

Original Research Article

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## Assessment of Tamarind (*Tamarindus indica* L.) Varieties for Growth, Flowering, Fruiting, Yield and Quality

C. Tania<sup>1\*</sup>, M. Das<sup>1</sup>, T. Basanta<sup>1</sup>, R. Chatterjee<sup>2</sup>, V. Hnamte<sup>2</sup> and P.K. Chattopadhyay<sup>2</sup>

<sup>1</sup>ICAR RC NEH Region Manipur Centre, Imphal-795004, India

<sup>2</sup>Department of Spices and Plantation Crops, Faculty of Horticulture, B. C. K. V.,  
Mohanpur-741252, West Bengal, India

\*Corresponding author

### ABSTRACT

#### Keywords

Quality, Variety,  
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#### Article Info

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A field trial in a complete Randomized Design was conducted at Bidhan Chandra Krishi Viswavidyalaya, West Bengal during 2010-2011 to assess the growth, flowering, fruiting, yield and quality of tamarind of five varieties namely PKM-1, Urigam, Vantoor, Red and Sweet. The results indicated superiority of variety PKM-1 with plant height (445.33- 569 cm), East-west canopy expansion (458.67- 604.00 cm), number of fruit retention panicle<sup>-1</sup> (44.33%), TSS (48<sup>o</sup> Brix), total sugar (40.33 g) with lower acidity (6.7 mg). The variety Urigam exhibited better performance with the characters like canopy expansion in North South direction (491.00 – 612.00 cm), trunk girth (39-52 cm), number of flowers panicle<sup>-1</sup> (14.33), number of fruit set panicle<sup>-1</sup> (10.33), fruit length (20.67 cm) and diameter (25.30 mm), fruit weight (17.77 g) and fruit yield tree<sup>-1</sup> (1388 g). Varieties Urigam and PKM-1 may be introduced in West Bengal for commercial cultivation.

### Introduction

Tamarind (*Tamarindus indica* L.) is one of the most important multipurpose tree species in the Indian sub-continent. India is the world's largest producer of tamarind product. Production in India is mainly concentrated in the drier southern states and the produce is collected by the villagers and sold in the open market.

Tamarind has a low water content and high level of protein, carbohydrates (60 – 72%) and minerals. The soluble solids content varies from 54 -69.9<sup>o</sup> Brix (Benero *et al.*, 1974; Baragano de Mosqueda, 1980).

In West Bengal tamarind is still not grown as a commercial crop rather it is naturally grown in scattered manner. The available varieties are sour in taste and as such scope exists on varietal replacement with high yielding varieties of both sweet and less sour taste as a first step towards commercialization.

### Materials and Methods

An experiment was carried out at Horticultural Research Station, Bidhan Chandra Krishi Viswavidyalaya, West Bengal during the month of fruiting, yield and quality of tamarind. The experiment was laid out in

Complete Randomized Design with 5 treatments (varieties) having 3 replication. The age of the plant was 6 years and have started bearing fruits. The varieties were: PKM-1, Urigam, Vantoor, Red and Sweet. Normal cultivation practices were adopted with NPK (20:20:20) @ 500g plant<sup>-1</sup> with FYM @ 5 kg plant<sup>-1</sup>. Observations were recorded on various growth characters viz., Plant height, Canopy growth, Girth, Days for flowering to fruiting, flowers, fruit set, fruit retention panicle<sup>-1</sup>, fruit drop and days from flowering to maturity. Yield and yield attributes (Fruit length, diameter, weight and number of seeds fruit<sup>-1</sup>) along with quality parameters (Total sugar, Acidity and TSS) were estimated (Ranjana, 2000).

## Results and Discussion

Growth, flowering, fruit set, fruit drop, fruit retention: Amongst the varieties PKM-1 registered maximum (445.33 cm) plant height while Vantoor was least vigorous (Table 1)

The annual growth rate recorded was 22.13%, 29.7%, 36.68%, 26.0% and 27.78% for Sweet, Red, Vantoor, Urigam and PKM-1 respectively. The annual canopy expansion (East-West) of varieties Sweet, Red, Vantoor, Urigam and PKM-1 was @ 48.38%, 40.18%, 47.48%, 33.0% and 31.69% respectively and in the north-south direction these were 29.16%, 30.37%, 42.16%, 39.30% and 31.06% respectively. Trunk girth increased gradually with the increase in age and it was different with the varieties. The annual growth rate of the varieties was 26.23%, 23.17%, 17.45%, 33.33% and 33.34% respectively for Sweet, Red, Vantoor, Urigam and PKM-1. It was observed that growth of the plant in all respect was maximum during June–July while the growth rate was slow during November to March. It is clear from the growth data that the growth of tamarind remained slow during winter months as the temperature appears to

be non-congenial for luxuriant growth. From April onwards the growth took up rapid stride with the rise in temperature favouring the physiological activities of the tree. It may be mentioned that Verheij and Coronel, (1991) indicated 33<sup>o</sup>– 37<sup>o</sup>C as ideal for growth of tamarind. The varieties showed variation with respect to days require from flowering to fruiting (Table 5). Variety Red was the earliest to set fruits (57 days) and PKM-1 took maximum time (82.33 days) for fruit set. Number of flowers panicle<sup>-1</sup> was recorded highest in Urigam (14.33) followed by PKM-1 (7.33), Vantoor (6.67), Red (5.67) and Sweet (4.00).

Significant variation was recorded with fruit set panicle<sup>-1</sup> and it was highest (10.33) with variety Urigam and was lowest (2.00) with both Red and Sweet (Table 5). Fruit drop panicle<sup>-1</sup> was total for variety Red and Sweet (100%) while the percentage was 70.96, 66.80 and 55.67 for Urigam, Vantoor and PKM-1 respectively (Table 5). Number for fruits retained panicle<sup>-1</sup> was 44.33% in PKM-1, 33.25% in Vantoor and 29.04% in Urigam (Table 5). The variety PKM-1 was the vigorous and took maximum time for flowering to fruit set possibly due to utilization of energy and food for growth purpose and thus required more time.

Similar trend was noticed with maturity also. The earliness of the flowering may also be attributed to the inherent potentialities of the varieties. It is interesting to note that varieties producing acidic fruits appear to be more productive whereas varieties with comparatively sweet in taste were shy in flower production. Variety Vantoor required 261 days from flowering to harvesting followed by Urigam (300.67 days) and PKM-1 (326.33 days). Urigam produced fruits with maximum (20.67 cm) length, diameter (25.30 mm), 17.77 g), maximum seeds fruit<sup>-1</sup> (20.67) and fruit yield (1383 g tree<sup>-1</sup>).

**Table.1** Plant height of different varieties

MONTH	VARIETY					GM	SE(m)	CD (0.05)
	SWEET	RED	VANTOOR	URIGAM	PKM-1			
DECEMBER 10	427.67a	367.00c	325.33d	400.00b	445.33a	393.07	8.37	25.39
JANUARY 11	431.00ab	372.00c	33.00d	405.00b	450.33a	397.87	8.26	25.05
FEBRUARY 11	434.67ab	375.00c	339.00d	409.00b	456.33a	402.80	8.52	25.83
MARCH 11	439.67ab	382.00c	348.00d	415.00b	465.67a	410.07	9.14	27.72
APRIL 11	444.33b	389.00c	356.67d	425.00b	476.33a	418.27	9.11	27.63
MAY 11	452.33b	400.00c	367.33d	436.00b	485.33a	428.20	9.19	27.88
JUNE 11	465.00b	414.00c	382.67d	445.00b	498.33a	441.00	9.26	28.09
JULY 11	474.67b	432.00c	397.33d	460.00bc	516.00a	456.00	9.46	28.69
AUGUST 11	493.33b	448.00c	414.33d	476.00bc	535.00a	473.33	9.64	29.24
SEPTEMBER 11	509.00b	463.00c	430.67d	488.00bc	550.67a	488.27	9.70	29.44
OCTOBER 11	518.67b	472.00cd	441.00d	499.00bc	565.33a	499.20	9.91	30.05
NOVEMBER 11	522.33b	476.00c	444.67d	504.00bc	569.00a	503.20	9.71	29.46

**Table.2** Canopy expansion (East West)

MONTH	VARIETY					GM	SE(m)	CD (0.05)
	SWEET	RED	VANTOOR	URIGAM	PKM-1			
DECEMBER 10	359.00d	433.00ab	376.33cd	400.00bc	458.67a	405.40	11.41	34.60
JANUARY 11	367.67d	436.00ab	383.67cd	406.00bc	464.00a	411.47	11.27	34.17
FEBRUARY 11	378.67c	446.00ab	393.00c	415.00bc	472.00a	420.93	11.15	33.82
MARCH 11	394.00c	458.00ab	407.67c	424.00bc	479.33a	432.60	11.31	34.31
APRIL 11	409.33c	472.00ab	423.67c	437.00bc	490.33a	446.47	11.55	35.03
MAY 11	425.00c	484.00ab	439.67c	448.00bc	501.33a	459.60	12.06	36.57
JUNE 11	441.00c	501.00ab	465.33bc	461.00bc	517.00a	477.07	12.23	37.09
JULY 11	466.33b	531.00a	488.33b	487.00b	543.00a	503.13	12.88	39.08
AUGUST 11	487.67b	559.00a	511.67b	499.00b	567.33a	524.93	12.77	38.73
SEPTEMBER 11	507.67b	588.00a	534.67b	514.00b	588.67a	546.60	12.44	37.72
OCTOBER 11	529.00b	602.00a	550.33b	528.00b	599.67a	561.80	12.76	38.71
NOVEMBER 11	532.67b	607.00a	555.00b	532.00b	604.00a	566.13	12.83	39.93

**Table.3** Canopy expansion (North South)

MONTH	VARIETY					GM	SE(m)	CD (0.05)
	SWEET	RED	VANTOOR	URIGAM	PKM-1			
DECEMBER 10	365.67c	428.00b	342.33c	491.00a	429.33b	411.27	9.07	27.51
JANUARY 11	370.00c	432.00b	346.67c	496.00a	435.00b	415.93	9.31	28.24
FEBRUARY 11	374.67c	439.00b	353.33c	502.00a	441.67b	422.13	9.26	28.10
MARCH 11	383.67c	447.00b	362.00c	510.00a	449.33b	430.40	9.37	28.41
APRIL 11	392.33c	457.00b	373.33c	520.00a	460.00b	440.53	9.25	28.05
MAY 11	400.67c	470.00b	385.00c	530.00a	469.33b	451.00	8.88	26.92
JUNE 11	413.00c	488.00b	399.67c	546.00a	483.67b	466.07	9.30	28.20
JULY 11	429.33c	506.00b	423.00c	560.00a	503.00b	484.27	9.44	28.63
AUGUST 11	446.00c	529.00b	447.33c	588.00a	529.33b	507.93	9.65	29.26
SEPTEMBER 11	460.00c	545.00b	468.67c	598.00a	549.33b	524.20	10.10	30.63
OCTOBER 11	468.33c	554.00b	482.00c	608.00a	559.33b	534.33	9.72	29.49
NOVEMBER 11	472.33c	558.00b	486.67c	612.00a	562.67b	538.33	9.78	29.67

**Table.4** Trunk girth

MONTH	VARIETY					GM	SE(m)	CD (0.05)
	SWEET	RED	VANTOOR	URIGAM	PKM-1			
DECEMBER 10	27.33d	41.00a	36.33b	39.00a	33.50c	35.43	0.83	2.53
JANUARY 11	27.62c	41.50a	36.33b	39.50a	33.83b	35.76	0.89	2.71
FEBRUARY 11	28.17c	42.00a	36.67b	40.00a	34.33b	36.23	0.94	2.85
MARCH 11	28.17c	42.00a	37.17b	41.50a	35.33b	36.83	0.98	2.98
APRIL 11	28.33c	43.00a	37.67b	42.00a	36.50b	37.50	1.05	3.17
MAY 11	29.17c	43.50a	38.33b	43.00a	37.50b	38.30	1.11	3.36
JUNE 11	30.17c	45.00a	39.50b	44.50a	39.00b	39.63	1.20	3.64
JULY 11	31.33c	46.50a	40.33b	47.00a	40.83b	41.20	1.36	4.13
AUGUST 11	32.83c	48.00a	41.50b	49.00a	42.67b	42.80	1.41	4.28
SEPTEMBER 11	33.67d	48.50a	42.17c	50.50a	43.67c	43.70	1.62	4.91
OCTOBER 11	34.17d	49.00a	42.67c	51.50a	44.33c	44.33	1.70	5.15
NOVEMBER 11	34.50d	49.50a	42.67c	52.00a	44.67c	44.67	1.68	5.09

**Table.5** Days for flowering to fruiting, harvesting, number of flowers/panicle, fruits set/ panicle fruits drop / panicle, fruits retention / panicle of tamarind varieties

	VARIETY					GM	SE(m)	CD (0.05)
	SWEET	RED	VANTOOR	URIGAM	PKM-1			
FLOWERING TO FRUITING DAYS	65.33	57.00	73.67	68.33	82.33	69.33	1.87	5.89
FLOWERING TO HATVESTING DAYS	0.0	0.0	261.00	300.67	326.33	296.00	1.32	4.57
NUMBER OF FLOWERS/ PANICLE	4.00	5.67	6.67	14.33	7.33	7.60	0.60	1.88
NUMBER OF FRUITS SET/PANICLE	2.00	2.00	4.00	10.33	3.00	4.27	0.60	1.88
NUMBER OF FRUITS DROP / PANICLE	2.00	2.00	2.67	7.33	1.67	3.13	0.45	1.41
NUMBER OF FRUITS RETAIN / PANICLE	0.0	0.0	1.33	3.00	1.33	1.13	0.43	NS

**Table.6** Days for flowering to fruiting, fruits set/ panicle and fruits drop / panicle of tamarind varieties

	VARIETY					GM	SE(m)	CD (0.05)
	SWEET	RED	VANTOOR	URIGAM	PKM-1			
FLOWERING TO FRUITING DAYS	65.33	57.00	73.67	68.33	82.33	69.33	1.87	5.89
NUMBER OF FRUITS SET/PANICLE	2.00	2.00	4.00	10.33	3.00	4.27	0.60	1.88
NUMBER OF FRUITS DROP / PANICLE	2.00	2.00	2.67	7.33	1.67	3.13	0.45	1.41

**Table.7** Fruit yield/ tree, total sugar, total acidity, total soluble solids (TSS)

	VARIETY					GM	SE(m)	CD (0.05)
	SWEET	RED	VANTOOR	URIGAM	PKM-1			
YIELD (gm/plant)	NIL	NIL	722.67	1383.00	923.33	1009.67	19.88	68.80
Total sugar per 100gm of edible pulp	NIL	NIL	33.67	29.33	40.33	34.44	1.00	3.46
Total acid per 100 gm of edible pulp (mg)	NIL	NIL	7.67	8.60	6.73	7.67	0.12	0.43
TSS ( <sup>0</sup> Brix)	NIL	NIL	39.33	35.33	48.00	40.89	0.72	2.49

It may be that the growth of variety Urigam was comparatively higher than other four varieties and provided higher amount of photosynthetic assimilates to produce higher yield. Quality characters indicated PKM-1 with higher TSS (48<sup>0</sup> Brix) and total sugars (40.33 g) and these obtained lowest (35.33<sup>0</sup> Brix and 29.33 g) with variety Urigam (Table 7). The acidity recorded highest (8.60) with Urigam and lowest with PKM-1.

## References

Baragano de Mosqueda, M. 1980. Technology of clarified tamarind juice.

In Tropical and Subtropical Fruits. (Eds) Nagy, S. and Shaw, P.E. AVI Publishing, Westport, Conn., 375.

Benero, J.R., Collazo de Rivera, A.L. and George, L.M.I. 1974 Studies on the preparation and shelf life of soursop, tamarind and blended soursop- tamarind soft drinks. Journal of Agriculture University Puerto Rico: 58-99.

Rangana, S. 2000. Manual of analysis of fruit and vegetables products. Tata McGraw Hill publishing Company Limited. West Patel Nagar, New Delhi-8.

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