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GENETIC DIVERGENCE IN SOME FLOWERING CLONES OF *SACCHARUM BARBERI* AND *S. SINENSE*

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Nine clones of S. barberi *and four clones of* S. sinense *were evaluated to study genetic divergence. The clones were grouped into four clusters on the basis of 13 quantitative characters subjected to multivariate D^2 analysis. Hybridization among clones from cluster IV and II, IV and III; and I and II having the maximum inter-cluster distances may yield better recombinants for various characters.*

Saccharum barberi and *S. sinense* clones were under cultivation in India and China before the advent of hybrid varieties of sugarcane. The clones are low yielding, but hardy, tolerant to environmental stresses and major diseases and have fairly good sucrose content. The clones of these species have received little attention after the initial use due to poor flowering and sterility. The present investigations aim at the evaluation of some flowering clones of *S. barberi* and *S. sinense* to study the pattern of genetic divergence for further improvement of the crop.

MATERIALS AND METHODS

The experimental material comprised nine clones of *Saccharum barberi* and four clones of *Saccharum sinense* which flowered at Coimbatore and/or Cannonore. The clones were evaluated in a randomised block design with two replications at Sugarcane Breeding Institute, Coimbatore during 1989-90. The clones were planted in a row plot of 6m length spaced 90cm apart.

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Twenty three-budded setts were planted at equal distance. Sample juice analysis was done at 10 month crop age and the trial was harvested at 12 month crop age. Data on 13 quantitative characters of cane yield and juice quality were recorded. The data were subjected to Mahalanobis D^2 analysis and the clones were grouped in various clusters by Tocher's method (Rao 1952).

RESULTS AND DISCUSSIONS

Significant differences were observed among the genotypes for all traits, except juice extraction per cent and purity per cent indicating the scope for isolating better parents which may produce elite progenies. Performance of clones with respect to cane yield and juice quality traits is presented in Table 1. The clones **Khakai** and **Manjuria** were significantly superior to general mean 3.96kg for sugar yield (per plot). Four clones, viz., **Kansar, Khadya, Katha** and **Manjuria** were better to general mean (62) for number of millable canes (NMC). For juice quality only the clone **Manjuria** was significantly superior to general mean.

Thirteen clones were grouped into four clusters (Table 2). Cluster I comprised nine clones. Two clones, viz. **Manjuria** and **Nargori** formed individual clusters (III and IV). Cluster means indicated that cluster III has the highest sugar yield per plot whereas cluster IV was the poorest (Table 3). Cluster II was the best for cane yield, NMC, cane length and germination percentage. For quality traits also cluster III was the best, whereas cluster I was the poorest.

Intra-cluster distances ranged from 0 to 52.92. The highest value was observed for cluster I. Cluster II and III were quite close to each other. Inter-cluster distances varied from 91.85 between clusters II and III to 236.29 between clusters II and IV (Table 4). Remarkably high inter-cluster distances were observed between cluster IV and other clusters. Therefore, the hybridization among the clones from IV and II, IV and III, I and II might enhance the variance of the progeny populations. The use of genotypes from various clusters with the maximum diversity has been emphasised by many workers in sugarcane (Singh and Singh, 1981; Gill and Tripathi, 1983; Hooda *et al.*, 1990). This would enhance variability whereby making selection more efficient. Utilization of such improved clones of the species in breeding would seem appropriate in achieving better and quicker gains.

Table 1. Performance of 13 flowering clones of *S. barberi* and *S. sinense*

Clones	Cane yield/ plot (kg)	NMC[1]	Cane dia-meter (cm)	Cane length (m)	Single cane weight (kg)	Juice extra-ction	Brix (%)	Sources (%) 10 months	Sources (%) 12 months	Purity	CCS [2](%)	Sugar yield/ plot (kg)
Agoul	36.3	77	1.83	1.40	0.46	48.7	14.63	13.83*	11.78	80.14	7.78	2.60
Kansar	61.0	148*	1.3	1.80	0.41	48.2	19.16	13.19	15.88	82.93	10.64	6.48
Khadya	24.2	111*	1.35	1.60	0.22	33.2	17.76	10.35	13.34	76.59	8.45	2.01
Khakai	65.3	77	2.58*	1.68	0.85*	61.3	18.20	11.82	15.75	86.57	10.78	7.05*
Katha	64.3	138*	1.80	2.10*	0.46	43.2	17.29	13.09	13.21	75.98	8.45	5.01
Kheli	56.1	79	2.20*	1.98*	0.71*	46.5	15.33	8.08	10.82	70.36	6.58	3.72
Lal Khadi	46.7	90	2.00	1.78	0.52	47.9	15.08	7.90	10.36	68.58	6.18	2.87
Manjuria	54.3	112*	1.85	1.68	0.47	58.6	20.71	14.96*	18.61*	89.93	12.98*	6.98*
Nargoi	13.5	42	1.35	1.58	0.32	50.0	18.85	13.21	16.01	84.86	10.86	1.43
Pansahi	40.3	90	1.50	1.70	0.47	54.2	13.76	10.23	10.19	73.53	6.40	2.45
Pathri	28.8	61	2.12	1.58	0.47	52.8	19.56	15.16*	17.35	88.76	12.03	3.45
Uba Seed-ling	33.3	73	1.98	1.48	0.45	57.8	18.30	14.47*	16.16	88.37	11.18	3.77
Uba White	39.2	90	2.03	1.53	0.44	58.0	16.50	10.77	13.53	81.81	9.02	3.65
G.M.	43.3	62	1.87	1.68	0.48	50.8	17.32	12.08	14.08	80.65	9.33	3.96
C.D.	26.0	35	0.32	0.24	0.09	NS	3.45	1.54	4.44	NS	3.62	2.70

*Significantly superior to general mean (G.M.) at P = 0.05
[1]NMC : Number of millable canes
[2]CCS : Commercial cane sugar

Table 2 Distribution of 13 *S. barberi* and *S. sinense* clones in different clusters on the basis of cane yield and juice quality characters

Cluster	*No. of clones*	*Clones*
I	9	Agoul, Khadya, Kheli, Khakai, Lal Khadi, Pansahi, Pathri, Uba-seedling, Uba white
II	2	Kansar, Katha
III	1	Manjuria
IV	1	Nargori

Table 3. Cluster means for 13 characters in *S. barberi* and *S. sinense*

Cluster	Sugar yield/ plot (kg)	Cane yield/ plot (kg)	CCS %	Purity (%)	Sucrose (%) 10 Months	Sucrose (%) 12 Months	Brix (%)	Juice extra-ction (%)	NMC	Cane dia-meter (cm)	CAne length (m)	Single cane weight (kg)	Germi-nation (%)
I	3.51	41.1	8.71	79.41	11.40	13.25	16.57	51.2	83	1.95	1.64	0.51	70.2
II	5.75	62.7	9.55	79.46	13.14	14.55	18.23	45.7	143	1.77	1.95	0.44	82.1
III	6.98	54.3	12.98	89.93	14.96	18.61	20.71	58.6	112	1.85	1.68	0.47	76.7
IV	1.43	13.5	10.86	84.86	13.21	16.01	18.85	50.0	42	1.35	1.58	0.32	18.0

Table 4 Average intra and inter-cluster distance (D) values on the basis of cane yield and juice quality traits in *S. barberi* and *S. sinense*

Clusters	*I*	*II*	*III*	*IV*
I	52.92	188.72	101.26	145.24
II		17.83	91.85	236.29
III			0.00	234.49
IV				0.00

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