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Genetic Variability in Different Tamarind Genotypes

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ABSTRACT

Thirty eight tamarind genotypes studied were found to exhibit wide range of variability for most of the characters. The phenotypic and genotypic coefficient of variability (GCV and PCV) were low for the characters like pod length, width and thickness. Remaining characters exhibited moderate to high PCV and GCV. The higher PCV and GCV were found to be with pod yield and number of pods per tree. High heritability (bs) estimates were obtained for most of the characters except number of pods per shoot, number of pods per kilogram and per cent of shell. Genetic advance (GA) was high for the character of number of pods per tree.

Key words : Genetic variability, Tamarind genotypes

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Tamarind *(Tamarindus indica* L.) is dicotyledonous belongs to family Fabaceae (Leguminaceae) and sub family caesalpinoideae. It is a diploid species with a chromosome number 2n = 26 (Purseglove, 1987). The existence of variability is common in highly cross pollinated species and this is true in case of tamarind also. It offers more avenues for establishing desirable clones by selection. A wide variability in germplasm exists in tamarind in terms of pod bearing ability and acidity of the pulp and pod size, therefore in order to incorporate such traits germplasm collections and intensive evaluations are to be emphasized to select desirable types and to initiate breeding programme.

MATERIAL AND METHODS

The clonal propagules of 38 trees of tamarind which were selected from various locations of Karnataka were planted during 1989 at F.R.C. Gungaragatti of the Forest Department. Six grafts were selected from each clone which were planted at 6 x 6 m spacing. The experiment was laid out in RBD with three replications. The statistical analysis was done using the procedure of SPAR (Statistical Packages for Agricultural Research) which was suggested by Doshi and Gupta (1991).

RESULTS AND DISCUSSION

Variability estimates such as genotypic and phenotypic coefficient of variation, heritability (bs), genetic advance and its per cent over mean in respect of growth, yield and pod characteristics of 38 clones indicated wide range of variations, which help to select a combination of desirable traits that might result in elite genotypes. Therefore, hopes of crop improvement on the extent of genetic variation and the degree of improvement possible upon the beneficial genetic variability, the relative magnitude of these components determines the genetic potential of the genotypes.

Means and ranges of the various characters (Table 1) studied revealed considerable variation among the genotypes and significant differences were observed. The data provides an insight into the extent of improvement that could be possibly achieved through range of characters. Judicious selection of genotypes for further improvement can be supplemented by these estimates.

The phenotypic and genotypic co-efficient of variation recorded low and high values indicating wider variability. Moderate to low differences between phenotypic and genotypic coefficient of variation were observed. However, the PCV and GCV were high 106.94 and 83.41 per cent respectively, for pod yield per tree, number of pods per tree (95.03 and 68.94), real value of pulp (43.81 and 28.71), vein weight per pod (36.41 and 25.93), pulp weight per pod (34.51 and 22.32), number of pods per shoot (49.52 and 19.06), crown size (24.88 and 18.42), per cent of vein (32.07 and 15.78) and tree height (21.11 and 16.85) there by indicating that most of the characters had sufficient variability present for selection to effectively improve these characters (Table 1).

The response of selection depends not only on the phenotypic and genotypic variability but also in the magnitude of the heritability. Broadsense (bs) heritability estimate with respect to number of pods per tree (52.60), pod length (31.10%), pod width (56.5%), pod thickness (51.9%), crown size (54.80), real value of pulp (42.9%) were high, high heritability is an indication of low environmental influence over the characters and presence of higher proportion of

Table 1. Variability estimates for different characters of clonal progenies of tamarind at F.R.C. Gungaragatti

Characters	Range	Mean	GCV (%)	PCV (%)	h^2 % (BS)	GA	GA % over mean
Pod yield tree^{-1}	0.50-18.95	5.35	83.41	106.94	60.80	7.16	133.83
Number of pods tree^{-1}	31.92-830.86	323.77	68.94	95.03	52.60	333.55	103.02
Number of pods shoot^{-1}	6.74-27.33	15.44	19.06	49.52	14.80	2.33	15.09
Number of pods kg^{-1}	51.10-137.48	81.02	15.29	28.23	29.30	13.82	17.06
Tree height (m)	3.09-6.54	4.44	16.85	21.11	63.70	1.23	27.70
Crown size (m)	2.43-5.25	3.75	18.42	24.88	54.80	1.05	28.00
Average pod weight (g)	7.85-20.91	13.58	14.49	22.84	40.20	2.57	18.92
Pulp weight pod^{-1} (g)	2.57-10.25	5.22	22.32	34.51	41.80	1.55	29.69
Seed weight pod^{-1} (g)	1.46-5.68	3.70	17.46	28.93	36.4	0.80	21.20
Weight of shell pod^{-1}	2.31-4.79	3.78	24.87	34.92	50.86	0.68	17.99
Vein weight pod^{-1}	0.28-1.14	0.59	25.93	36.41	50.7	0.23	38.98
Per cent of pulp	25.30-49.41	37.09	9.80	21.72	20.4	3.38	9.11
Per cent of seed	19.89-35.61	27.25	15.61	23.77	43.1	5.75	21.10
Per cent of shell	21.30-37.87	29.10	3.09	21.45	2.1	0.27	0.93
Per cent of vein	3.10-5.86	4.46	15.78	32.07	24.2	0.71	15.92
Real value of pulp	0.65-4.96	2.00	28.71	43.81	42.9	7.95	38.78
Pod length (cm)	9.11-14.24	11.65	6.57	11.79	31.10	0.88	7.55
Pod width (cm)	1.77-3.15	2.28	10.52	14.00	56.5	0.37	16.23
Pod thickness (cm)	1.15-1.78	1.44	8.17	11.34	51.9	0.17	11.81
Number of seeds pod^{-1}	2.37-8.07	6.09	14.32	32.77	19.10	0.78	12.81
Average seed weight (g)	0.47-0.88	0.63	11.64	23.30	25.0	0.08	12.70

flexible additive variance in the genotypes. The heritability estimates were found be moderate for the characters like number of pods per kg (29.30%), per cent of pulp (20.40%), per cent of vein (24.20%), average seed weight (25.00%), which indicates that the characters were moderately influenced by environment. Estimates of low heritability were observed for number of pods per shoot (14.80%) and per cent of shell (2.1%). The heritability however, indicates only the effectiveness with which selection of the genotypes can be based on their phenotypic performance but fail to show the genetic progress (Johnson *et al,* 1955). Therefore, heritability coupled with genetic advance can be used as a measure of improvement by practicing selection in a population. Number of pods per tree (333.55) showed high estimates of GA, coupled with high heritability indicating additive gene effects for this character with the possibility of improvement through selection.

In case of attributes like pod length,width, thickness,seed weight, vein weight per pod the heritability was high coupled with low genetic advance. Low GA was noticed for the character such as shell per cent, average seed weight, number of pods per shoot, where the heritability estimates were either moderate or low indicating that these characters offer limited scope for selection. The results of the present studies of variability in tamarind are in accodance with the studies is Kahlona and Uppal (1994), Khan *et al.* (1994), Hanumashetti (1996), Jambulingam *et al* (1997), Kennedy *et al.* (1998) and Rao *et al.* (1999) .

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