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GENETIC DIVERGENCE ANALYSIS IN NIGER (*GUIZOTIA ABYSSINICA CASS.*)

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Abstract

Genetic divergence was studied in 17 genotypes of niger *(Guizotia abyssinica Cass.)* using D^2 statistic for seven developmental characters. The genotypes were grouped into 5 clusters. The inter-group distance was much more larger than the intra-group distances. Cluster III showed maximum genetic distance from cluster IV. Genotypes belonging to the clusters III, IV and V might be included in future hybridization program for getting desirable segregants.

Key words : Genetic divergence, D^2 statistic, Niger.

The inportance of genetic diversity in the selection of suitable genotypes for hybridization has been stressed by several workers in different crops. (Asthana and Pandey, 1980, Bhutani *et al.*, 1983 and Jagadev and Samal, 1991). With the development of advanced biometrical methods such as multivariate analysis (Rao, 1952) based on Mahalanobis's (1936) D^2 statistic, quantification of the magnitude of genetic diversity among all the possible pairs of populations at genotypic level before effecting actual crosses in modelling the genotypes in a desired genetic architecture has become possible. Thus the present investigation was taken up with 17 niger genotypes to ascertain the nature and magnitude of genetic diversity present in the material which will ultimately help to identify parents for future breeding programs.

The experiment was conducted at Hajee Mohammad Danesh Agricultural College, Dinajpur, during 1991-92. Seventeen genotypes of niger were evaluated in randomized block design with three replications in plots of 5 m-long rows at 30 x 10 cm. spacing. Ten plants were selected randomly

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Table 1. Composition of clusters based on D^2 statistic in niger.

Cluster	No. of genotypes	Population included
I	3	Comilla-1, Nig-1 (shova), Acc-105
II	7	Acc-101, Acc-104, Acc-106, Acc-107 Kalainagar, Acc-108, Acc-110.
III	2	Acc-102, Faridpur local.
IV	4	Nabinagar, Belanagar, Muradnagar, Bancharampur.
V	1	Companiganj.

from each plot for recording data on days to maturity, plant height (cm), number of branches per plant, capsules per plant, 1000-achene weight (g) and achene yield per plant (g). Days to 50% flowering was recorded from observation of whole plot. The data were subjected to analysis of variance and then transformed into uncorrelated means by pivotal condensation method (Singh and Chaudhury, 1977). The Mahalanobis's distance (D^2) values of all the combinations were calculated from the transformed uncorrelated means of seven characters. Based on the calculated D^2 values, the genotypes were grouped into different clusters.

Results of analysis of variances showed highly significant differences among the genotypes for all the characters studied. On the basis of D^2 values for all possible 85 pairs of populations, the 17 genotypes were grouped into five clusters (Table 1). Cluster II comprised seven genotypes followed by cluster IV with four, cluster I with three, cluster III with two and cluster V with single genotype. Clusters II and III showed that maximum and minimum intracluster distances respectively (Table 2). Thus, the seven genotypes in cluster II were most heterogenous. As regards intercluster distances, cluster III showed maximum genetic distance from cluster IV (6822.84), suggesting wide diversity between these two groups (Singh *et al.*, 1987).

The characters contributing maximum to the divergence were days to maturity, plant height, capsules per plant and achene yield. Patel *et al.* (1989) reported that plant height, seed yield and test weight contributed more towards diversity in safflower. Considering cluster means in respect to these four characters, the importance of cluster V for days to maturity and achene yield, cluster IV for capsules per plant and that of cluster III for plant height become obvious (Table 3). The cluster V comprising only one genotype with specific traits could also be used in a hybridization program for exploiting hybrid

Table 2. Average intracluster and intercluster D^2 values for five clusters in niger.

Cluster	I	II	III	IV	V
I	**293.73**	2353.34	776.48	5538.04	1991.55
II		**422.24**	2139.96	1503.05	1628.27
III			**105.37**	6822.48	930.62
IV				**0.0**	2735.80
V					**0.0**

Bold faces denote intracluster values

Table 3. Cluster means for different characters in niger.

Cluster	Days to 50% flowering	Days to maturity	Plant height (cm)	No. of branches per plant	Capsules per per plant	1000-achene weight (g)	Achene yield (kg/ha)
I	64	110	87.20	6.47	27.34	3.82	923.75
II	66	112	95.00	5.83	28.00	4.02	935.83
III	70	115	96.29	6.80	25.50	3.92	915.49
IV	67	112	80.33	7.05	30.93	4.00	862.62
V	62	107	88.56	6.66	26.20	3.76	944.23

igour. Thus, crosses among the genotypes of clusters III, IV and V are likely to exhibit high heterosis and to produce new recombinations with desired traits in niger.

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