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Evaluation of tamarind (*Tamarindus indica* L.) genotypes for growth, yield and quality

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Abstract
The present study on "Evaluation of tamarind genotypes for higher yield and fruit quality" was carried out at Horticultural College and Research Institute, Periyakulam with the objective to find out genotypes suitable for high yielding and quality was aimed at. Thirty one genotypes were used for this study. Biometric observations on tree height (m), pod characters such as pod length (cm), pod width (cm), pod circumference (cm), shell weight (g), fibre weight (g), pulp weight (g), number of seeds per pod, fruit weight (g), yield character *viz*., number of fruits per tree and fruit quality traits like acidity (%) were recorded. The collected morphological traits datas' were analysed statistically. In the present study significant difference among the thirty one tamarind genotypes were observed. Among the 31 genotypes evaluated, TI-23 recorded the highest values in all the growth, pod, yield and quality characters. In the present study, TI - 23 recorded the highest tree height of 19.23 m. Regarding pod characters, TI-23 recorded the highest pod length (18.23 cm), pod width (4.67 cm) and pod circumference (9.23 cm), shell weight (7.34 g), fibre weight (1.67 g), pulp weight (11.38 g), number of seeds per pod (10.67) and fruit weight (57.88 g). In the case of yield characters, TI-23 genotype recorded the highest number of fruits per tree (550.33). In the case of quality traits *viz*., acidity showed the highest in TI–12 genotype of 15.90 per cent. From the conclusion of the present study revealed that TI-23 showed the highest mean performance of growth, yield and quality characters and it can be required for further evaluation programme.

Keywords: Tamarind, genotypes, growth, yield and pod characters

Introduction
Tamarind (*Tamarindus indica* L.) is a monotypic genus tree belonging to the family Leguminosae. Tamarind is also called as 'Indian date', a multipurpose tree known for drought tolerance and used primarily for its fruits, which are eaten fresh or processed, used as a seasoning or spice, or the fruits and seeds are processed for non-food uses. Tamarind is a dicotyledonous perennial tree belongs to the family Fabaceae (Leguminaceae) and sub family Caesalpinioideae. It is a diploid species with a chromosome number 2n=26 (Purseglove, 1987) [8]. It is indigenous to tropical Africa and Southern India (Nas, 1979) [6]. The edible pulp of ripe fruit is used as flavoring agent in soups, jams, chutneys, sauces and juices (Isholoa *et al*. 1990) [2]. The tamarind fruit pulp is the richest natural source of tartaric acid (8–18%). In tamarind, sweet, red and sour tamarinds are widely cultivated in India. In India it is growing larger areas in Tamil Nadu, Madhya Pradesh, Andhra Pradesh, Maharashtra and Karnataka. In Tamil Nadu, tamarind is extensively cultivated in Ramanathapuram, Sivagangai, Virudhunagar, Tirunelveli, Salem, Krishnagiri, Madurai, Dindigul, Theni, Dharmapuri, Tuticorin and Vellore Districts. Tamarind is highly suitable for wastelands, drylands, saline and sodic soils and withstands high pH also. It is act as windbreak in many areas and also suitable for drought prone areas. Tamarind grows well in tropical climate wherein summer is hot and dry and winter is mild. It is drought resistant but frost tender. Tree can be grown in almost all types of soil even poor and margin soils also. Since, its life-span is long, a deep loamy soils with adequate moisture would be the best. In Tamil Nadu only one variety is released from Horticultural Research Station, Periyakulam long back. But recent years there is no variety released for tamarind from Tamil Nadu soil and conditions. Hence the present investigation on "Evaluation of tamarind genotypes for higher yield and fruit quality" was carried out at Horticultural College and Research Institute, Periyakulam.

Materials and methods

The present investigation on "Evaluation of tamarind genotypes suitable for higher yield and fruit quality" was carried out at Horticultural College and Research Institute, Periyakulam with the aim to study the extent of variability among tamarind genotypes and to identify the elite genotypes for growth, pod and fruit quality and thirty one tamarind genotypes maintained at the central farm was used for the study. The present study was laid out in a Randomized Block Design (RBD) as per the method was suggested by Panse and Sukhatme (1985) [7]. The cultural practices as per the Crop Production Guide of TNAU (2004) were followed. The biometric observations on quantitative characters *viz*., tree height (m), pod characters such as pod length (cm), pod width (cm), pod circumference (cm), shell weight (g), fibre weight (g), pulp weight (g), number of seeds per pod, fruit weight (g) and yield character *viz*., number of fruits per tree and acidity were recorded. The acidity of fruits was determined by using standard estimation technique (Ranganna, 1986) [9]. The collected morphological traits datas' were analysed statistically.

Results and discussion

Development of high yielding varieties of crops requires information about the nature and magnitude of variability present in the available genotypes depends on judicious assessment of available data on phenotypic characters that are connected with yield. The growth and yield parameters of 31 tamarind genotypes are described in Table 1. In the present study significant difference among 31 tamarind genotypes were observed. The finding revealed that among 31 genotypes evaluated, TI-23 genotype recorded the highest values in all the growth, pod and yield characters. The growth characters such as plant height at the time of harvest, TI – 23 genotype recorded the highest tree height of 19.23 m which was higher than among 31 tamarind genotypes evaluated. The tree height was the lowest in TI -10 (10.67 m). This might be due to the genetical characters and age of the plant. In addition, age of the tree is also an important factor which influences the yield (Kadam *et al.,* 2005) [3].

In the present study pod characters such as pod length (cm), pod width (cm) and pod circumference (cm) are presented in Table 1. Regarding pod length, genotype TI-23 recorded the highest length of 18.23 cm followed by TI -12 (17.87 cm). The lowest pod length was observed in TI – 5 (9.67 cm). In the case of pod width TI-23 recorded the highest value of 4.67 cm and the lowest was noticed in 2.57 cm. The same trend was observed in pod circumference also. The highest value was found in TI – 23 (9.23 cm) followed by TI-12 (8.77 cm) and the lowest circumference was observed in TI - 5 (5.83 cm). This might be due the genetical characters of genotypes. Nandini *et al.* (2011) [5] reported that longest fruit length was recorded the range of 20.04 cm to 6.65 and the pod width ranged of 4.84 cm to 2.30 cm among the 100 tamarind genotypes were evaluated at Karnataka.

In our study fruit characters such as pulp weight, fibre weight, shell weight, number of seeds per pod and fruit weight are presented in Table 2. In the present study fruit characters were significantly difference among the 31 tamarind genotypes evaluated. The finding revealed that shell weight was ranged from 7.34 g to 2.11 g. The highest shell weight recorded in TI-23 genotypes (7.34 g) which was higher than among the 31 genotypes evaluated followed by TI-6 (7.00 g). The lowest shell weight was found in TI-21 of 2.11 g. The same trend was observed in fibre weight also. Fibre weight ranged from 1.67 g to 0.31 g. The highest fibre weight was recorded in TI-23 genotype of 1.67 g and the lowest weight was found in TI - 21 (0.31g). The pulp weight ranged from 11.38 g to 4.10 g. The highest pulp weight was recorded in TI – 23 of 11.38 g followed by TI -28 (10.63 g). The lowest pulp weight was observed in TI -7 of 4.10 g. Number seeds per plant ranged from 10.67 to 4.67. The highest number of seeds per pod was recorded in TI – 23 (10.67) and the lowest number of seeds was noticed in TI – 3 (4.67). Such variations in fruit characteristics were observed in tamarind by Divakara (2008) [1]. Nandini *et al.* (2011) [5] also reported that pulp weight is ranged from 6. 99 g to 0.99 g at 100 tamarind genotypes were evaluated at Karnataka. In the present study the same trend was observed in fruit weight also. Fruit weight ranged from 50.88 g to 11.17 g. The highest fruit weight was recorded in TI-23 (50.88 g) followed by TI-12 (41.67 g). The lowest fruit weight was noticed in TI-20 of 11.17 g. Variations in fruit characteristics might be due to genetical characters were observed in tamarind by Divakara (2008) [1]. Nandini *et al.* (2011) [5] also reported that the pod weight is ranged from 16. 41 g to 2.34 g of 100 tamarind genotypes were evaluated at Karnataka.

Regarding yield characters, genotype TI-23 recorded the highest number of fruits per tree (550.33) which was the higher than among 31 tamarind genotypes studied, followed by TI - 10 (533.33). The lowest number of fruits per tree was noticed in TI-20 genotype (92.00). Wide variation was observed among the different genotypes with respect to growth and yield traits and this may be attributed to their genotypic differences. In addition, age of the tree is also an important factor which influences the yield. Marichamy (2012) [4] reported that yield per tree was recorded in PKM -1 variety of 19.68 kg per tree under Periyakulam condition. In the case of quality characters acidity only the character was recorded. In the present study, acidity ranged from 15.90 per cent to 8.25 per cent. TI-12 genotype recorded the highest acidity (15.90 %) which was higher than among 31 tamarind genotypes evaluated. The lowest acidity was observed in TI-31of 8.25 per cent.

Table 1: Evaluation of 31 tamarind genotypes for growth and pod characters

Genotype No.	Tree height at the time of harvesting (m)	Pod length (cm)	Pod width (cm)	Pod circumference (cm)
TI-1	18.20	12.30	3.53	7.17
TI-2	17.50	11.57	3.40	7.57
TI-3	17.30	16.87	3.37	6.47
TI-4	16.67	16.50	4.40	8.57
TI-5	17.57	9.67	2.57	5.83
TI-6	18.12	10.63	3.67	7.00
TI-7	16.30	13.17	3.60	7.27
TI-8	16.50	15.23	4.53	8.73
TI-9	14.57	15.47	4.12	8.30
TI-10	10.67	15.17	3.47	7.27

TI-11	11.33	14.47	3.62	7.33
TI-12	18.67	17.87	4.43	8.77
TI-13	15.37	11.27	3.61	7.17
TI-14	13.67	10.43	3.63	7.47
TI-15	17.57	13.48	4.19	8.57
TI-16	11.50	15.83	4.17	8.17
TI-17	11.40	16.40	4.33	8.30
TI-18	10.90	15.33	3.37	7.00
TI-19	12.23	11.53	3.27	6.40
TI-20	13.43	13.43	2.73	5.77
TI-21	12.63	14.33	3.70	7.27
TI-22	14.37	16.47	3.77	7.40
TI-23	19.23	18.23	4.67	9.23
TI-24	12.43	16.80	4.40	7.87
TI-25	12.50	13.03	3.57	7.53
TI-26	13.33	16.10	2.50	5.90
TI-27	16.33	15.37	3.80	7.27
TI-28	13.97	12.43	3.00	6.07
TI-29	12.53	14.51	3.71	6.93
TI-30	13.43	14.67	3.67	7.00
TI-31	13.00	16.53	3.33	6.60
SEd	0.164	1.066	0.175	0.416
CD (0.05%)	0.329	2.132	0.350	0.832

Table 2: Evaluation of 31 tamarind genotypes for yield and quality characters

Genotype No.	Shell wt (g)	Fibre weight (g)	Pulp weight (g)	No. of seeds per pod	Fruit weight (g)	No. of fruits per tree	Acidity (%)
TI-1	5.50	1.39	5.67	6.00	20.03	95.33	12.25
TI-2	6.16	1.36	5.19	7.67	19.56	341.00	11.25
TI-3	3.21	1.01	8.14	4.67	16.63	123.33	10.78
TI-4	5.00	0.32	6.27	8.33	28.07	407.67	10.98
TI-5	5.38	0.18	5.55	7.00	23.83	420.33	10.47
TI-6	7.00	1.59	8.13	6.00	14.40	430.00	9.87
TI-7	6.33	1.47	4.10	8.67	21.77	387.33	9.52
TI-8	6.17	1.15	10.09	9.00	29.80	433.33	14.25
TI-9	2.77	0.91	9.46	8.97	28.52	277.33	12.58
TI-10	3.47	0.92	7.31	9.33	29.50	533.33	11.68
TI-11	4.11	0.88	8.20	9.33	37.00	476.33	13.19
TI-12	3.27	0.34	5.34	9.33	41.67	484.67	15.90
TI-13	6.13	0.62	9.48	5.67	35.83	382.33	15.23
TI-14	6.42	0.57	4.35	8.33	19.20	116.67	12.69
TI-15	5.00	0.40	9.27	8.67	33.50	264.33	12.87
TI-16	3.60	1.28	10.10	5.33	26.63	436.67	14.26
TI-17	2.23	1.16	10.31	9.33	25.33	319.67	13.77
TI-18	5.20	1.04	7.13	9.00	20.23	249.00	11.55
TI-19	2.16	0.27	4.88	5.67	12.80	332.33	11.25
TI-20	6.50	0.34	5.30	6.67	11.17	92.00	14.22
TI-21	2.11	0.31	3.10	5.67	14.07	176.33	9.87
TI-22	4.67	0.80	4.49	7.33	26.40	258.00	10.45
TI-23	7.34	1.67	11.38	10.67	50.88	550.33	14.88
TI-24	6.41	0.84	9.27	7.33	23.80	258.67	10.58
TI-25	5.50	0.98	6.71	8.33	19.33	471.00	14.23
TI-26	4.30	1.58	7.78	8.33	28.37	374.00	13.25
TI-27	5.17	1.34	10.61	9.33	36.33	389.33	9.11
TI-28	6.53	1.51	10.63	9.45	26.08	371.67	9.28
TI-29	4.73	1.15	7.74	7.55	31.12	299.67	8.79
TI-30	5.43	1.06	10.58	8.10	28.37	284.67	8.32
TI-31	5.07	1.06	11.25	9.20	26.07	283.00	8.25
SEd	0.1730	0.0717	0.1417	0.056	0.265	5.790	0.3812
CD (0.05%)	0.3460	0.1434	0.2835	0.115	0.541	11.823	0.6521

Conclusions

Among the 31 tamarind genotypes evaluated, TI-23 genotype recorded highest values in the growth, pod, fruit and quality characters. In the case of pod length (18.23 cm), pod width (4.67 cm), pod circumference (9.23 cm) and fruit weight (50.88 g) were recorded. The number of pods per tree (550.33) recorded the highest in TI-23 and fruit quality such as acidity was the highest in TI -12 of 15.90 per cent were recorded. Based on the present study, among the 31genotypes of tamarind evaluated TI – 23 and TI -12 appeared to be the best genotypes based on fruit yield per tree, pod weight and quality attributes.

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