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GENETIC DIVERGENCE IN KENAF

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ABSTRACT

Genetic divergence using D^2 statistic of 51 kenaf (*Hibiscus cannabinus* L.) genotypes of different ecogeographic origins revealed considerable diversity and were grouped into eight clusters, indicating that geographical isolation may not be the only factor causing genetic diversity. Days to 50% flowering, node No./plant, plant height, and fibre length were the most potential traits contributing to the total genetic divergence. Clusters III and IV were important as base material in hybridization programme aimed at high fibre yield, tall plants with greater fibre length, and short duration progenies.

Key words: *Hibiscus cannabinus*, kenaf, genetic divergence.

Kenaf (*Hibiscus cannabinus* L.) is an important fibre crop. Research on genetic divergence in this crop is very important in formulating successful breeding programme for evolving superior cultivars. Multivariate analysis using D^2 statistic is a potential tool for estimating the degree of genetic divergence in the germplasm. In order to assess the degree of diversity, D^2 statistic based on multivariate analysis [1] was used in linseed, jute and in mesta [2–4].

MATERIALS AND METHODS

Fifty one genotypes of diverse origin were sown in randomized block design replicated thrice at the Agricultural College Farm, Bapatla. The recommended agronomic practices were followed. Ten plants selected at random from each plot were used for observations on nine quantitative characters. The data was subjected to Mahalanobis D^2 statistic to measure genetic divergence. The relative contributions of different characters towards genetic divergence were worked out.

RESULTS AND DISCUSSION

The analysis of variance indicated significant difference among the genotypes for most of the characters studied except basal stem diameter, fibre : wood ratio, and internodal

length. The 51 genotypes were grouped into 8 clusters (Table 1), using the clustering technique. The magnitude of D^2 values suggested considerable diversity among the genotypes.

Table 1. Distribution of 51 genotypes of kenaf in eight clusters

Cluster	Genotypes
I	MT-747 (GP_2), AMC-28, AMC-44, AMC-32, AMC-47, AMC-24, AMC-38, MT-750 (GP_2), MT-760, AMC-108, AMC-3, AMC-1, AMC-6, AMC-50, MT-898 (GP_2), AMC-46, HC-583, UPM-13, AMC-45, AMC-27, AMC-53, AMC-4, HC-773 (GP_2), AMC-33 and AMC-35.
II	AMC-7, AMC-11, MT-15 (GP_6), AMC-10, AMC-14, AMC-41, AMC-17, AMC-34, MT-901, MT-867, AMC-8, MT753 (GP_2), AMC-37 and MT-183.
III	AC-80-9, AC-81-3 and AMC-15
IV	AC-80-3, AC-81-2 and HC-683 (GP_2)
V	AMC-23 and AMC-22
VI	MT-102 and AC-80-5
VII	Pure Green
VIII	NDM-7701

The characters contributing maximum to the D^2 values (Table 2) were given greater emphasis for deciding the clusters for the purpose of further selection and choice of parents for hybridization. The highest contribution in this regard was of days to 50% flowering (72.7%) and the lowest of green plant weight (1.8%).

Intracluster average divergence (D^2) values (Table 3) ranged between 0 (clusters VII and VIII) and 25.6 (cluster VI). The average intercluster D^2 values between clusters III and VI was maximum (309.9), while the minimum divergence was between I and VIII (22.9).

Clusters VII had a single, medium statured, late maturing and high yielding genotype each (Pure Green), and cluster VIII an early maturing, short statured less fibre-length (NDM 7701) genotype. Genotypes with high yield, tall statured, long fibre and fairly late maturity were included in cluster VI, whereas dwarf and early maturing genotypes were included in cluster III. This suggests a possibility of obtaining a greater variation among the segregants by crossing the genotypes of cluster III with those of clusters VI or VII.

Table 2. Contribution of different quantitative characters towards genetic divergence in 51 genotypes of kenaf

Character	Contribution to divergence (%)	Rank
Plant height	4.2	4
Green plant wt.	1.8	6
Nodes/plant	13.5	2
Fibre length	5.0	3
Days to 50% flowering	72.7	1
Fibre yield/plant	2.7	5

The cluster means (Table 4) were most significant for fibre length, green plant weight, nodes/plant, basal stem diameter, days to 50% flowering, and fibre yield/plant.

Table 3. Intra- (in bold) and intercluster average divergence (D^2 values) of eight clusters of 51 kenaf genotypes

Clusters	I	II	III	IV	V	VI	VII	VIII
I	**11.2** (**3.4**)	35.9 (6.0)	185.2 (13.6)	97.0 (9.9)	92.6 (9.1)	36.6 (6.1)	37.1 (6.1)	22.9 (4.8)
II		**15.4** (**3.9**)	79.7 (8.9)	38.0 (6.2)	44.3 (6.6)	101.4 (10.0)	96.6 (9.8)	47.2 (6.8)
III			**6.6** (**2.6**)	35.2 (5.9)	39.2 (6.3)	309.9 (17.6)	275.9 (16.6)	188.5 (13.7)
IV				**11.3** (**3.4**)	54.2 (7.4)	204.1 (14.3)	205.6 (14.3)	119.5 (10.9)
V					**6.4** (**2.5**)	182.8 (13.5)	151.3 (12.3)	93.0 (9.6)
VI						**25.5** (**5.0**)	39.4 (6.3)	49.2 (7.0)
VII							**0.0**	33.6 (5.8)
VIII								**0.0**

Note. Values of D are given in parentheses.

The 51 genotypes showed considerable diversity, indicating that geographical isolation may not be the only factor causing genetic diversity. Out of the characters studied, days to 50% flowering, node number, fibre length and plant height were the most potential traits contributing to the genetic divergence, as these characters accounted for more than 95% of total divergence. Presence of high genetic diversity in a population will be useful to take up hybridization programme for isolating good recombinant genotypes.

Table 4. Cluster means based on 51 kenaf genotypes for nine characters

Cluster	Plant height (cm)	Green plant wt. (g)	Node number	Basal stem diameter (cm)	Fibre:wood ratio	Fibre length (cm)	Internodal length (cm)	Days to 50% flowering	Fibre yield per plant (g)
I	259.0	227.8	63.5	1.5	0.4	228.0	4.0	104.4	8.4
II	239.8	215.7	60.0	1.5	0.5	209.4	4.1	97.7	7.8
III	237.6	279.3	46.0	1.7	0.4	214.3	5.2	86.8	7.9
IV	240.2	289.5	44.5	1.7	0.3	211.3	3.6	90.0	7.0
V	248.6	271.2	43.2	1.5	0.4	213.7	5.8	95.0	6.7
VI	284.9	261.3	74.9	1.6	0.5	239.2	3.6	110.3	11.6
VII	252.4	234.0	55.9	1.7	0.5	230.3	4.5	111.0	10.1
VIII	236.0	258.2	59.8	1.5	0.5	148.6	4.0	105.7	7.0

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