Journal of Pharmacognosy and Phytochemistry
Available online at www.phytojournal.com

E-ISSN: 2278-4136
P-ISSN: 2349-8234
www.phytojournal.com
JPP 2021; 10(1): 60-66
Received: 20-11-2020
Accepted: 25-12-2020

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Comparative evaluation study on the physicochemical composition of three different tamarind varieties

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Abstract
The experiment aimed to study the Physico-chemical characteristics of Anantha Rudhira (red), Thettu Amalika, and the local, variety of Ananthapuramu, and the results were compared with local. It showed that the Thettu Amalika variety was superior in physical characteristics like thickness, weight, volume whereas the local variety was superior in respect of average width, weight while the Anantha Rudhira was superior in length and proximate composition. The mean width, length, and thickness of fruit pulp were found to be 9.73, 1.50, and 0.15 cm. The average values of vitamin C, calcium were found to be 0.54 and 185 mg. Anantha Rudhira, the red variety was rich in protein (3.8%), fat (0.30%), reducing sugars, ascorbic acid, tartaric acid and with lowest crude fiber Anantha Rudhira were more superior in proximate and chemical composition than Thettu Amalika and local variety.

Keywords: Physical parameters, proximate composition, chemical composition, tamarind pulp

Introduction
Tamarind is also called imli/Indian date and it is a multipurpose plant. The pulp of the fruit is used as a spice in Asian cuisine, especially in the southern parts of India, for a long time. Each part of the tree finds use in the pharmaceutical or textile industries, or as fodder, timber, and fuel. (Jaspher *et al.* 2017) [32].
Among all countries, India ranks first place *i.e.,* (300,000 tons) in production as well as the export of tamarind pulp followed by Thailand (140,000 tons) and the remaining percentage of trees are only planted for tamarind pulp because it creates a food value to a particular product. (Narina *et al.* 2018) [42]. Mostly in India, the states of Tamilnadu, Andhra Pradesh, *etc*. produce the largest volume of tamarind pulp. (Muzaffar & Kumar 2017) [40].
Tamarind has several medicinal values to cure many diseases and disarray conditions like GIT disorder and jaundice. From the fruit pulp, a remedial drink was prepared and it was more helpful to reduce the conditions like bowel syndrome, dysentery, *etc*. (Adeola *et al.* 2010) [4]. Industries and commercial companies like juice and jam making tell that tamarind plant parts have good medicinal and nutritional values. (Emmy *et al.*, 2010) [23]. When compare to regular fruits, seasonal fruits are particular in the duration of time. So in that period, there is no availability of fruit. So, more value-added products can be processed with fresh fruit of tamarind and used for ready to use the convenient product with the advantage of storage, and export. To raise the demand in the market, as well as benefit both farmers in the post-harvesting processand consumer acceptance froma nutritional point of view.

Material and Methods
a) Procurement of raw material
Anantha Rudhira (red), and Thettu Amalika tamarind varieties was procured from Horticultural Research station (HRS), DR.YSR Horticultural university, Ananthapuramu and local variety from local market of Ananthapuramu, of Andhra Pradesh state, India.

b) Assessment of Physical Parameters
The analysis of physical properties of tamarind pulp which includes length (cm), width (cm), thickness (cm), pulp weight (g), volume (cm^3), density (g/ cm^3), and color of pulp. For each parameter 20 pulp samples were taken randomly and measurements were done separately.

Length (L), Width (W), and Thickness (T) of Tamarind Pulp
Average length (L), width (W), and thickness (T) of tamarind pulp was calculated as follows:

$$L = \sum_{i=1}^{n} \frac{L}{n}$$

$$W = \sum_{i=1}^{n} \frac{w}{n}$$

$$T = \sum_{i=1}^{n} \frac{T}{n}$$

Where,
L= largest intercept (length), cm;
W = width, cm;
T = thickness, cm and
n = number of sample, (n = 20)

Weight of the Tamarind Pulp
The weights of tamarind pulp were measured by weighing balance (least count 0.01 g) and value of each pulp was recorded.

Volume of the Tamarind Pulp
The length, width and thickness were of tamarind pulp was measured assuming perpendicular axis along its largest dimension. The volume of the tamarind pulp was calculated by using the formula:
Volume = (L×W×T)

Where,
L = length of the tamarind pulp, cm;
W = width of the tamarind pulp, cm; and
T = thickness of the tamarind pulp, cm

Density of the Tamarind Pulp
The density (g / cm^3) of the tamarind pulp was calculated by using the formula

$$\text{Density} = \frac{M}{V}$$

Where,
M = mass of the tamarind pulp, g and
V = volume of the tamarind pulp, cm^3

Proximate composition
The proximate analysis is a quantitative method to determine different nutrient present in tamarind. It includes moisture (g %), protein (g %), fat (g %), ash (g%), crude fiber (g%), CHO (g%) and energy (Kcal).
In the present study the proximate composition was estimated as per standard AOAC (2006) [6].
Estimation of CHO (g %): The carbohydrate content was determined by differential method using the formula.
Calculation: 100 – (% moisture + % protein + % fat + % ash + % crude fiber) Estimation of energy value: The sample calorific value was estimated (in Kcal) by multiplying percentages of protein, fat, CHO with recommended factors 4, 9, 4 respectively.

Chemical Parameters
Color of the Pulp: The analysis of color of tamarind pulp was done by using the spectrophotometer.
Total Soluble Solids: Soluble Solids content of the sample was estimated by using Ranganna, 1986. Soluble solids content of the sample was expressed as g/100g.

Total Soluble Solids (^{0}Brix)
The percentage of Soluble Solids was determined using ERMA hand refractometer by placing a drop of the filtered juice on the refractometer prism. Before taking the reading, the refractometer was tested for error with distilled water.

pH: pH content of the sample was estimated by using AOAC, 2006 [6]. pH content of the sample was expressed as g/100g.

Tartaric Acid: Tartaric Acid content of the sample was estimated by using AOAC, 1975 [7]. Tartaric acid content of the sample was expressed as g/100g.

Acidity (%)
Ten grams of homogenized sample was taken and made up to 100 ml. volume in a volumetric flask. The contents were than filtered through whatman no.1 filter paper; an aliquot of 1 ml. was taken for titration against 0.1 N NaOH using phenolphthalein indicator and light pink colour as end point, to estimate titrable acidity in terms of tartaric acid.

Calculations
Factor for acidity: One ml. of N/10 NaOH = 0.0075g of tartaric acid.

$$\% \text{ Tartaric acid} = \frac{\text{Titre value} \times \text{Normality of NaOH} \times 75 \times 100}{\text{Volume of the sample} \times \text{volume of aliquot taken} \times 1000}$$

Reducing Sugars and Total Sugars: Reducing Sugars and Total Sugars content of the sample was estimated by using the method of Lane and Eyon. AOAC, 1975 [7]. Reducing Sugars and Total Sugars content of the sample was expressed as g/100g.
Ten grams of samples was transferred to 250 ml volumetric flask using a little amount of distilled water and 2 ml of lead acetate. Solution was added to the flask for precipitation of colloidal matter and kept aside for 10 min. Then 2 ml of potassium oxalate solution was added to this solution to precipitate the lead and then the volume was made up to 250 ml using distilled water. And the contents were then filtered through whatman no.1 filter paper. Reducing Sugars in the lead free solution were then estimated by taking this solution in burette and titrating against 10 ml of standard fehling's solution mix of A and B (1:1), using methylene blue as an indicator and formation of brick red precipitate as an end point. Keeping the fehling's solution boiling on the heating mantle carried out the titration.

Total Sugars (%)
For Total Sugars, 50 ml of filtered sample was taken in a 250 ml conical flask to which 50 ml water and 5 gm of citric acid was added boiled gently for 10 mints to complete the inversion of sucrose, then transferred to 250 ml volumetric flask and neutralized with 1N NaOH. The volume was made up to the mark and determined the total sugar as invert sugars. (AOAC, 1975) [7].

Ascorbic acid: Ascorbic acid content of the sample was estimated by using AOAC, 2006 [6]. Ascorbic acid content of the sample was expressed as mg%.

Calcium: Calcium content of the sample was estimated by using AOAC, 2006 [6]. Calcium content of the sample was expressed as mg%.

Iron: Iron content of the sample was estimated by using AOAC, 2006 [6]. Iron content of the sample was expressed as mg%.

Results and discussion

Table 1: Physical characteristics of tamarind varieties

Variety	Parameters					
	Length (cm)	Width (cm)	Thickness (cm)	Weight (g)	Volume (cm^3)	Density (g/ $cm^{3)}$
AnanthaRudhira (red)						
Mean	9.73	1.05	0.08	2.17	0.80	4.03
Range	8.00 -12.50	0.83 - 1.40	0.02 - 0.14	0.17 - 2.08	1.10 - 3.30	1.44 - 16.78
ThettuAmalika(brown)						
Mean	8.64	1.38	0.15	2.90	1.40	2.36
Range	7.00 - 11.50	0.94 - 1.72	0.05- 0.18	0.39 - 2.94	2.10 - 4.10	1.24 - 6.65
Local variety						
Mean	8.40	1.50	0.05	1.97	0.77	8.71
Range	7.00 -11.00	1.05 - 1.97	0.04 - 0.16	0.03 - 2.69	1.10 - 3.60	1.33 - 50.0
S.E	1.32	0.28	0.04	0.71	0.66	8.46
C.D	0.51	0.03	0.01	0.27	0.25	3.27
C.V	6.00	0.03	0.10	3.00	3.00	40.8

The data on physical characteristics of tamarind for different varieties presented in table-1revealed that in physical characteristics among three different varieties compared Anantha Rudhira had the highest fruit length value 9.73 cm followed by ThettuAmalika, 8.64 cm, and Local variety, 8.40 cm. The ranges of the length of Anantha Rudhira, ThettuAmalika, and local variety were found to be 8.00 to 12.50 cm followed by 7.00 - 11.50 cm and 7.00 -11.00 cm with an average length of 9.75 cm, 8.64 cm, and 8.40 cm. Our results conform with the findings of Joshi *et al.* (2013) [33], Kotecha (2002) [34], Benjamin and Seegobin *et al.*(1999) [11], Bueso (1980) [12], and Lewis (1954) [36], reported ranged from 9.94 to 11.35 cm.

The width of the local variety had the highest value of 1.50 cm followed by Thettu Amalika, 1.38 cm, and Anantha Rudhira, 1.01 cm. The ranges of the width of local variety had the highest value of 1.05 - 1.98 cm followed by Thettu Amalika, 0.94 - 1.72 cm, and Anantha Rudhira, 0.83 - 1.39 cm. Joshi *et al.* (2013) [33] and Geetesh *et al.* (2015) [26] also reported similar results.

The thickness of Thettu Amalika had the highest value of 0.15 cm followed by Anantha Rudhira, 0.07 cm, and local variety, 0.05 cm. The ranges of thickness of Thettu Amalika had the highest value of 0.05- 0.19 cm followed by a local variety, 0.04 - 0.16 cm, and Anantha Rudhira, 0.01 - 0.14 cm.

Thettu Amalika had the highest value of 2.90 g weight followed by Anantha Rudhira, 2.17 g, and local variety, 1.97 g. The ranges of the weight of Thettu Amalikahad highest value of 0.39 - 2.95 g followed by a local variety, 0.03 - 2.70 g and Anantha Rudhira, 0.16 - 2.08 g. In the present investigation, the average pulp weight is on par with the findings of Sulieman *et al.* (2010) *i.e.*, 54.2 g per 100 g raw fruit material. The pulp obtained in the study was found to be wide variation findings of Challapilli (1992) [13]; Benjamin and Seegobin (1999) [11]; Hanamashetti and Sulikeri (1997) [28] and Ilango and Vijaylakhmi (2002) [29] which ranged between 2.70 to 9.18 g.

The volume of Thettu Amalika had the highest value of 1.39 cm^3 followed by Anantha Rudhira, 0.80 $cm^{3,}$ and the local variety, 0.77 cm^3. The ranges of the weight of Thettu Amalika had the highest value of 2.10 - 4.10 cm^3 followed by a local variety, 1.10 - 3.60 $cm^{3,}$ and Anantha Rudhira, 1.10 - 3.30 cm^3.

Local variety had the highest density value of 8.71 g/cm^3 followed by Anantha Rudhira, 4.03 g/cm^3 and Thettu Amalika, 2.35 g/cm^3. The ranges of the density of local variety had the highest value of 1.35 - 50.00 g/cm^3 followed by Anantha Rudhira, 1.44 - 16.78 g/cm^3 and Thettu Amalika, 1.25 - 6.64 g/cm^3.In the present investigation, physical parameters ranged from length (1.52-1.74) cm, width (1.6-0.19) cm, thickness (0.12-0.81) cm, and density (99.23) g/cm^3 values were almost different as the findings of Asoiro *et al.* (2017) [8] and Pandian *et al.* (2013) [44]. Om Prakash *et al.* (2018) [43].

Thettu Amalika was highest in fruit weight, flesh percent, and highest pulp yield over Anantha Rudhira and Local variety. The variety Thettu Amalika significantly found superior in the desirable characteristics like flesh, pulp yield, and waste over Anantha Rudhira and local variety which moves its suitability for processing. Joshi *et al.* (2013) [33] also reported similar results on the physical parameters.

Table 2: Proximate compositions of tamarind fruit flesh

Variety	Parameters (g %)						
	Moisture	Protein	Fat	Ash	Crude fiber	CHO	Energy (Kcal)
Anantha Rudhira	17.3	3.8	0.30	3.95	4.44	70.21	298
Thettu Amalika	13.4	3.1	0.10	3.71	4.12	73.57	307
Local	10.60	3.2	0.01	5.60	5.54	75.05	313
SE	1.99	0.22	0.09	0.42	0.43	2.27	7.93
CV	23.9	11.24	108.6	21.06	15.84	5.38	4.43

Table-2 reveals the proximate composition of three varieties. The moisture percent of tamarind flesh from Anantha Rudhira was 17.3. which is slightly lower than documented values by Siddiq *et al.* (2016) Rasala *et al.* (2011) [46], Morton and Mohammed (2007), Gursharan *et al.* (2006) [27], Kotecha and Kadam (2002) [34], Feungchan *et al.* (1996) [25], and Coronel

(1991) [17], who reported values between 20.15 – 24.5 percent, and higher than the value 11.22 percent reported by Abd Alhameed (2007) [1], while the moisture content of tamarind from Thettu Amalika.

Amalika and the local variety was found to be 13.4%, 10.4%, which is slightly lower than the values reported by Chimsah *et al.* (2020) [15], Sulieman *et al.* (2015) [51] and also equal result for moisture content of tamarind was noticed by Adekunle and Adenke (2012) [3]. Kotecha and Kadam (2002) [34] and Shinde (2014) [49]. They recorded 13.6 and 13.8 percent moisture content in tamarind, respectively. The variation found in moisture percent of tamarind could be due to the agroclimatic conditions and also storage, Ananthapuramu known as the hottest area throughout the year. Ash percentshows the total content of minerals in food. In the present investigation, the ash percent of tamarind fruit pulp from Anantha Rudhira and Thettu Amalika was found to be 3.9, this value falls and ranged between the results obtained by Sulieman *etal*. (2015) [51], Gursharan *et al. (*2006) [27], and Coronel (1991) [17], Feungchan *et al.* (1996) [25] and Morton (2007), who reported the value range between 2.6% - 3.9%, while the ash percent of local variety tamarind was found to be 5.10 percent, which is higher than those documented by Joshi *et al.* (2013) [33]., Gursharan *et al. (*2006) [27] and Coronel (1991) [17], Feungchan *et al.* (1996) [25], and Morton (2007) reported the value range between 2.6 – 4.6 percent respectively. however, the values obtained in the present study were higher than those reported by Abd Alhameed (2007) [1] and Mohammed (2007) [37], who reportedthe value ranged between 2.01%- 2.44% respectively. The variation in ash percent was attributed to the difference in environmental factors (Land).

The protein percent of tamarind fruit pulp from Anantha Rudhira was found to be 3.8 percent, which is equal to the result recorded by Joshi *et al.* (2013) [33]. who reported a value of 3.9 percent, while protein percent of tamarind from Thettu Amalika and the local variety was to be 3.1 and 3.2 percent, these values were lower than that of Chimsah *et al.* (2020) [15], Sadiq *et al.* (2016) [48], Shalini and Siddalinga *et al.* (2015) [50] Mohammed (2007) [37] and Abd Alhameed (2007) [1], who reported protein content of 5.44% and 5.3%, respectively. The differences in protein content are probably associated with the difference in agro climatical conditions.The edible pulp of the fruit is relatively poor in protein and oil but the seed is good in both protein and oil (Ishola *et al.* 1990) [31].

From Table-2, Anantha Rudhira, Thettu Amalika, and local variety were found to contain low contents of fat which was: 0.30; 0.10, and 0.01 percent respectively. These values were lower than those of Chimsah *et al.*(2020) [15], Sadiaq *et al. (*2016), Shilini and Siddalinga (2015) [50], who recorded 51.4,1.4,15.0,2.7 percent and similar to values reported by Gursharan *et al.* (2006) [27] and Coronel (1991) [17], Feunghchan *et al.* (1996), Morton (1987) [38], Abd Alhameed (2007) [1] and Mohammed (2007) [37]. The variation could be attributed to genetic factors.

The crude fiber content of Anantha Rudhira, Thettu Amalika, and the local variety was found to be 4.44, 4.12, 5.54 percent, respectively as shown in table (1.2) which were relatively lower than the value of 5.6% documented by Gursharan *et al.* (2006) [27] and Morton (1987) [38], and greatly lower than the values 8.04% and 13.05%, reported by Abd Alhameed (2007) [1] and Mohammed (2007) [37], respectively and similar to values reported by Joshi *et al.* (2013) [33] and Sulieman *et al.* (2015) [51]. However,the RDA values are low in fiber forchildren and lactating mothers which are 19-25% and 29% respectively. (Ishida *et al.* 2000) [30].

The carbohydrates content of tamarind from Anantha Rudhira, Thettu Amalika, and local variety were found 70.2, 73.6, and 75.0 percent respectively, which were in close agreement by Ebifa-Othieno *et al.* (2020) [21], Sulieman *et al.* (2015) [51], Joshi *et al.* (2013) [33] Morton (2007) and Gursharan *et al.* (2006) [27], and greater than that of Mohammed (2007) [37], who reported a value of 55 to 88.7 percent. The higher amount of carbohydrate in tamarind fruit flesh can encourage its utilization in many fermented products like vinegar production; it must be converted by acid hydrolysis and enzymatic or to obtaina fermentable source of hexose sugar. Unavailable carbohydrates are considered a dietary fiber.

The calorific values ranged from 295 to 313 kcal. Food energy Sources are categorized into carbohydrates,fats, water, and proteins, which represent the weight of all food, while a small percentage of the weight can make up by vitamins and minerals. Compared to all mentioned categoriesfats and oils have higher calories. Earlier studies also reported that the energy valuesare low than those documented by Jaspher (2017) [32], Sadiq *et al.* (2016) [48] and El-Siddig *et al.* (2006) [22] and higher (Wilfred *et al.*, 2010) [53] and (Phytotrade, 2009) [45] in Baobab dried fruit pulp

Table 2 showed AnanthaRudhira variety was found to be significantly superior in carbohydrates, ash, and fiber content over local variety while it was significantly at par with Thettu Amalika in carbohydrates and fiber content. There was not much observed in fat and ash content among three varieties of tamarind. The highest content of protein, fat, ascorbic acid, and low content of moisture, and fiber of Anantha Rudhira variety was useful to prepare nutritionally rich good quality commercial value-added products moisture, fiber. Lewis and Neelkanthan (1964) [34] also coated the as tamarind pulp containing 3 percent crude protein (Nx6.25). These results were in accordance with results reported by Roy and Joshi, (1995) [47] as ripe tamarind pulp contains water 22.6-69.2 percent, protein 1.4-3.3 percent, carbohydrates 59.7-71.8 percent. The edible pulp is relatively poor in protein and oil but the seed is a good source of both protein and oil (Ishola *et al.*, 1990) [31].

Table 3: Chemical constituents of tamarind

Parameter	Varieties			SE	CV
	Anantha Rudhira	Thettu Amalika	Local		
TSS (^{0} Brix)	42.0	46.5	38.4	2.315	9.473
P^H (%)	2.0	1.9	1.8	0.058	5.263
Acidity (%)	3.87	3.10	2.66	0.354	19.080
Reducing sugars (%)	6.85	6.83	6.75	0.031	0.777
Total sugars (%)	26.13	26.13	25	0.377	2.533
Ascorbic acid	0.54	0.33	0.5	0.064	24.417
Calcium (mg %)	185	159	138	13.593	14.654
Iron (mg %)	17	19	14	1.453	15.100

In the present study, the total soluble solids of tamarind pulp from Anantha Rudhira, Thettu Amalika, and local variety were recorded 42.0^0, 46.5° and 38.4° Brix respectively (table-1.3), which were higher than Deokar *et al.* (2019) [19], Shinde (2014) [49] reported 20.4^0, 20.70^{0}Brix and lower than that reported by Baraganade Mosqueda (1966) [9] and Benero *et al.* (1972) [10] which the range between 54° to 69.9° Brix, as well as the result of this study is lower than the result obtained Joshi *et al.* (2013) [33] and Abd Alhameed (2007) [1], who

reported a value of 31^0 and 63° Brix. A similar result for TSS was reported by Sulieman *et al.* (2015) [51].

As shown in Table-3, the pH of tamarind from Anantha Rudhira,ThettuAmalika, and local were found to be 2.0, 1.9, and 1.8, respectively, our study lower than the value obtained by Sulieman *et al.* (2015) [51], Joshi *et al.* (2013) [33] Duke (1981) [20] reported the value of 3.4 and 3.15. The result of the present study was found maximum when differentiate with obtained values by Deokar *et al.* (2020) and Abd Alhameed (2007) [1], who mentioned a value of 2.8. The reduction of pH leads to inhibition of food spoilage microorganisms growth, hence extending the shelf life of tamarind and its products like juice, vinegar, and pickles

The titratable acidity recorded 3.87 percent in our study. Similar findings were illustrated by Joshi *et al.* (2013) [33] 3.9 percent and 4.04 percent by Shinde (2014) [49] and Deokar *et al.* (2019) [19].

It was also observed from the data that the total sugar content of tamarind was 26.13 percent. the reported values are in agreement with the uses of Chimsah *et al.* (2020) [15]. Deokar *et al.* (2019) [19], Joshi *et al.* (2013) [33], and Chavan *et al.* (2016) [14] reported 18.16 percent, 38.8, and 18.92 of total sugars in tamarind.

The reducing sugar percent for tamarind was noticed as 6.7 to 6.85 percent. These values are less when compared to values reported by Deokar *et al.* (2019) [19], Shinde (2014) [49], and Chavan (2016) [14] 15.4, 15.9, and 16.10 percent.

Tamarind pulps are a major source of sugars, vitamin C, minerals and exhibit high antioxidant capacity (Ajayi *et al.*, 2006) [5]. The ascorbic acid content of tamarind pulp from Anantha Rudhira, Thettu Amalika, and the local variety was found to be 0.54 mg/100g, 0.33 mg/100 g, and 0.5 mg/100g (table-1.3). The vitamin C/ascorbic acid content was however low in the current experiment as compared to a higher value of 3.0to 37.6 mg/100g obtained in the Nigerian study.The recordedvalues were much higher than those reported by Chimsah *et al.* (2020) [15], Ferrara (2019) [24], Natukunda *et al.*, (2016) [41]; Sadiq *et al.* (2016) [48], Sulieman *et al.* (2015) [51]; Gursharan *et al.* (2006) [27]. Chiteva and Kituyi (2006) [16] and El-Siddig *et al.* (2006) [22]. Coronel (1991) [17], Feungchan *et al.* (1996) [25], and Vitamin C contents of other documented plant species were within the range reported for *Dialiumguineense* (Abiodun *et al.*, 2017) [2] but lower than values reported for olive fruit (Muhammad *et al.*, 2014) [39].

Most studies considered in this review did not test for content in the tamarind pulps. It has earlier been reported by Adekunle and Adenike (2012) [3] that the content of vitamin C in tamarind pulps is very low. Ascorbic acid (Vit. C) is a water-soluble vitamin and plays a key role as an antioxidant as well as co-factor for enzyme metabolism in our body. It helps inthe formation of bile in the liver which aids to detoxify alcohol and other substances. It treats scurvy, common cold, hypertension, strokehealing of wounds, maintainsthe elasticity of the skin, and controlling the symptoms of asthma.

The calcium concentration in the tamarind pulp from Anantha Rudhira,Thettu Amalika, and the local variety was found to be 185 mg/100g, 159 mg/100g, and 138 mg/100g, respectively, these values were higher than the results (111.0 mg/100g) obtained by de Oliveira *et al.* (2006) [18]. The concentration of calcium in tamarind pulp from ThettuA malika and local variety 159 mg/100g and 138 mg/100g was found to be within the range 35-170 mg/100g that previously found by Morton (1987) [38], while Anantha Rudhira tamarind contained a value 185 mg/100g, which was in close agreement to the value obtained by Morton.

The concentration of iron of tamarind from Anantha Rudhira, Thettu Amalika, and local (Table-3) was found to be 17 mg/100g, 19 mg/100g, and 14 mg/100g, respectively. Raw tamarind is a good source of iron, In terms of serving, a single serving is 10 percent of the recommended daily requirement. The iron contained in tamarind improves the healthy functioning of red blood cells in the blood. (Sylvie Tremblay 2018) [52]. Properly functioning red blood cells ensures the proper nourishment and oxidation of organs and muscles in the body. For absorption of iron vitamin C is recommended so tamarind contains vitamin C and it also thought beneficial in staving off anemia—particularly in women.

The data on chemical constituents of tamarind varieties presented in table 3 revealed the variety Anantha Rudhira rich in ascorbic acid, ironcalcium, reducing and total sugars and minerals followed by Thettu Amalika and local variety.

Conclusion

The present study indicated significant variation among the three varieties in terms of physicochemical parameters. Anantha Rudhira variety was superior in both chemical and proximate composition compared with Thettu Amalika and local variety, could be utilized for the preparation of various value-added products.

Acknowledgements

The authors express their sincere gratitude to Dr. P. Deepthi, Scientist (Pl. pathology) and staff members of the HRS, DR.YSR Horticulture University, Ananthapuramu, Andhra Pradesh.for their unlimited assistance support in carry put research work.

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