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VARIABILITY IN FRUIT CHARACTERS OF MANGO (*MANGIFERA INDICA*) CLONES IN ANDAMANS

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Thirty-six clones of mango (*Mangifera indica*) were studied for two seasons by surveying South, North and Middle Andaman during flowering and fruiting periods. The genetic and phenotypic coefficient of variance, heritability, genetic advance, coefficient of correlation were estimated for weight of fruit, length and breadth of fruit, total soluble solids, acidity, stone weight and pulp weight. Remarkable variability was observed among clones for the characters studied. All these characters exhibited higher estimates of broad sense heritability and that of low to moderate for genetic advance, length, breadth, weight of fruit and weight of pulp had high estimate of broad sense heritability as well as high expected genetic advance. Fruit weight, length and breadth are found to be effective selection index.

Key words: Coefficient of variance, heritability, genetic advance, quality character.

India holds rich genetic diversity in both cultivated and wild relatives of several horticultural crops including mango. In Andamans, mango, the important tropical and sub-tropical fruit crop, were brought from most mango growing areas of India and is distributed unsystematically to most of the Islands and hence, no standard variety has been reported in these Islands suitable for early monsoons. Nevertheless, these genetic resources could be utilized for further upgrading and improvement. Due to unsystematic introduction and indiscriminate multiplication from all types of introduced base material in mango, a lot of variation resulted in the existing population or in clones of the crop. Earlier Santas DEL Rosa *et al.*, (1989), Uthaiah *et al.* (1990) and Gupta *et al.* (1993) have made similar studies on mango. It is therefore imperative to study the extent of variability in the base population. Most of the plant characters of economic importance are quantitatively inherited and are highly influenced by environmental conditions. It is difficult to adjudge whether observed variability is heritable or due to environment alone. Clonal variation is available in mango growth along the stretches of islands and from island to island in respect of size, shape, fruiting time, weight of fruit and yield in different regions of islands, where these clones are not only in sizable plantations but large variability also exists. Keeping these points in view the

present study was undertaken to study the variability in different population of mango in the Andamans.

MATERIALS AND METHODS

Variability/diversity in mango was explored during 1991-92 and 1992-93 by surveying South, North and Middle Andaman during November to February when flowering and fruiting takes place in most cultivars and again during April to July when fruits were physiologically mature. Observations were recorded for flowering and fruiting behaviour, physico-chemical traits of fruits in 36 accessions of mango in three replicates. For physico-chemical analysis of fruits, five samples in each accession were randomly selected for weight of fruit (g), breadth and length of fruit (cm), total soluble solids (T.S.S.; % Brix), acidity (%), stone weight (g) and weight of pulp (g) in all the 36 accessions/clones. To find out the variability CV - coefficient of variation (Burton, 1952); H - broad sense heritability (Burton and De Vane, 1953), G.A. - expected genetic advance (Allard, 1960) and r - correlation coefficient (Aljibouri *et al.*, 1958) were estimated.

RESULTS AND DISCUSSIONS

Interclonal variation was evident by significant difference among the clones and further a wide range of variability was found in different plant characters studied (Table 1). Highest range of variation was exhibited by

Table 1. Phenotypic variability for different characters in 36 clones of mango

Character	Mean ± SE	Range	C.D. at 5%
Average weight of fruit (g)	296.50 ± 1.9	24.70 -896.67	32.00
Average length of fruit (cm)	10.90 ± 0.3	6.70 - 17.40	0.60
Average breadth of fruit (cm)	8.20 ± 0.2	4.70-17.40	0.40
T.S.S. (% Brix)	11.52 ± 0.2	8.20-16.13	0.54
Acidity (%)	0.40 ± 0.007	0.27 - 0.46	0.02
Stone weight (g)	30.70 ± 1.0	21.00-47.0	2.50
Pulp weight (g)	271.40 ± 18.0	53.00-659.00	36.10

weight and pulp of fruit and lowest by acidity of fruit. The phenotypic component of variance in general was higher than genotypic component (Table 2) and the extent of latter component also showed that they are mostly hereditary in nature which is again evident by higher estimates (above 90% of broad sense heritability. All characters under study exhibited higher estimates of broad sense heritability which ranges from 90% (weight of pulp) to 99.5%

Table 2. Variance components, genetic and phenotypic coefficient of variance, heritability (H%) and mean expected genetic advance (GA%)

Character	Variance components		Coefficient of variance		Herita-bility (H%)	Genetic advance (GA%)
	Phenotypic	Genotypic	Genetic	Phenotypic		
Weight of fruit (g)	793.350	787.850	9.46	9.50	99.4	57.600
Length of fruit (cm)	2.906	2.892	15.54	15.58	98.4	3.528
Breadth of fruit (cm)	9.980	9.920	38.50	38.62	99.5	6.420
T.S.S. (% Brix)	2.248	2.175	0.128	0.130	96.1	2.986
Stone weight (g)	48.143	46.573	0.220	0.225	97.2	13.978
Acidity (%)	0.00184	0.00173	0.1191	0.1192	98.0	0.088
Weight of pulp (g)	2918.14	2429.45	0.181	0.199	90.0	10.117

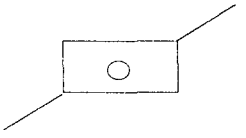
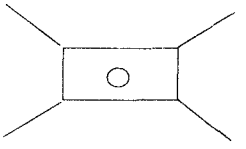
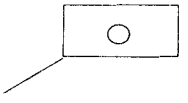
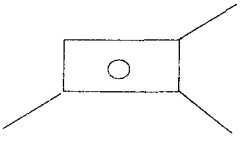
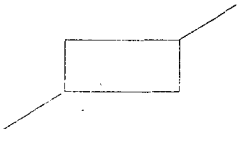
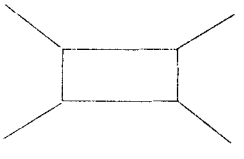
(breadth and weight of fruit). While calculating the coefficient of variation it was found that a few characters had ample scope for bringing about improvement. In case of any selection made thereupon and extent of improvement could be made as 57.6%, 10.1 and 2.99 for fruit weight, pulp weight and TSS, respectively with the 5% selection intensity. Thus, higher magnitude of genetic variability, genetic coefficient, heritability and expected genetic advance, revealed the possibility of profitable selection. Predominant genetic variance also showed that fluctuation due to environmental effect is undoubtedly tolerable. This revealed the predominant effect of additive component of gene action which can be fixed through selection. It has been pointed out that heritability estimates coupled with genetic advance may precisely reflect the progress that will result from selection of best individuals (Jhonson *et al.* 1955). Correlation coefficients estimated in all possible ways among the different pairs of characters are presented in Table 3. Significant correlations of fruit

Table 3. Matrix of simple correlation coefficients

Character	Breadth of fruit	Length of fruit	T.S.S.	Acidity	Stone weight	Weight of pulp
Weight of fruit	0.699	0.843**	0.379	–0.294	0.672**	0.983**
Breadth of fruit		0.650**	0.068	–0.151	0.358	0.729**
Length of fruit			0.119	–0.274	0.640*	0.834**
T.S.S.				–0.013	0.197	0.310
Acidity					–0.175	–0.289
Stone weight						0.623

**Significant at P < 0.01 *Significant at P > 0.05

Table 4. Meterograph analysis of 36 clones of mango in Andamans

Group	Varieties/clones		Characteristics	
	Acc 1		Weight of fruit	Moderate
			Length of fruit	Moderate
			Breadth of fruit	Moderate
			T.S.S.	Moderate
			Weight of pulp	Moderate
	Acc 2	Acc 12	Weight of fruit	Moderate
	5	14	Length of fruit	More
	6	14	Breadth of fruit	More
		18	T.S.S	More
	10	19	Weight of pump	Moderate
	11	20		
	Acc 3		Weight of fruit	Moderate
	4		Length fo fruit	Moderate
	8		Breadth of fruit	More
	23		T.S.S.	More
			Weight of pulp	Moderate
	Acc 7		Weight of fruit	Moderate
	21		Length of fruit	Moderate
	33		Breadth of fruit	Moderate
			T.S.S.	More
			Weight of pulp	More
	Acc 15		Weight of fruit	Moderate
	17		Length of fruit	More
			Breadth of fruit	More
			T.S.S.	More
			Weight of pulp	More
	Acc 25		Weight of fruit	Moderate
			Length of fruit	More
			Breadth of fruit	More
			T.S.S.	More
			Weight of pulp	Moderate
	Acc 29		Weight of fruit	More
			Length of fruit	More
			Breadth of fruit	More
			T.S.S.	Moderate
			Weight of pulp	More
	Acc 9	28	Weight of fruit	More
	13	31	Length of fruit	More
	22	32	Breadth of fruit	More
	24	34	T.S.S.	More
	26	35	Weight of pulp	More
	27	36		

weight *versus* fruit length and breadth, stone weight, pulp weight; pulp weight *versus* length and breadth of fruit suggest the scope of direct and indirect effective selection for further improvement. Similar results have been reported by Santos DEL Rosa *et al.*, (1989), Uthaiah *et al.*, (1990) and Chadha *et al.*, (1993). Hence fruit weight as direct and fruit length and breadth as indirect traits would be better selection index. With the help of metrographic analysis (Table 4), 36 clones (obtained) are divided into eight major groups, characterized by these traits and majority of better clones have higher magnitudes of weight, length and breadth of fruit, total soluble solids and weight of pulp. This is again in agreement with the above mentioned selection index. In addition to these traits regular bearing habit, taste and flavour of fruit would be important characters for clones in Andaman, six promising ones have been selected and multiplied on locally available root stock for further study and improvement (Table 5).

Table 5. Morpho-chemical status of some selected clones

Clone No.	Fruit weight (g)	Fruit length (cm)	Fruit breadth (cm)	T.S.S. (% Brix)	Acidity (%)	Stone weight (g)	Pulp weight (g)	Remarks
6-1-7	246	9.4	7.8	12.4	0.40	31	217	Regular, sweet with red ting, fruit ripens before monsoon, thin skin.
6-1-8	896	17.4	11.3	10.9	0.35	45	848	Regular, ripens in early May.
6-3-1-II	235	11.1	7.1	12.1	0.38	31	204	Regular, tastes excellent, ripens in May.
6-4-6a	311	13.0	7.8	12.2	0.41	32	257	Regular, heavy bearing, fruiting throughout year.
9-1-3a	540	10.2	10.8	16.1	0.31	32	507	Regular, heavy bearing, ripens early May.
6-1-3a	616	15.3	10.6	10.6	0.41	44	509	Regular, tasty, good keeping quality, ripens middle of April.

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