

CHARACTERIZATION OF *SORU-CHAKLI* – A TRADITIONAL FOOD OF WEST BENGAL

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ABSTRACT

India has a great heritage of traditional foods. Every state has its own special food which is consumed in a particular season and occasion. Soru-chakli is one of such traditional food of West Bengal, consumed during rainy season and is made from the batter of raw rice flour and palmyra palm (Borassua flabellifer) pulp. It has an attractive yellow colour and pleasant flavor. The present study has the objectives of documenting the traditional knowledge pertaining to preparing soru-chakli. Traditional knowledge offers enormous potential for development of social-economic conditions of the particular area and state. Therefore, every effort must be made to preserve this traditional knowledge so that they can carry on with their aesthetic beauty & knowledge into prosperity.

KEY WORDS:

soru-chakli, traditional food, palmyra plup, scanning electron micrographs

1. INTRODUCTION

India has a great heritage of traditional foods, where the peoples employ to the foods in diverse aspects like edible purpose, economic input and many other activities. Soru-chakli is one of the traditional foods of West Bengal; the state of India has different ethnic communities with distinct identity, culture and food habit. The processing and preparation of ethnic foods not only demonstrate the creativity and treasure of food heritage of localized people but also their incremental learning to sustain the life and ecosystem as a whole (Singh *et al.*, 2007). The literature survey revealed that no detail studies have been made so far from this state regarding the utilization of this traditional food. It is intended to develop strategies for preserving and conserving this traditional foods as well as life, cultural practices etc. of resources utilization by the people. However, proper documented knowledge on the utilization of traditional food resources is less expertise in India. Keeping in mind the significance, the work will be able to help and provide all the basic information in the proper assessment for further research on scientific basis acquires from local peoples. Advance food enterprises in India can get the recognition due to food, nutritional and economic values and effective commercialization of the soru-chakli, as compare to traditional food resources utilization in different corners of the world. In view of the above importance, the present records and all the information are collected from the culture and knowledge of the several ethnic people regarding the utilization of traditional food resources particularly soru-chakli.

Palmyra or Borrassus Palm (*Borassua flabellifer*)

The palmyra palm (*Borassua flabellifer*) is a large tree of drier tropical regions grows wildly up to 30m high and the trunk may have a circumference of 1.7m at the base, commonly cultivated in India, Sri Lanka, Burma, Southeast Asia, Malaysia and tropical Africa (**Wickens, 1995; Chandrasekhar et al., 2012; Davis & Johnson, 1987**). The leaves are leathery, gray green, fan-shaped, 1-3m wide, folded along the midrib with marginally spiny segments. The fruit of *B. flabellifer* depicted in Fig. - 1 (a), is coconut-like, generally three-sided when young and, becoming rounded or more or less oval shape. About 50 fruits per year may bear on 6-12 bunch of each palm tree. The outer cover of the fruits is smooth, thin, leathery, and brown, turning nearly black after harvesting (**Wickens, 1995**). There contains 3 hard seeds like stone fully covered by white fibres coated with yellow or orange pulp inside the juicy mass of the fruits. The fruit may have 2 or 4 stones depending upon size but it is very rare (**Srivastav, 2000**). A solid white kernel is within the mature seed which resembles coconut meat but comparatively is much harder than the coconut. This kernel is hollow, soft as jelly and translucent like ice when fruit becoming very young and is accompanied by a watery liquid, sweetish and potable (**Harrison et al., 1985; Morton, 1988**). Its fruits are consumed as food and or food supplements especially during famine periods (**Ali et al., 2010**).

Another very important chief product of the *B. flabellifer* is the sweet sap also known as toddy obtained by tapping the tip of the inflorescence. The fresh sap is reportedly a good source of vitamin B-complex (**Morton, 1988; Atchley, 1984**). There are innumerable medicinal uses for all parts of the palmyra palm. Briefly, the young plant is said to relieve biliousness, dysentery, and gonorrhoea. Young roots are diuretic and anthelmintic, and a decoction is given in certain respiratory diseases. The ash of the spadix is taken to relieve heartburn and enlarged spleen and liver. The bark decoction, with salt, is used as a mouth wash, and charcoal made of the bark serves as a dentifrice. Sap from the flower stalk is prized as a tonic, diuretic, stimulant, laxative and anti-phlegmatic and amebicide (**Morton, 1988**). Sugar made from this sap is said to counteract poisoning, and it is prescribed in liver disorders. Candied, it is a remedy for coughs and various pulmonary complaints. Fresh toddy, heated to promote fermentation, is bandaged onto all kinds of ulcers. The cabbage, leaf petioles, and dried male flower spikes all have diuretic activity. The pulp of the mature fruit relieves dermatitis.

In India it is mainly used for sugar production, though it also grows in other Asian countries and in (**Chandrasekhar et al., 2012; Roy 1951**). The Tapping of palm's sap may begin about 15 years from sowing when flowers are first formed, and may continue for 30 – 40 years. The sap flows for 5-6 months - 200 days in Ceylon - each male spadix producing 4-5 l per day; the female inflorescence gives 50% more yield than the male. The annual tapping period is usually 4 –5 months during the hot dry season, during which a single tree can yield a total of 50 – 80 gallons of sap. The sap is boiled down immediately to make sugar or can be fermented naturally within a few hours after sunrise and is locally popular as a beverage; it is distilled to produce the alcoholic liquor called palm wine, arrack, or arak. The prohibition of alcoholic drinks in some Indian states has meant that more trees are used to produce sugar and fewer for toddy (**Harrison et al., 1985; Morton, 1988**).

Soru-chakli: A Traditional Food

Soru-chakli is traditional food; made from different ingredients viz. raw rice flour, palm pulp, water, salt and sugar. This has got soothing yellow colour and pleasant flavor after preparation. Consumer's preference for preparation of this food product is special during rainy season or on the some occasion. It compares well with corn flakes when dehydrated and consumed with milk.

Therefore, it is an urgent need to explore, analyze and document the aforesaid traditional foods generally consumed by tribal communities of West Bengal and its associated dynamics to understand, food consumption pattern and availability, nutritional and medicinal values and associated cultural and social aspects of ethnic foods (**Singh et al., 2007**).

2. MATERIALS AND METHODS

2.1. Raw Materials

Raw Rice Flour: Broken raw rice is washed properly and heaped for some time in a perforated utensil for equilibration of moisture. The broken rice is then ground to fine powder to in a pestle and mortar pass through a 35-mesh sieve (which is generally used for sieving wheat flour for chapati making). The machine ground rice flour is not suitable because it is believed that this flour could not impart the desired stickiness and spread-ability to the paste. The ground rice flour is sieved and the material retained on the sieve is reground in the pestle and mortar. This process is repeated 3 to 4 times till all the rice is ground.

Palm pulp: The palm pulps are obtained from fruit shown in Fig.-1, available during the rainy season of July to September. Either it fell down itself after it is fully ripened or it is cut off from the tree when required. The fresh pulp is reportedly rich in vitamins A and C (**Nadkarni, 2002**). The pulp has to be squeezed off leaving behind the fibers attached with seeds. The variation of different parts/components in the palm fruit is presented in the Table 1.

2.2. Extraction of Pulp

The pulp present in between the fibers of the palm fruit makes the extraction extremely difficult. Traditionally, after removal of green part and peel the fruit is broken to separate the stones apart. These are then immersed into the water sufficient to cover the stones. The stones are rubbed between the two palms of the hand and fingers to take out the pulp.

Laboratory Method of Pulp Extraction: After removing the green part and peel the palm fruit was broken into the three parts containing one stone in each. Individual stones were rubbed on an inverted 16 mesh size sieve to extract maximum possible pulp out of it. The stones were then wetted with about 50-60 ml of water and again rubbed for some more easily extractable pulp. The stones were then submerged into about 250-300ml water for 5-10 min. and washed with hands for residual pulp extraction.

Removal of Bitterness Factor: The palm pulp has inherent bitterness, which some people like and some dislike. To remove this factor the pulp is further diluted with about a litre of water and boiled. The scum and foam are removed which is supposed to contain the bitterness factor. In another process the pulp is tied in a fine muslin cloth and hanged for an hour or so to drop out the bitter fraction.

Slurry Making: Slurry is made of finely ground (35-mesh) raw rice flour (250 g), 50 ml of palm pulp (moisture content $79.36 \pm 0.96\%$, total soluble solids $19.29 \pm 0.62^\circ \text{Bx}$ and pH 6.54 ± 0.06 shown in Table-2). A pinch of common salt was also added along with enough water to make the slurry free flowing (TSS 10°Bx).

3. RESULTS AND DISCUSSION

3.1. Preparation of Soru-chakli

For preparation of soru-chakli, a specially designed hot plate made of stone (diameter 300 mm, height 20 mm and thickness 5 mm) is used. The surface of this plate is carefully smoothed. Continuous slow heat is preferred for heating the stone plate for which rice husk is used instead of firewood or agricultural waste. Abrupt and localized heat may either result in temperature gradient on the stone surface, which will result in burning of the product, or it will break the stone plate (Fig.-2). The stone plate when attained the desired temperature (86.3°C) oil (mustard oil) is evenly smeared with help of a stem of elephant food yam, which is cut at an angle of $30\text{-}40^\circ$. This particular stem is used because of its perforation very less quantity of oil can be evenly applied on the surface of the stone plate. About 20-30 ml of slurry is put on the hot plate and evenly spread in form of a thin film (0.5 mm thick) throughout the plate with the help of a rectangular piece (10 cm x 4 cm) of palm leaf. The temperature of the stone plate reduced to 76.2°C . When it is cooked (after 1.5 - 2.0 min) it is peeled-off from one side with the help of a sharp edged ladle. It is baked on one side only. The whole traditional process flow chart has been given in Fig. 3

3.2. Surface characterization through Scanning Electron Microscopy

Pieces of samples were freeze dried followed by coating with gold employing a sputter coater (**Bhattacharya et al., 1991**). The coated samples were examined under a scanning electron microscope (JEOL JSM-5800 SCANNING MICROSCOPE, Tokyo, Japan) at a voltage of 15 kV and only the representative photograph is cited. The whole process was repeated once. The surface characteristics of the product at a moderate magnification are shown in Fig. 4, which represents the unevenness of surface. The presence of minor cracks and bulged areas are possibly formed during processing of product during drying. In addition, this representative photograph (Fig. 4) shows that the thin product surface has been ruptured at certain places to have open zones which lead to additional crispness in the product.

4. CONCLUSIONS

The 21th century witnessed a revolution in human welfare where many foods based on traditional knowledge are important sources of income, food and health care. The traditional foods are getting lost day by day because the scientific community, even common people is not globally exploring this traditional knowledge. It has been limited to the particular region and locality. A small attempt has been made through this study to explore a very important traditional food of west Bengal i.e. soru-chakli. The traditional processing of soru-chakli is very unique. If this or similar product is prepared using some modern /latest technologies, the product will not be only hygienic but also have improved shelf life to ensure the availability round the year. Good and attractive packaging and marketing may improve the socioeconomic conditions besides creating rural employment. The complete characterization of soru-chakli is done along with the effect of thermal processing on its surface uniformity through the scanning electron micrographs. It has been found that soru-chakli has irregular surface properties coupled with void spaces and hairy cracks.

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Table 1. Different parts/components of the palm fruit (in kg)

S. N.	Component	Range of variation	Average	Variance
1.	Weight	1.34 - 1.68	1.48	0.09
2.	Green part	0.08 – 0.10	0.09	0.01
3.	Brown peel	0.06 – 0.10	0.08	0.01
4.	Stone	0.72 – 1.01	0.87	0.09

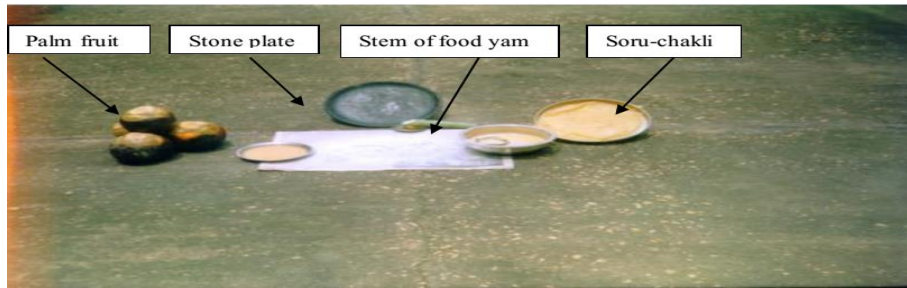
Table.2. Physiochemical characteristics of soru-chakli

Chemical characterization		
Moisture content	–	79.36 ± 0.96 %
Total soluble solids	–	19.29 ± 0.62° Bx
pH	–	0.54 ± 0.06
Physical characterization		
Diameter	–	30 cm
Thickness	–	0.73 ± 0.1 mm
Weight per piece	–	23 ± 2 g
Yellow index	–	87.39 (L = 55.05, a = 4.83, b = 25.01)
Water activity	–	0.934 at 32.2° C
Moisture content	–	35.84 % (wb)
Crude protein	–	6.68 % (wb)
Crude fat	–	1.5 % (wb)
Crude fibre	–	0.4 % (wb)
Ash	–	1.54 % (wb)

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Fig. 1. Palm fruits and its pulp; a) Palm fruit and b) Palm pulp



(a) Ingredients and utensils



(b) Smearing of oil on stone plate



(c) Spreading of batter on stone plate



(d) peeling off cooked soru-chakli



(e) Ingredients and ready soru-chakli

Fig. 2. Ingredients, utensils and steps involved in preparing of soru-chakli traditionally.

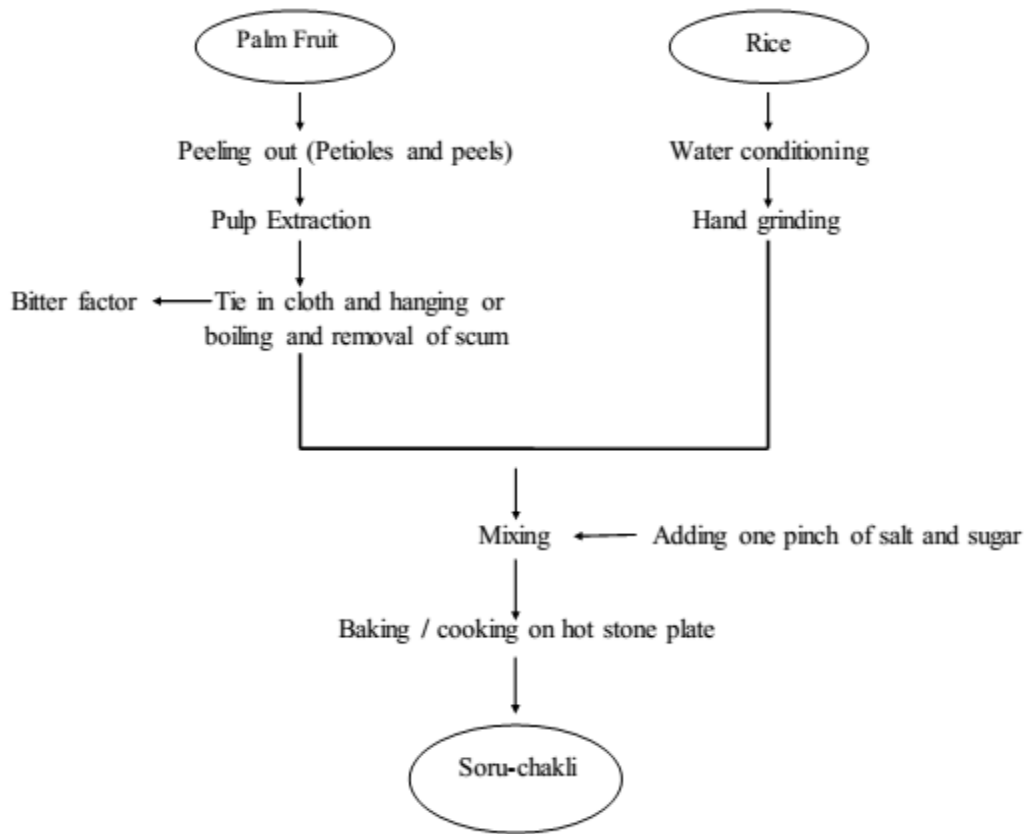


Fig. 3. Traditional process flow chart of soru-chakli.

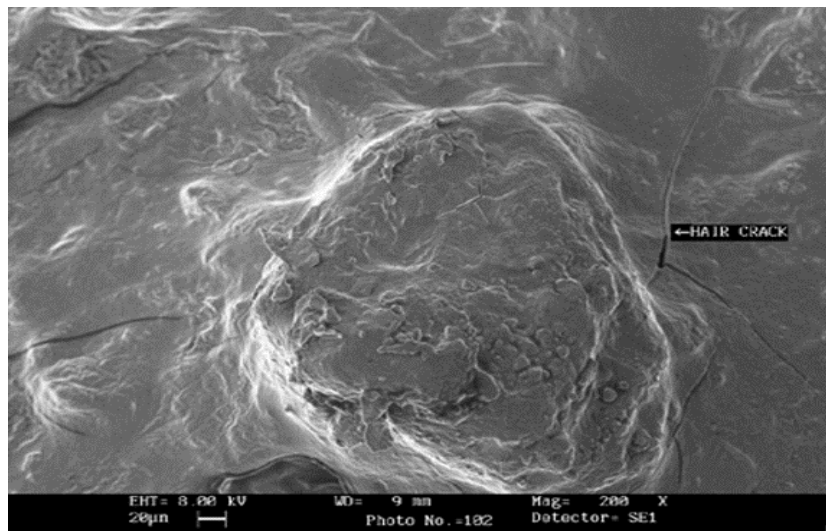


Fig. 4. Electron micrograph (200X) of the product surface showing minor cracks