SOME STUDIES ON PHYSICAL AND CHEMICAL PROPERTIES OF TAMARIND AT DIFFERENT MOISTURE CONTENT

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Abstract: Tamarind (*Tamarindus indica* L) is an economically important fruit of India as well as Chhattisgarh. The knowledge about physical and chemical properties like size, weight,moisture content, protein content, carbohydrate content *etc.* of any biomaterial is essential to designing its equipment for processing , storage , transportation and for the value addition. In the present investigation, some studies on physical and chemical properties of tamarind at different moisture content were carried out. For the experiment physical and chemical properties were determined at three different moisture- Initial 22.0%(wb), After sun drying 17.90%(wb), After hot air drying 15.80% (wb). physical properties of Tamarind fruit like size, length, breadth, thickness and weight of fruit (pulp weight, seed weight, shell weight etc) followed a declining trend with decrease in moisture content of the tamarind fruit. The chemical properties like total soluble solids, protein content, carbohydrate content, fat and ash content followed an increasing trend but the titratable acidity is decrease with decreasing the moisture content of the fruits and the color of tamarind pulp was clearly observed that it became darker, redder and yellowier than the initial and the total color (ΔE) difference at different treatments is 0, 5.807 and 6.458 under normal, sun dried and hot air dried condition respectively.

Keywords: Tamarind, Physical & chemical properties

INTRODUCTION

Tamarind *(Tamarindus indica L.)* fruit was at first thought to be produced by an Indian palm, as the name tamarind comes from a Persian word 'Tamar-u1-hind', meaning 'Date of India', Its name 'amlika' in Sanskrit indicates its ancient presence in the country. In India, tamarind is known by a wide variety of vernacular names: Assamese – Tetuli; Bengali – amli, nuli, textili tentul; Gujrati – amali, ambali; Hindi – ambli, amli, imli; Kannada – hunase, hunase-mara, hunse; Malayalam – puli; Marathi – amli,chinch; Oriya – koya, tentuli; Punjabi – imli; Parsian – Tamarhindi; Tamil – Puli,pulia-maram; Telugu – Chinta; Urdu – imli. In Arabic it is Tamre-Lindi, in French –tamarind, in Spanish and Portuguese – tamarindo and English-speaking people call it tamarind (Mishra, 1997).

Tamarind is an economically important tree of India as well as Chhattisgarh. In India, it is abundantly grown in Madhya Pradesh, Bihar, Andhra Pradesh, Tamil Nadu and Karnataka (Anon, 1993).

Tamarind is a long living (80-120) years, large spreading tree, upto 30 m high. Generally, the tree begins to bear fruit at the age of 8-12 years and continuous to yield for more than 60 years (Duke, 1981). Tamarind is a highly cross pollinated crop hence a wide variety is common in this spice (Geetha, 1995). Every part of the tree can be put to use. The product of tamarind, leaves, fruits, seeds, flowers, roots have been extensively used in the traditional medicines in India and Africa and several medicinal properties are claimed for the various preparations of tamarind (Ravindran *et al*, 2002).

On an average tamarind pod composed of shell (15-25%), pulp (45-55%), seeds (25-35%), fiber (10-15%). The edible portion of dried tamarind contain moisture (15-30%), protein (2.0-8.79%), tartaric acid (8.0-18.0%), carbohydrates (56.70-70.70%), fibre (2.20-18-30%), reducing sugar (25.0-45.0%), and protein (2.0-4.0%) (Shankaracharya, 1998).

MATERIAL AND METHOD

The work was carried out in the Department of Agricultural Processing and Food Engineering, Faculty of Agril. Engg. and Department of Dairy Chemistry, C.O.D.T. Indira Gandhi Krishi Viswavidyalaya, Raipur (CG).In order to analysis the physical and chemical parameters of tamarind at different moisture content tamarind fruits were kept under three different treatments (before sun drying, after sun drying and after hot air drying up to 100˚C in Tray dryer) and the tamarind at the three moisture content was analyzed for physical and chemical properties of tamarind. For the analysis of physical properties 20 pod were taken randomly and for each parameter measured separately. The different physical properties of tamarind such as size, length, breadth, thickness and weight of fruit were determined using standard techniques. The moisture content of tamarind fruit was determined as per the Standards of American Society of Agricultural Engineers (Anon, 1992). The chemical properties of tamarind such as titratable acidity of tamarind pulp was determined as per the procedure of Ranganna (1986), total soluble solids were determined by using portable hand refractometer, protein of the tamarind pulp was determined by Kjeldahl method (Jackson, 1958), fat content of tamarind was determined by Soxhelet extraction apparatus using petroleum ether of 40-60 °C. Ranganna (1986), ash content of the raw materials was estimated by the dry ashing method as described in the A.O.A.C.(1995), total carbohydrates were calculated by the "By – difference" method as described in the A.O.A.C. (1995), and for the

analysis of color of tamarind pulp the Hunter Lab Color Flex spectrophotometer was used.

RESULT AND DISCUSSION

Physical properties of tamarind fruit

By studying physical properties of Tamrind fruit at different moisture content (table-1,2) the higher fruit length (11.2 cm) was observed at before sun drying, after sun drying (11.2 cm) & after hot air drying (11.1 cm). The higher fruit breadth (2.00 cm) was observed at before sun drying, after sun drying (2.00 cm) & after hot air drying (1.9 cm). The higher fruit thickness (1.2 cm) was observed at before sun drying, after sun drying (1.1 cm) & after hot air drying (1.00 cm). The higher size of fruit (2.99 cm^3 **)** was observed at before sun drying, after sun drying (2.90 cm^3) & after hot air drying (2.71 cm^3). The higher weight of fruit (18.15 g**)** was observed at before sun drying, after sun drying (17.35 g) & after hot air drying (17.10 g). The higher weight of shell (2.15 g**)** was observed at before sun drying, after sun drying (2.05 g) & after hot air drying (2.00 g). The higher weight of shell (0.45 g**)** was observed at before sun drying, after sun drying (0.44 g) & after hot air drying (0.43 g). The higher weight of pulp (9.65 g**)** was observed at before sun drying, after sun drying (8.96 g) & after hot air drying (8.79 g). The higher weight of seed (5.9 g**)** was observed at before sun drying, after sun drying (5.9 g) & after hot air drying (5.88 g).

Table 1. Length, breadth, thickness and size of tamarind fruit at different moisture contents.

Different moisture contents	Physical parameters			
	Length (cm)	Breadth (cm)	Thickness (cm)	Size (cm^3)
Initial (22.0%)	11.20	2.00	1.20	2.99
After sun drying (17.90%)	11.20	2.00	1.10	2.90
After hot air drying (15.80%)	11.10	1.90	1.00	2.71

Table 2. Fruit weight, shell weight, pulp weight, fiber weight, & seed weight at different moisture contents.

Different moisture contents	Physical parameters				
	Fruit wt. (g)	Shell wt. (g)	Pulp wt. (g)	Fiber wt. (g)	Seed wt. (g)
Initial (22.0%)	18.15	2.15	9.65	0.45	5.9
After sun drying (17.90%)	17.35	2.05	8.96	0.44	5.9
After hot air drying (15.80%)	17.1	2	8.79	0.43	5.88

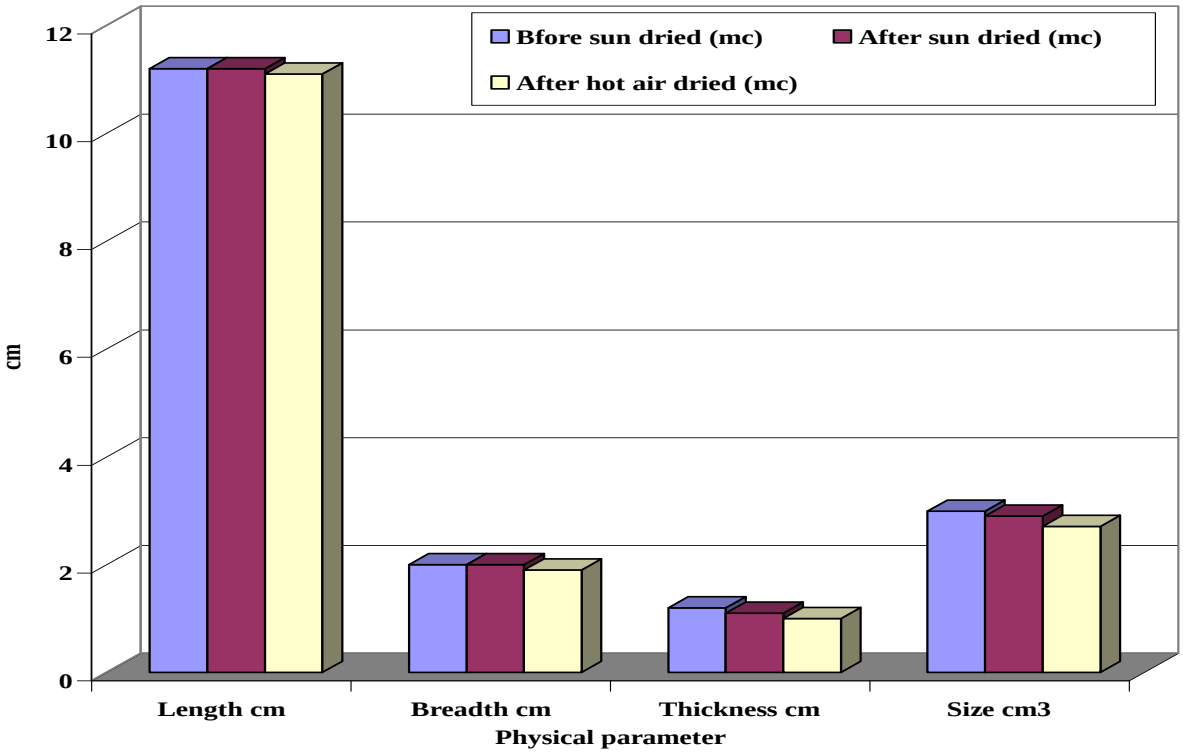

Fig.4.1 Effect of moisture content of fruits in its physical character

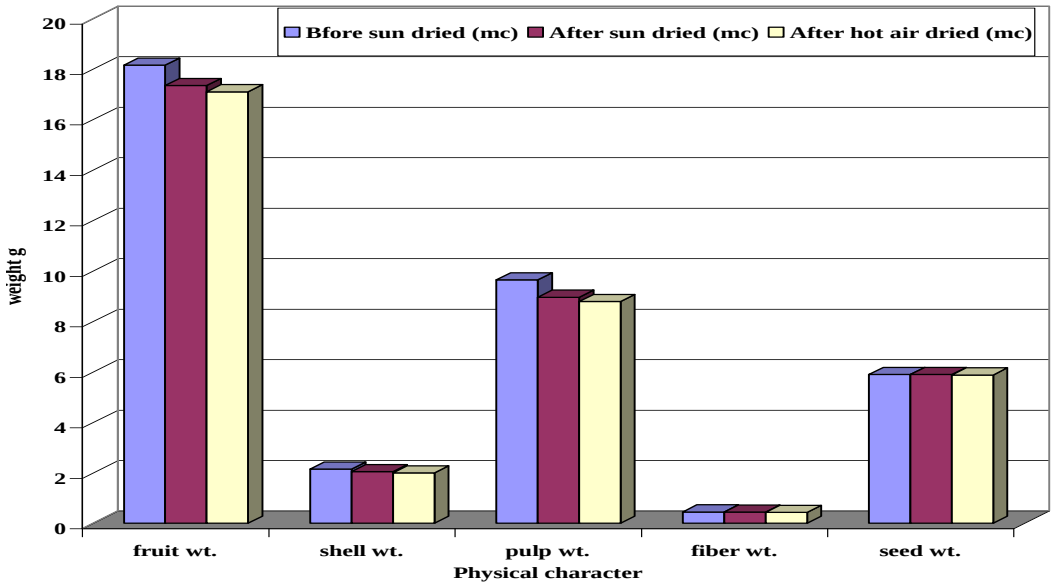

Fig. 4.2 Effect of moisture content of fruits in weight of fruits

Chemical properties of tamarind fruit

By studying chemical properties of Tamrind fruit at different moisture content (table-3) the higher percent of titratable acidity was found in before sun drying of fruit (8.1 %), after sun drying (7.8 %) & after hot air drying (7.5 %). The higher percent of TSS of pulp was found in after hot air drying of fruit (15.79 ° Brix), after sun drying (13.81 ° Brix) & before sun drying (12.33 ° Brix). higher percent of protein content was found in after hot air drying of fruit (3.8 %), after sun drying (3.4 %) & before sun drying (2.85 %). Higher percent of fat content of pulp was found in after hot air drying of fruit (3.8 %), after sun drying (3.4 %) & before sun drying (2.85 %). The higher percent of ash content of pulp was found in after hot air drying of fruit (2.69 %), after sun drying (2.32 %) & before sun drying (1.96 %). The higher percent of carbohydrate content was found in after hot air drying of fruit (77.45 %), after sun drying (75.93 %) & before sun drying (72.78 %). The total color (ΔE) difference at different treatments is 0, 5.807 and 6.458 under normal, sun dried and hot air dried condition respectively.

Table 3. Effect of different moisture content on chemical parameters of tamarind

Different moisture contents	Chemical parameters					
	TA	TSS	Fat	Protein	Carbohydrate	Ash
Before sun drying (22.0 %)	8.10	12.33	0.37	2.85	72.78	1.96
After sun dried (17.90 %)	7.80	13.81	0.45	3.40	75.93	2.32
After hot air dried (15.80 %)	7.50	15.79	0.49	3.80	77.45	2.69

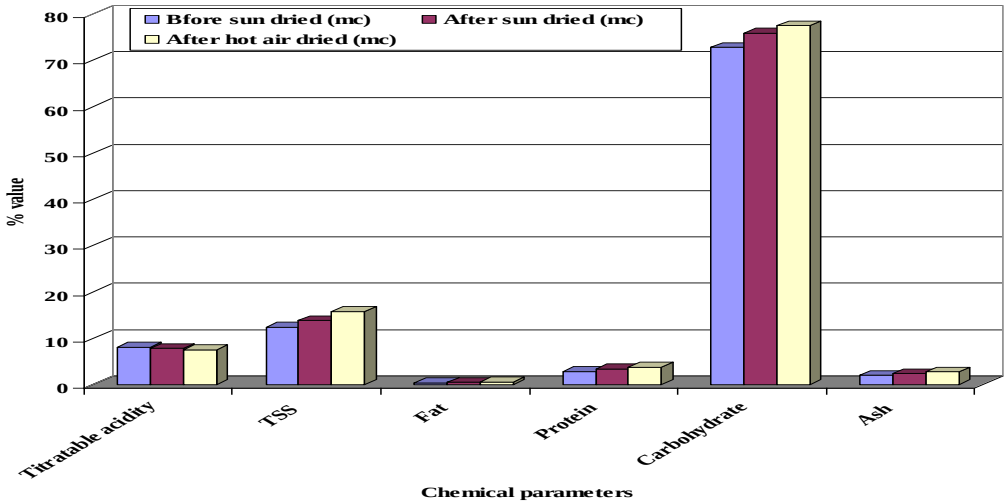

Fig 4.3 Effect of different moisture content of fruits on chemical parameters

CONCLUSION

In conclusion it can be state that the physical properties of Tamarind fruit like size, length, breadth, thickness and weight of fruit (pulp weight, seed weight, shell weight etc) followed a declining trend with decrease in moisture content of the tamarind fruit. The chemical properties like total soluble solids, protein content, carbohydrate content, fat and ash content followed an increasing trend but the titratable acidity is decrease with decreasing the moisture content of the fruits and the color of tamarind pulp was clearly observed that it became darker, redder and yellowier than the initial and the total color (ΔE) difference at different treatments is 0, 5.807 and 6.458 under normal, sun dried and hot air dried condition respectively.

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