



## Research Paper

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# Status and performance of different mango varieties and hybrids under climatic condition of Tripura

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**ABSTRACT :** Studies were conducted to know the performance of different mango varieties and hybrids under climatic condition of Tripura. Mango is a popular fruit ranking next to jack fruit, banana, pineapple and citrus in total annual production. The climatic condition, fertile soil, sub-tropical climate and abundant rainfall favour mango cultivation in all part of the state. Ten varieties and hybrids were studied for performance under Tripura condition. Out of ten, three performed well under Tripura condition like Amrapali, Mallika and Himsagar. Out of all varieties and hybrids under climatic condition of Tripura, performance of Amrapali was best under Tripura condition with medium size (238.77g) fruit, highest TSS (23.53°Brix) and carotenoids (15795.67 µg/100 g pulps) and lowest acidity (0.17%). Area under Amrapali cultivation is much higher than Himsagar and Mallika. Farming community of state earns a lot of profits from cultivation of mangoes. There is a high potential to increase cultivation area, production with systematic cultivation.

**KEY WORDS :** Amrapali, Sub-tropical climate, Tripura

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Tripura has undulating topography with small hillocks called tilla land interspersed with valley called lunga land. The mango is one of the most popular fruits of India. It is rightly and widely known as the king of fruits in our country. Ten varieties and hybrids were studied for performance under Tripura condition. Out of ten varieties and hybrids, three performed well under Tripura condition like Amrapali, Mallika and Himsagar. Out of all varieties and hybrids, performance of Amrapali was best under Tripura condition and grown in different parts of Tripura. However, area under Amrapali cultivation is highest (80%) than others varieties and hybrids. Since the hybrid Amrapali is suitable for the region because of its dwarfness, having less canopy and is a regular bearer and very easy to cultivate in agro-climatic condition. There is a high potential for increasing area and production. Tripura enjoys a typical monsoon climate and the year being divided into four characteristic seasons, viz., i) winter (December- February), ii) Pre-monsoon (March-April), iii) Monsoon (May- September) and iv) post-Monsoon (October- November). The monsoon period is the longest season. The total annual rainfall varies between 1500 mm to 2500 mm. The soil varies in reaction, very strong to

strong acidic with medium organic matter content and low availability of phosphorus and potash. The pH ranges from 4.5 to 5.5. Soil texture ranges from sandy clay loam to clay loam with medium organic carbon. Raised beds on slopes are utilized with laterite soils on hill tops or medium to heavy loams, rich in humus, low calcium and having a slightly acidic pH of 5.0-6.0 are best soil for mango cultivation. In Tripura summers are warm (19-37°C) and relative humidity is about 85-95 per cent, while the winters are cool (7-27°C) and comparatively dry. High (more than 35°C) and low (below 10°C) temperatures affect growth and development.

## RESEARCH METHODS

Studies were conducted during the 2008-2010 at Department of Horticulture, College of Agriculture, Lembucherra and State government orchard, along with farmers field near by College. The data were generated in different parameters like fruit weight, TSS, acidity, carotenoids, vitamin-C and shelf life. The data were compiled, analysed and subjected to standard statistical processes. Information was also collected regarding present status of area, production and productivity of state and

country.

## RESEARCH FINDINGS AND DISCUSSION

The results obtained from the present investigation are summarized below :

### Present Status (Tables 1, 2, 3 and 4) :

The area, production and productivity are 2,312.3 thousand hectare, 15,026.7 thousand tones and 6.5 MT/hectare, respectively.(Anonymous, 2010) (Table 2). Andra Pradesh alone has highest area of 4,80,400 hectare and production 40,58,300 MT and highest productivity is 13.0 mt/ha in Uttar Pradesh (Anonymous, 2010) (Table 3). Systematic and exact judgement of area and production of various Horticultural crops in the northeastern region are not available. In Tripura mango is the fifth most important fruit crop next to jack fruit, banana, citrus and pineapple, is

cultivated in about 4,190 ha and production is 12,706 mt and productivity 3.03 t ha<sup>-1</sup> (Table 1) which is far below the national productivity (Anonymous, 2011).

### Alphonso (Gundu or Khader or Badami or Hafus):

This is one of the choice variety of mango and is rated to be the best by many at home, abroad and ideal for export market. Fruits are medium-sized (249.53 g), 4 fruits/kg and oval in shape with a prominent ventral shoulder having attractive pink blush towards the basal end. Pulp is firm, fibreless with excellent orange colour. It has good sugar to acid blend with good keeping quality. Besides being a table cultivar it is also a favoured fruit of the processing industry because it retains its characteristic flavour even during processing. As observed TSS (19.53 °Brix), carotenoids (11216.33µg/100g pulp), vitamin C (37.04mg/100g pulp) and acidity (0.21 %) (Table 4). The shelf life is 5-6 days under

Year	Mango		
	Area	Production	Productivity
1995-96	5036	41270	8.2
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1997-98	5022	23100	4.6
1998-99	5030	23145	4.6
1999-00	5000	22300	4.5
2000-01	3075	4500	1.5
2001-02	3150	8500	2.7
2002-03	3175	4600	1.5
2003-04	3460	6121	1.8
2004-05	3623	9360	2.6
2005-06	3868	12340	3.2
2006-07	3700	11358	2.9
2007-08	3981	11924	3.00
2008-09	4190	12706	3.03
2009-10	4254.00	13170	3.09

State	2007-08			2008-09			2009-10		
	Area	Pron.	Pdy.	Area	Pron.	Pdy.	Area	Pron.	Pdy.
Andra pradesh	483.5	4157.9	8.6	497.7	2522.0	5.1	480.4	4058.3	8.4
Uttarpradesh	265.9	3365.0	12.7	271.2	3465.9	12.8	276.4	3588.0	13.0
Karnataka	134.6	1223.3	9.1	141.3	1284.4	9.1	153.8	1694.0	11.0
Bihar	142.2	870.4	6.1	144.1	1329.8	9.2	146.0	995.9	6.8
Gujarat	109.6	930.1	8.5	115.7	299.8	2.6	121.5	856.7	7.0
Tamil Nadu	136.6	753.6	5.5	148.8	821.4	5.5	132.7	636.3	4.8
Maharashtra	455.8	710.9	1.6	457.0	712.8	1.6	474.5	597.0	1.3
West Bengal	80.9	623.3	7.7	86.0	548.9	6.4	88.1	578.0	6.6
Orrisa	148.2	251.8	1.7	164.3	449.7	2.7	177.6	577.5	3.3
Kerala	76.7	445.4	5.8	76.7	445.4	5.8	63.8	273.2	5.9
Others	167.4	665.1	4.0	206.2	869.5	4.2	197.4	1071.7	5.4
Total	1717.9	9838.9	5.7	1811.3	10227.8	5.6	2312.3	15026.7	6.5

room temperature.

#### Amrapali :

It is cross between Dashehari x Neelum. Dwarf, regular bearer, medium sized fruit with high density planting 2.5 x 2.5 m<sup>2</sup>. It is one the choice hybrid in Tripura with about 80 per cent of the farmers growing Amrapali across the state, the remainder are Himsagar and Mallika. Amrapali is suitable for the region because of its dwarfness, less canopy and regular bearer with good flavour, taste, aroma, texture and over all acceptability. Its fruits are very sweet and have no fibres. Flowering starts in the first week of February and matures in the first week of June. Fruits are small to medium-sized (238.77g/ fruit), 4fruits/kg and is a mid-season hybrid. As observed TSS (23.53<sup>0</sup>Brix), carotenoids (15795.67 µg/100g pulp), vitamin C (37.91mg/100g pulp) and acidity (0.17 %)(Table 4). The shelf-life is 4-5 days under room temperature.

#### Bangalora (Kallamai or Kilimooku or Totapuri):

This is one of the most widely cultivated, mid-season cultivars. It is a heavy yielder and one of the few regular bearing cultivars of Mango. The fruits are medium to large

sized (570.47g/fruit), 2 fruit/kg and typical in shape, *i.e.* oblong (bottle-necked towards the base) with a prominent sinus and beak. The fruits are attractive and have apricot-yellow colour with thick skin. Keeping quality is very good. The fruit quality is relatively inferior but is preferred by the processing industry because of its dependable regular supply. The raw fruits are used for fresh pickle preparation. As recorded T.S.S (13.22<sup>0</sup>Brix), carotenoids (7293.00µg/100g pulp), vitamin C (39.43mg/100g pulp) and acidity (0.30%) (Table 4). Shelf life is 4-5 days under room temperature.

#### Himsagar:

It is an excellent commercial variety of Tripura and West Bengal and is the third choice hybrid in Tripura. Flower initiation is around January 15-20, maturing during the second week of May. The fruits are medium to large (246.97g/fruit) average 2-3 fruits/kg, oval in shape with green color and ripens with rough skin. The fruit pulp is very sweet with good flavor, taste, aroma, texture and acceptability but susceptible to mango stone weevil infestation and sooty mould. As observed T.S.S (22.95<sup>0</sup>Brix), carotenoids (7870.00µg/100g pulp), vitamin C (41.89mg/100g pulp) and acidity (0.22 %) (Table 4). Shelf-life is very short, only 3-4 days under room

**Table 3 : All India area (000 ha), production (000mt) and productivity (ha/mt) of mango**

Year	Area	% of total frt. area	Production	% of total frt. area	Productivity
1991-92	1077.6	37.5	8715.6	30.4	8.1
2001-02	1575.8	39.3	10020.2	23.3	6.4
2002-03	1623.4	42.9	12733.2	28.2	7.8
2003-04	1906.7	40.8	11490.0	25.2	6.0
2004-05	1970.4	39.7	11829.7	24.0	6.0
2005-06	2080.7	39.1	12663.1	22.9	6.1
2006-07	2154.0	38.8	13734.0	23.1	6.4
2007-08	2201.0	37.6	13997.7	21.3	6.4
2008-09	2309.0	37.8	12750.0	18.6	5.5
2009-10	2312.3	36.5	15026.7	21.0	6.5

**Table 4 : Evaluation of varieties and hybrids of mangos under Tripura climatic condition**

Varieties / Hybrids	Fruit weight (g)	TSS (%)	Acidity (%)	Carotenoids (µg/ 100 g pulp)	Vit. 'C'(mg/ 100 g pulp)	Shelf life* (Days)
Alphanso	249.53	19.53	0.21	11216.33	37.04	5.42
Amarapali	238.77	23.53	0.17	15795.67	37.91	4.97
Bangalora (Totapuri)	570.47	13.22	0.30	7293.00	39.43	4.53
Chausa	228.80	22.62	0.20	8090.33	36.07	4.67
Himsagar	246.97	22.95	0.22	7870.00	41.89	3.84
Lal Sundari	257.02	15.98	0.23	8374.33	33.13	4.81
Mallika	737.10	23.20	0.22	9306.67	47.06	6.42
Pusa Arunima	225.50	20.30	0.25	14065.00	34.35	12.00
Pusa Surya	240.50	20.58	0.25	12657.33	33.32	11.87
Ratna	235.50	20.58	0.24	12140.00	40.04	7.17
S.E. ±	12.26	00.37	0.002	2.98122	0.049	0.17
C.D (P=0.05%)	36.43	1.11	0.01	8.8577	0.146	0.50

\* at room temperature

temperature.

#### **Mallika :**

It is a cross between Neelum x Dashehari and is the second choice hybrid in Tripura. It is semivigorous, regular bearer, fruits large (737.10 g/ fruit). Fruits are with better keeping quality and have very good taste, colour, flavour, texture, aroma and overall acceptability. It is mid season hybrid. It starts flowering in the first week of February and matures at end of May and first week of June. As observed T.S.S. (23.20 °Brix), carotenoids (9306.67µg/100g pulp), vitamin C (47.06mg/100g pulp) (Table 4) and acidity (0.22%). Shelf-life is 6-7 days under room temperature.

#### **Ratna:**

It is cross between Neelum x Alphonso, a moderately vigorous tree, regular and precocious bearer, attractive fruit shape, size and colour. Good quality with respect of taste, flavour, texture, aroma and overall acceptability, medium sized(235.50g/fruit) and free from spongy tissue. The fruit is small to medium(235.50g/fruit), 4-5 fruit/kg having T.S.S (20.58 °Brix), Carotenoids (12140.00µg/100g pulp), vitamin C (40.04mg/100g pulp) with acidity (0.24 %)(Table 4). Shelf-life is 7-8 days under room temperature.

#### **Chausa:**

This is one of the sweetest mango and a late-maturing variety. It is a late season cultivar and matures towards the end of July or first week of August. The fruits are small to medium size (228.80g/ fruit), weighing about 4fruit/kg, almost oblong in shape (with a characteristic sinus) and bright yellow in colour with soft and sweet pulp. Its very vigorous growth habit with shy bearing having T.S.S (22.62 °Brix), Carotenoids (8090.33µg/ 100g pulp), vitamin C (36.07 mg/ 100g pulp) with acidity (0.20 %)(Table 4). The shelf-life is 4-5 days under room temperature.

#### **Lal Sundari (Swarnarekha/ Sundari) :**

This is one of the table cultivars of commerce which have highly colored fruits of attractive pinkish red. The fruit is medium sized (257.02g/fruit), 4fruit/kg and the shape is ovate-oblong. The flesh has good taste, flavour with acidic blend. The bearing is moderate. As observed T.S.S. (15.98 °Brix), carotenoids (8374.33µg/100g pulp), vitamin C (33.13mg/100g pulp), with acidity (0.23%) (Table 4). Shelf-life is moderate (4 to 5 days) under room temperature.

#### **Pusa Arunima:**

The fruit is small to medium size (225g/fruit), 4-5fruits/ kg., T.S.S. (20.30 °Brix), Carotenoids (14065.00µg/100g pulp), vitamin C (34.35mg/100g pulp), with acidity (0.25%) (Table 4). The fruit has good colour and shape with good taste, flavour, aroma, texture and acceptability. Shelf-life is

very good at 12 days under room temperature.

#### **Pusa Surya :**

The fruit is small to medium size (240g/fruit), average 4-5fruit/ kg), T.S.S. (20.58 °Brix), Carotenoids (12657.33µg/ 100g pulp), vitamin C (33.32mg/100g pulp) with acidity (0.25%) (Table 4). The fruit has good colour and shape with good taste, flavour, aroma, texture and acceptability. Shelf-life is good at 12 days under room temperature.

Among the varieties and hybrids evaluated under Tripura condition, the hybrid Mallika had the highest fruit weight of 737.10 g/ fruit followed by Bangalora 570.47 g per fruit (Table 4). The lowest fruit weight was Pusa Arunima, at 225.50 g/fruit. The hybrid Amrapali recorded highest TSS (23.53°Brix) (Table 4) followed by Mallika (23.20°Brix) and lowest TSS was found the variety Bangalora (13.22°Brix) (Table 4). Similar observation was reported by Sharma *et al.* (1981); Singh *et al.* (1977) and 1985 and Ghosh *et al.* (1985). The lowest acidity was observed in Amrapali hybrid (0.17%), followed by Alphanso (0.21%). Similar observation was also reported by Sanyal *et al.* (1991); Ghosh *et al.* (1985) and Sharma *et al.* (1981). The hybrid Amrapali recorded highest carotenoids (15795.67µg/100 g pulp) followed by Pusa Arunima (14065.00 µg/100 g pulp) and lowest carotenoid was recorded in the Bangalora variety (7293.00µg/ 100 g pulp). The highest ascorbic acid was recorded in Mallika hybrid (47.06mg/100g) followed by Himsagar (41.89mg/100g) and lowest ascorbic acid was recorded in Amrapali hybrid (33.13 mg/100g) (Table 4). Similar observation was also reported by Singh *et al.* (1977); Singh *et al.* (1985); Salvi (1983); Sharma *et al.* (1981); Ghosh *et al.* (1985) and Sanyal *et al.* (1991). The hybrid Pusa Arunima had the longest shelf life (12.00 days) under room temperature followed by Pusa Surya and shortest was seen in Himsagar variety (Table 4).

Among the varieties and hybrids studied under Tripura condition Amrapali had good performance across the state with respect of size, shape, quality, taste, aroma, texture, overall acceptability and adaptability. Tripura is blessed with huge genetic resources so systematic cultivation is urgently required in the state for improving the socio-economical and creating employment opportunity. Mango cultivation will provide food, nutrition, health security and livelihood opportunity in the state. Among the cultivars and hybrids studied under Tripura condition, the hybrid Amrapali recorded highest TSS (23.53°Brix) and carotenoids (15795.67µg/100 g pulp) and lowest acidity (0.17%) with most acceptable to consumers, in the state.

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