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Genetic divergence in okra (*Abelmoschus esculentus* (L.) Moench.)

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Okra (*Abelmoschus esculentus* (L.) Moench.) is the sixth important vegetable crop cultivated throughout the country. It is one of the most widely grown vegetables from tropical to subtropical and warmer part of temperate zone of the country as summer and rainy season crop. Okra is specially valued for its tender and delicious fruits in different parts of the country.

It has a great potential as foreign exchange earner vegetable and accounts for about 60% of the export of total fresh vegetables excluding onion in the India. Due to high iodine content, the fruits are considered useful for control of goiter. Genetic variability plays an important role in crop breeding for selecting the elite genotypes for making rapid improvement in yield and other desirable characters as well as to select the potential parent for hybridization programme.

The experiment was carried out with 25 genotypes viz. IIVR-10, Punjab-7, Pusa A-4, IIVR-l1, HRB-55, Pusa Sawani, Selection-4, Punjab-Padmini, HRB-9, EMS-10, Bhindi vaphy, D-187-5, No. 375, K.S. 410, DOV-91-4, BO-2, Pusa Makhmali, VRO-3, VRO-6, VRO-4, Prabhani Kranti, VRO-5, Arka Anamika, P.K. Super, Ankur-40, during summer season of 2006-2007. All the genotypes were grown in a Randomized Block Design with three replications. The observations of five randomly selected were recorded. The recommended NPK fertilizers doses and cultural practices along with plant protection measures were carried out from time to time to raise good crop. The fruits were harvested at marketable stage and size. Observations were recorded for fourteen quantative and qualitative characters. D^2 statistics was used for assessing the genetic divergence among the population as suggested by Mahalanobis (6).

The values of cluster composition, inter cluster, intra cluster and cluster means are presented in the table 1 to 3. The D^2 values were calculated among 25 genotypes. The 25 genotypes were grouped according to Torcher method into 6 cluster having 7 genotypes in the cluster I, 5 genotypes in cluster II, 6 genotypes in cluster III, 3 genotypes in cluster IV, 3 genotypes in cluster V and 1genotype in cluster VI (Table 1). The divergence within the cluster (intra-cluster distance) indicates the divergence among the genotypes falling in the same cluster. On the other hand, inter cluster divergence suggests the distance (divergence) between the genotypes of different clusters Bandabe *et al*. (2003),

Table 1. Distribution of twenty-five genotypes in different clusters obtained by multivariate analysis.

Cluster	Genotypes
I	IIVR-10, HRB-55, K.S. 410, VRO-6, DI -87 -5, HRB-9, Punjab-7
II	Pusa A-4, BO-2, Pusa Makhmali, IIVR-11, VRO-5
III	Pusa Sawani, Punjab Padmini ,VRO-6, Bhindi Vaphy, Prabhani Kranti, DOV-9 1-4
IV	Selection -4, EMS-10, P.K. Super
V	VRO-4, Arka Anamika, Ankur-40
VI	NO. 375

Table 2. Inter and intra cluster D^2 values (light) and distance (vD^2) dark.

Cluster	I	II	III	IV	V	VI
I	26.302 (5.128)	38.218 (6.18)	34.954 (5.91)	58.060 (7.61)	46.612 (6.82)	542.219
II		25.596 (5.058)	34.203 (5.85)	68.843 (8.29)	83.733 (9.15)	422.281 (20.54)
III			20.045 (4.47)	57.685 (7.60)	47336 (6.88)	452.624 (21.27)
IV				38.949 (6.24)	75.476 (8.68)	485.265 (22.02)
V					26.246 (5.12)	608.072 (24.65)
VI						0.000 (0.00)

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Table-3. Cluster means of okra genotypes for different characters based on D^2 analysis.

Genotypes	Plant height (cm)	No. of Leaf /plant	Branches /plant	Days to first flowering	Fruit length (cm)	Fruit diameter (cm)	Wt. of green fruit (g)	No of Fruit /plant	Fruit yield/ha (tones)	Vitamin C mg/10 gm
I Cluster	73.793	14.195	1.200	36.914	12381	2.429	13.918	6.781	15.807	13.60
II Cluster	61.324	14.453	1.276	37.453	11.573	2.493	13.830	5.644	12.707	14.98
III Cluster	73.294	15.044	1.144	38.022	10.782	2.191	14.792	6.411	15.879	14.30
IV Cluster	84.556	18.378	2.178	36.933	11.856	2.380	14.627	7.889	19.268	14.00
V Cluster	81.478	14.356	1.089	38.089	13.481	2.222	15.739	6.11	16.009	14.85
VI Cluster	33.467	14.100	2.933	46.933	9.200	2.817	15.110	5.200	13.100	13.56

Dhanduk *et al*. (2004), Hazara *et al*. (2005), also reported the same results in okra.

However, minimum intra cluster distance was found between the genotypes falling in cluster II and maximum was observed between the genotypes falling in cluster VI, followed by V, IV and III. Maximum inter cluster distance and their genetic distance was recorded in between the cluster number V and VI, followed by I and VI , II and IV, II and III, II and V respectively. Minimum inter cluster distance and their genetic distance was recorded in between the cluster number I and II. Two clear pictures emerged from the study of divergence. First most of the varieties of cultivated okra were highly variable based on individual trait but were not genetically much divergent based on the number of traits collectively which support the observation of Martin *et al.* (1983) second, the genotype No. 375 belonging to cluster VI was the most divergent one.

Highest cluster means for plant height, leaf per plant, number of branches per plant, days to first flowering, fruit per plant, fruit yield per hectare was recorded in the cluster number IV (Table 3). However maximum values of cluster means for fruit length and weight of green fruit were found in the cluster number V. Maximum values of cluster means for percentage plant affected by Milibug, ascorbic acid, fruit diameter were recorded in the cluster I, II, VI, respectively (Table 3).

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