

Jaggery from Palmyrah palm (*Borassus flabellifer* L.)- Present status and scope

Vengaiiah PC^{1*}, Ravindrababu D², Murthy GN³ & Prasad KR⁴

^{1,3,4}Horticultural Research Station, Pandirimamidi-533288, Andhra Pradesh,

²College of Agricultural Engineering, Bapatla-522101, Andhra Pradesh

E-mail: pcvengaiiah@gmail.com

Received 21.02.12, revised 29.05.13

Jaggery is a sugar rich product and medicine obtained by evaporation of sugarcane (*Saccharum officinarum* L.) juice or sap obtained from Palmyrah palm (*Borassus flabellifer* L.), Date palm (*Phoenix dactylifera* L.) or Coconut palm (*Cocos nucifera* L.). Among all Jaggery, palm Jaggery having its own importance. It usually contains 65-85% sucrose and 5-15% reducing sugars, and is consumed directly or used for preparation of sweet confectionary items and ayurvedic/traditional medicines, and it may have a role to reduce the chance of lung cancer. It is a good source of minerals like calcium, phosphorous and iron. Jaggery industry is one of the most important cottage level industries in India since ancient times and it is prepared mostly by small and marginal farmers. Besides India, countries like Pakistan, Bangladesh, Nepal, Burma and Philippines are also manufacturing Jaggery.

Keywords: Palmyrah Palm, Jaggery, Traditional process

IPC Int. Cl.⁸: A61K 36/00, D05B 91/04, A23, A01D 4/04, A47G 19/26, A47J 39/02, A23L 1/00

Palm jaggery is almost like a jaggery that is made out of sugarcane juice. Palm jaggery is made from the extract of Palm trees in Southern India. These trees are also known as Toddy palm trees or Palmyra trees. The Jaggery is processed from the unfermented Palmyra tree sap called neera. It is highly priced due to its medicinal properties¹. It has an intense, earthy taste or reminiscent of chocolates in its taste. The palm jaggery obtained after processing is darker and richer in colour. It is slight salty to taste but much healthier of the two. Due to its cooling effects over human body, it is of high value. It does not have the bone meal content which is used for whitening processed sugar. The price of the palm jaggery is double that of sugar. Palm jaggery is quite popular in the Southern states of Tamil Nadu (called *Karupatti vellam* or *pana vellam*), Karnataka (it is called *thaati bella* in some places and *Olebella* in Mangalore, which is believed to be the best), Kerala and Andhra Pradesh. In the South Indian families of the coastal region of Mangalore and also the *Keralites* of the Malabar coast, palm jaggery has a big role. It is used in the preparation of delicacies like *payasams* and *neyyai appams*. Mangaloreans use the same to prepare

puddings and sweets. In temples, it is distributed with banana, or a bit of coconut, as prasadam. In Kolkatta city, West Bengal state, it is an important ingredient in sweets like *Payeesh*, *Nalan gurer sandesh* and *Nalan gurer moa*. Nutritional composition of palm gur is protein - 0.35%, fat (ether extraction) - 0.17%, minerals - 0.74%, carbohydrates - 90.60%, calcium - 0.06%, phosphorus - 0.06%, iron - 2.5 (mg/gm), nicotinic acid - 5.24 (mg/100 gm), vitamin B1 - 24.0 (mg/100 gm), Riboflavin - 432.0 (mg/100 gm) and Vitamin C - 11.0 (mg/100 gm)²

Preparation of palm jaggery

Initially sap was collected in slacked lime treated earthen pots by tappers. The cleared sap after lime sedimentation and filtration is transferred in to the boiling Galvanised Iron pan on a traditional furnace (Fig. 1).

During boiling, a white scum arises to the surface which is skimmed off (removed with a ladle) and a few castor beans are crushed and put into allay frothing. After 5 min, boiling was stopped and pan is taken off from furnace and allowed for settling of lime (Fig. 2).

Then clear brown syrup was again poured in to boiling pan. Clarification (deliming) was needed (a) if

*Corresponding author

sap's pH is more (b) for getting crystalline Jaggery (c) to get more clear syrup (d) for shape. Both vegetable and chemical clarifiers used for clarification. Jaggery can be made in both solid blocks as well as in semi-liquid form (liquid Jaggery) (Fig. 3).

The quality of *gur* can be improved by precipitating lime with carbon dioxide gas or citric acid or unripe tamarind fruits, before boiling the juice.

Constraints in palm jaggery preparation

Palm Jaggery preparation starts with tapping process (Fig. 4). Tapping is done daily both in the morning and evening and it includes Palmyrah climbing, slicing the inflorescence to exude sap and collecting it in earthen pots. Each tapper has to climb 25-30 trees (each tree average height 30 m). Traditional tapping methods involves neither excessive nor insufficient tapping and they involves risk, muscular strain and drudgery and consumes high amount of human energy³ (Fig. 4).

Second step in the palm Jaggery preparation is preservation of sap with lime, because when it is tickles from tree susceptible to fermentation. However, percentage of lime to be added for a given quantity of sap is unknown. Third step in the palm Jaggery preparation is clarification and is done to neutralize the lime treated sap. Again quantification and type of clarificant to be added is non-standardised. Processes to be standardised includes type of mucilage to prevent caramalization, pan material, heat application and final supersaturation stage (high TSS) for moulding. These results give spoiled results (Fig. 5)

Studies on Palmyrah jaggery preparation

In absence of Scientific data, final stage of Jaggery production becomes critical, and is mostly tackled by the skill of the processor and also no information available on physical and thermo-physical properties Palmyrah palm sap⁴. Jaggery deteriorates faster and becomes watery with in 1 or 2 weeks due to its hygroscopic nature and thus deteriorates its quality through microbial fermentation. The quality of the stored Jaggery mostly depends upon the moisture content which is favourable for inversion and development of different types of fungi and bacteria in the Jaggery resulting in changes in tastes and colours because of the formation of organic acid and complex decomposition of products¹. Also production of invert sugar through microbial degradation further

increases the hygroscopicity of the Jaggery. For the ease of handling, packaging and storage, Jaggery in granular form is becoming popular which could be made either from concentrated juice or solid Jaggery. However, hygroscopic nature of Jaggery granulated product initiate caking and follows deterioration by mould and yeast. Knowledge of moisture absorption isotherms of granulated Jaggery products at different storage temperature could be a useful tool for its handling, storage and packaging system design and drying. The information on moisture absorption isotherms of Palmyrah Jaggery is not available⁵ and data on thermal properties of granular or powdered Palmyrah Jaggery is scanty^{6,7} reported that to meet the global needs of sweeteners, the technology to produce palm gur into massive, well promoted and as commercial product is remote. It serves a much better purpose as a small scale rural industrial product both for the society and the consumer. Since, the availability of palm *gur* is season bound and the demand is usually more than its production, its price is comparatively much higher than *gur* made from sugarcane sources. Today, there is a separate classes of consumers, who prefer Jaggery with light golden yellow colour and medium soft texture and sweet in taste, while others prefer to have brown or brownish yellow colour with crystalline texture, which is very natural (Fig. 6).

Quality parameters of Jaggery in terms of its colour, texture (hardness) and taste (flavour) vary from place to place which generates lot of confusion for following particular Standards. In this regard, an attempt has been made to compile the data on quality standards, which could be used by the national/state level food standardisation organisations like Bureau of Indian Standards (BIS) and Prevention of Food Adulteration (PFA)⁸. Now a days, people worldwide are becoming health conscious. Diabeties and Obesity are two major health problems in India as well as in world due to consumption of high calorie sweeteners. Palmyrah palm jaggery has been used as sweetening agent and medicine. It is required to recognise the medicinal properties of Palmyrah *gur* by Government of India.

Government of India clearly indicated the minimum requirements of Jaggery that it should be well dried of firm consistency – non sticky or plastic; having characteristic taste and flavour; clean and free from insect infestations, live insect, dead insects, insect fragments, mould or mites, larvae, rodent hair



Fig.1-6—Inflorescence sap filtration and ready for boiling; 2 Concentration of Inflorescence sap for jaggery preparation; 3 Pouring of jaggery concentrate into mould for shape; 4 Slicing of spathe for Inflorescence sap extraction from Male palm; 5 Spoiled jaggery due to fermentation of Inflorescence sap; 6 Good quality jaggery.

and excreta; free from fermented and musty odour; free from dirt or soil; free from natural or synthetic colours, artificial sweetening agents; free from any fungal or bacterial contamination; free from deleterious substances injurious to health; free from bleaching agents; free from free from added starch and also Jaggery shall comply with the residual level of poisonous metals, crop contaminants, naturally occurring toxic substances, insecticides and pesticide residues and other food safety requirements as laid down under the provisions of Prevention of Food Adulteration Rules, 1955 for domestic purpose and it shall comply with the residual levels of heavy metals, pesticides residue and any other food safety requirements as prescribed under Codex Alimentarius Commission or importing countries requirement for export purpose and it shall be sweet to the taste and free from any objectionable flavour⁹.

Scope

However, there is a need to improve the low cost Palmyrah climbing device through greater mechanisation, system of tapping, improved efficiency in collection process, reduced chances of

contamination and improve shelf life without sacrificing the 'exotic flavour' that makes the sap a favourite of so many. Further, the product needs improved market promotion for it to become not only cost effective but also economically lucrative to those who are involved in its promotion and marketing¹⁰. Food products like Jaggery and liquid Jaggery from Palmyrah are not commercialised as the process for the preparation of those foods are traditional practice, not hygienic, less storage life. Even though the Palmyrah is an economically important palm it has not received proper attention from the agricultural research workers, probably on account of the fact that it is very slow growing palm found mostly in the wild state. In this context mechanization very much a need and need to develop value addition techniques and popularizing the same is essential².

Conclusion

Jaggery is highly priced due to its medicinal properties; there is need of developing standard process as well as mechanisation for the same. These information will be very much helpful to develop the process and machinery for jaggery preparation.

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