula and seeds per capitulum were the such variables which had high effect (Goyal and Kumar, 1985).

Considering these four factors and yield, regression analysis was done which was highly signiticant (Table 2) depicting very well dependency of yield on these characters.

TABLE 2

Analysis of variance.

Source	*d.f.*	*s.s.*	*m.s.s.*
Regression	4	160.1132	40.0283
Error	64	224.7292	3.5114

Multiple regression equation using 'b' values of these four variables was constructed as:

$$Y = 0.5159 - 0.0005\ X_1 - 0.0035\ X_2 + 0.0342\ X_3 + 0.062\ X_4$$

The results showed that these four variables contributed about 84.4% variability of the total variation in yield ($R = 0.9184^{**}$). It therefore, appeared that for improving yield in niger selection through days to maturity, number of branches, number of capitula and seeds per capitulum will be more effective. Since all these characters had high heritability (Goyal, 1985) significant positive correlation along with high direct and indirect effects on seed yield, it is possible to have rapid genetic gain. Sahu and Patnaik (1981) have also suggested a combination of characters like seeds per capitulum, days to flower, maturity, duration of flowering and seed weight for improving seed yield in niger. They have further noted that efficiency of selection increases up to 4-5 characters only and after that it fluctuates, if more characters are included in an index. It is therefore suggested that selection in niger should be done through days to maturity, number of branches, number of capitulum and seeds per capitulum for attaining rapid gain in yield.

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