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Research Article

Studies on Phytochemical Evaluation of Tamarind (*Tamarindus indica* L.) Genotypes Prevailing in Eastern Dry Zone of Karnataka

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ABSTRACT

The present investigation entitled "Studies on Phytochemical evaluation of tamarind (Tamarindus indica L.) Genotypes prevailing in Eastern dry zone of Karnataka" was carried out in the laboratory, Department of Horticulture, College of Agriculture, GKVK, Bangalore, during the year 2018 and 2019. The study was carried out with 22 treatments (genotypes) consist of ripe fruits collected from selected trees of tamarind exist in Department of Horticulture, College of Agriculture, GKVK, Bangalore, under Randomized Block Design with three replications. Higher Ascorbic acid content of pulp recorded in T_{19} [GKTAM-19 (11.35 mg/100g)], and lower Ascorbic acid content of pulp was recorded in T_9 [GKTAM-9 (5.67 mg/100g)]. Higher Tartaric acid content of pulp was noticed in T_1 [GKTAM-1 (12.15 %)] and lower Tartaric acid content of pulp was noticed in T_6 [GKTAM-6 (6.21 %)].

Keywords: *Tamarind, Eastern Dry Zone, Ascorbic acid, Tartaric acid and Genotypes.*

INTRODUCTION

Tamarind (*Tamarindus indica* L.) is a hardy evergreen monotypic tree which belongs to the family 'Leguminosae' and sub-family Caesalpinaceae and has the chromosome number 2n=24. The name tamarind was derived from the Arabic word 'Tamar-E-Hind' meaning 'Date of India'. It is cultivated throughout the tropics and sub-tropics of the world and has become naturalized at many places. Tamarind is an economically important tree of India as well as Karnataka. In India, it is abundantly grown in Madhya Pradesh, Bihar, Andhra Pradesh and Tamil Nadu.

Almost every part of the tree are useful, but the most important is the fruit pulp. It is a rich source of vitamins, minerals and also contains more of calcium than any other fruit.

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Hence it has a potential commercial future for the preparation of soft drinks, jams and confectioneries. The pulp contains a small amount of carotene, thiamine and nicotinic acid. The ascorbic acid content in tamarind is in very small quantity (2 to 20 mg/100 g), moisture ranged from (20.15 to 24.50%) and (8-18%) and predominantly tartaric acid (Ishola et al., 1990). The content of tartaric acid, however, does not decrease during fruit ripening, indicating that it is not utilized in fruit development; but during this time, reducing sugars increase to 30-40 percent giving the sour fruit a sweeter taste (El-Siddig et al., 2006). Generally, the chemical constituents of the fresh ripe tamarind varieties varied depending on location, soil, climate and other agro-climatic conditions.

While, pod yield is a very complex economic character and it is outcome of association of number of factors inherent in plant, genetic linkage and the environment in which the plant is grown. Keeping above points in view, the present entitled "Studies on Physico-chemical evaluation of tamarind (*Tamarindus indica* L.) Genotypes prevailing in Eastern dry zone of Karnataka" was undertaken.

MATERIALS AND METHODS

The present investigation entitled "Studies on Phytochemical evaluation of tamarind (*Tamarindus indica* L.) Genotypes prevailing in Eastern dry zone of Karnataka" was carried out during 2018-19 at department of Horticulture, College of Agriculture, GKVK, Bangalore, The experiment was laid out in a randomized block design with three replications and 22 genotypes *viz.*, GKTAM-1/PKM-1, GKTAM-2, GKTAM-3, GKTAM-4, GKTAM-5, GKTAM-6, GKTAM-7, GKTAM-8, GKTAM-9, GKTAM-10, GKTAM-11, GKTAM-12, GKTAM-13, GKTAM-14, GKTAM-15, GKTAM-16, GKTAM-17, GKTAM-18/ URIGAM, GKTAM-19, GKTAM-20, GKTAM-21 and GKTAM-22. The methods used for the estimation of various quality parameters of tamarind genotypes as given by Ranganna (1979) are mentioned below.

Ascorbic acid (mg/100 g)

The titrimetric method described by Ranganna (1979) was adopted for estimation of the ascorbic acid. Five grams of the homogenized pulp of tamarind was taken and transferred to 100 ml volumetric flask. The volume was made up with 4 per cent oxalic acid solution. After 30 minutes, the suspension was filtered through Whatman No.1 filter paper. Before actual titration, 2, 6-Dichlorophenol indophenols (Dye solution) was standardised by titrating against the standard ascorbic acid solution and the dye factor was calculated. Five ml of the aliquot was taken from the filtrate and titrated against standardised dye solution through a burette. The titration was continued till the light pink colour persisted for 15 seconds. The ascorbic acid content was calculated adopting the following formula.

$$\text{Ascorbic acid (mg/100 g)} = \frac{\text{Titre value} \times \text{Dye factor} \times \text{Vol. makeup (ml)}}{\text{Aliquot taken for estimation} \times \text{Vol. of sample taken}} \times 100$$

Tartaric acid

Tartaric acid was determined by computation. Titrable acidity was expressed in terms of tartaric acid using equivalent weight of tartaric acid (Roopa and Kesiviswanatham, 2013).

$$\text{Tartaric acid (\%)} = \frac{\text{T} \times \text{E} \times \text{N}}{1000 \times \text{W}} \times 100$$

T = Titre value
E = Equivalent weight of the acid (G) based on the organic acid expressed
N = Normality of NaOH
W = Weight equivalent (g) of the sample to the aliquot used for titration

RESULTS AND DISCUSSION

The data pertaining to Tartaric acid and Ascorbic acid pH are presented in Table 1.

Ascorbic Acid (mg/100g)

Significant differences were recorded between the accessions for ascorbic acid both during 2018-19 and 2019-20 as well as for pooled average.

During 2018-19, higher Ascorbic acid content was observed in T_{19} [GKTAM-19 (11.25 mg/100g)] followed by T_1 [GKTAM-1 (10.79 mg/100g)], T_7 [GKTAM-7 (10.47 mg/100g)] and T_{10} [GKTAM-10 (10.45 mg/100g)]. The lowest Ascorbic Acid was observed in T_9 [GKTAM-9 (5.83 mg/100g)].

During 2019-20, higher Ascorbic acid content was observed in T_{19} [GKTAM-19 (11.35 mg/100g)] followed by T_1 [GKTAM-1 (10.86 mg/100g)], T_7 [GKTAM-7 (10.85 mg/100g)] and T_{10} [GKTAM-10 (10.53 mg/100g)]. The lowest Ascorbic acid was observed in T_9 [GKTAM-9 (5.67 mg/100g)].

Among the pooled averages, higher pH was observed in T_{19} [GKTAM-19 (11.32 mg/100g)] followed by T_1 [GKTAM-1 (10.82 mg/100g)], T_7 [GKTAM-7 (10.66 mg/100g)] and T_{10} [GKTAM-10 (10.49 mg/100g)]. The lowest Ascorbic acid content was observed in T_9 [GKTAM-9 (5.75 mg/100g)].

Tartaric acid (%)

Significant differences were recorded between the genotypes for tartaric acid both during 2018-19 and 2019-20 as well as for pooled average.

During 2018-19, maximum Tartaric Acid was recorded in T_1 [GKTAM-1 (12.15 %)] which was found to be on par with T_9 [GKTAM-9 (11.26 %)], T_{15} [GKTAM-15 (11.11 %)] and T_5 [GKTAM-5 (10.80 %). The lower tartaric acid was recorded in T_6 [GKTAM-6 (6.41 %)].

During 2019-20, maximum Tartaric acid was recorded in T_1 [GKTAM-1 (12.12 %)] which was found to be on par with T_9 [GKTAM-9 (11.33 %)], T_{15} [GKTAM-15 (11.05 %)] and T_5 [GKTAM-5 (10.97 %)]. The lower tartaric acid was recorded in T_6 [GKTAM-6 (6.21 %)].

Among the pooled averages, maximum Tartaric acid was recorded in T_1 [GKTAM-1 (12.14 %)] which was found to be on par with T_9 [GKTAM-9 (11.30 %)], T_{15} [GKTAM-15 (11.08 %)] and T_5 [GKTAM-5 (10.89 %)]. The lower tartaric acid was recorded in T_6 [GKTAM-6 (6.31 %)].

All the phytochemical components of tamarind fruit pulp recorded was seen significant differences in all the accessions studied. Accessions GKTAM-1, GKTAM-18 and GKTAM-19 which found to be on par with each other, poses higher level of ascorbic acid and tartaric acid content. However, tartaric acid content in GKTAM-18 was close to GKTAM-1 and GKTAM-19.

On similar line of morphometric traits phytochemical traits seems to be under control of genetic makeup of accessions as depicted from the result during period of experiment. These results are also in agreement with the findings of Hanamashetti and Sulikeri (1997), Mastan et al. (1997), Benjamin and Seegobin (1999), Biradar (2001), Kotecha and Kadam (2002), Hanamashetti et al. (2003), Patil (2004), Prabhushankar et al. (2004), El-Siddig et al. (2006), Divakara (2009), Adeola and Aworh (2012), Joshi et al. (2013), Azhakiamanavalan and Vadivel (1997), Shankaracharya (1998), Obulesu and Bhattacharya (2010) and Sharma et al. (2015).

Table 1: Ascorbic acid and tartaric acid percentage of tamarind genotypes maintained at Department of Horticulture, UAS, GKVK, Bengaluru

Treatment	Genotype		Ascorbic acid (mg/100 g)			Tartaric acid (%)		
			2018-19	2019-20	Pooled average	2018-19	2019-20	Pooled average
T_1	GKTAM-1/PKM-1		10.79	10.86	10.82	12.15	12.12	12.14
T_2	GKTAM-2		10.31	10.31	10.31	10.31	10.21	10.26
T_3	GKTAM-3		6.82	6.74	6.78	9.80	9.77	9.78
T_4	GKTAM-4		9.36	9.45	9.40	8.89	8.81	8.85
T_5	GKTAM-5		8.90	8.95	8.93	10.80	10.97	10.89
T_6	GKTAM-6		9.76	9.78	9.77	6.41	6.21	6.31
T_7	GKTAM-7		10.47	10.85	10.66	9.70	9.73	9.71
T_8	GKTAM-8		10.18	10.15	10.16	8.70	8.87	8.78
T_9	GKTAM-9		5.83	5.67	5.75	11.26	11.33	11.30
T_{10}	GKTAM-10		10.45	10.53	10.49	10.21	10.15	10.18
T_{11}	GKTAM-11		8.37	8.52	8.45	10.67	10.57	10.62
T_{12}	GKTAM-12		9.33	9.30	9.31	7.38	7.62	7.50
T_{13}	GKTAM-13		10.18	10.19	10.19	8.16	8.16	8.16
T_{14}	GKTAM-14		10.20	10.28	10.24	10.37	10.57	10.47
T_{15}	GKTAM-15		8.36	8.41	8.39	11.11	11.05	11.08
T_{16}	GKTAM-16		9.64	9.71	9.68	10.64	10.53	10.58
T_{17}	GKTAM-17		10.17	10.29	10.23	9.21	9.2	9.20
T_{18}	GKTAM-18/URIGAM		7.35	7.37	7.36	10.48	10.55	10.51
T_{19}	GKTAM-19		11.25	11.29	11.27	9.71	9.78	9.74
T_{20}	GKTAM-20		10.20	10.29	10.25	8.39	8.26	8.33
T_{21}	GKTAM-21		6.23	6.25	6.24	8.80	8.77	8.78
T_{22}	GKTAM-22		7.30	7.26	7.28	9.69	9.79	9.74
	Mean		9.16	9.20	9.18	9.68	9.69	9.68
	Range	**Maximum**	11.25	11.29	11.27	12.15	12.12	12.14
		Minimum	5.83	5.67	5.75	6.41	6.21	6.31
	F test (p≤0.05)		*	*	*	*	*	*
	S.Em±		**0.05**	**0.09**	**0.06**	**0.02**	**0.09**	**0.04**
	C.D at 5%		**0.13**	**0.27**	**0.16**	**0.04**	**0.26**	**0.13**

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