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GENETIC VARIABILITY AND CHARACTER ASSOCIATION IN NIGER

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Niger (*Guizotia abyssinica* Cass) is a largely unexploited crop in respect of its genetic understanding and improvement. The present study is an attempt to understand the nature and extent of variability and character association in different agronomic traits of the population. This will help in formulating selection criteria.

The material for study comprised seventeen promising local collections of Orissa and two national varieties. All the nineteen cultivars were grown in randomised complete block design with three replications. Each genotype was grown in the net plot size of 2.1 x 5 m^2 with 30 cm row-to-row and 10 cm plant-to-plant distance. Fertilizer was applied @ 20:40:10 kg N:P:K/ha. The observations were recorded on a sample of 10 random plants from each plot for five characters except days to flowering and yield/plot which were taken on plot basis. Variability parameters and correlation coefficients were computed [1].

Highly significant differences were observed among the genotypes for all the characters except capitula/plant. The variability parameters are presented in Table 1. The high phenotypic (PCV) and genotypic (GCV) coefficient of variations for seeds/capitulum and moderately high values of genetic variability for yield indicates possibilities of improving these characters through selection. Low heritability (h^2) and low genetic advance (GA) for number of branches and capitula/plant indicated that selection for these characters would be less effective owing to greater environmental influence on the traits. The high h^2 and moderate GA for yield and 1000-seed weight showed the presence of both additive and nonadditive gene action. High h^2 coupled with high GA for days to flowering, plant height and seeds/capitulum suggested the role of additive gene action in these characters.

The genotypic correlation coefficients (r_g) of different character pairs are presented in Table 2. The seed yield showed significant positive association with number of branches

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Table 1. Mean, phenotypic (PCV) and genotypic (GCV) coefficients of variation, heritability (h^2) and expected genetic advance (GA) as percentage over mean in niger

Character	Mean	PCV	GCV	h^2	GA
Days to 50% flowering	71.07 ± 3.9	5.6	5.4	93.0	10.7
Plant height (cm)	134.11 ± 10.5	9.4	6.9	54.8	10.6
No. of branches/plant	5.28 ± 0.5	11.4	6.8	35.2	8.3
No. of capitula/plant	21.48 ± 2.4	17.2	6.4	14.0	5.0
No. of seeds/capitulum	11.06 ± 2.2	24.9	17.6	50.0	25.6
1000-grain weight (g)	3.87 ± 0.28	9.1	6.2	46.3	8.6
Yield (kg/plot)	0.27 ± 0.03	15.1	9.7	41.2	12.8

and capitula/plant. Similar observations were also reported earlier [2]. Seed yield showed significantly negative association with days to 50% flowering, seeds/capitulum and 1000-seed weight. Significantly high positive correlation was observed between number of branches and capitula/plant. The correlation coefficients among days to 50% flowering, plant height and 1000-seed weight were significantly positive. The number of seeds/capitulum exhibited significantly negative association with plant height, number of branches and capitula per plant. Moreover number of seeds/capitulum was under additive gene control. Thus selection should be based on this character.

Table 2. Genotypic correlation coefficients (r_g) among seven characters in niger

Character	Plant height	No. of branches per plant	No. of capitula per plant	Seeds per capitulum	1000-grain weight	Yield
Days to 50% flowering	0.89**	−0.08	−0.17	−0.22	0.66**	−0.44*
Plant height (cm)		0.29	−0.14	−0.47**,	0.58**	−0.03
No. of branches/plant			0.84**	−0.47**	0.02	0.74**
No. of capitula/plant				−0.55**	−0.41	0.68**
No. of seeds/capitulum					−0.17	−0.38*
1000-grain weight (g)						−0.32*

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

Considering the estimates of PCV, GCV, h^2, GA and r_g, it was observed that selection for number of branches and capitula per plant is likely to increase the yield of niger plant.

But the genetic variability, heritability and genetic advance for these characters are low. Thus, more genetic variability for these characters are to be created and selection should be based on these characters to improve yield. Therefore, in the first cycle selection should be based on seeds/capitulum and thereafter more genetic variability for number of branches and capitula per plant needs to be created for second cycle of selection.

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