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## Development of palm jaggery and comparison with sugarcane jaggery

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**Abstract**

Palmyrah palm (*Borassus flabellifer* L.) belongs to the family Palmae. These trees are used for tapping neera. Neera is the sweet sap of the palm, which is obtained by slicing the spathes of the palmyra. Neera is not only sweet but also a nutritious liquid. In this study Palm Jaggery was prepared by concentrating the sap syrup of about 13° to 14° brix at uniform heating of around 120 °C on open pan. Proximate analysis was carried out for palm jaggery and compared with sugarcane jaggery. It was found that palm jaggery is a good source of vitamin C and calcium. Palm jaggery obtained good acceptability as like sugarcane jaggery through sensory evaluation.

**Keywords:** Development, palm, jaggery, comparison, *Borassus flabellifer* L.

**Introduction**

Palmyra palm (*Borassus flabellifer* L.) trees are cultivating in south India for toddy. The unfermented toddy is called neera. Palm Jaggery is generally prepared from neera. Obtained by processing of neera. Among 103 million palms in India, 30% of trees are in Andhra Pradesh. India annually produces about 6 MT of jaggery, which accounts for 70% of the total production in the world. About 65-70% of the total jaggery is produced from sugarcane, and the remaining 30% is from palms (Madhava *et al.*, 2015) <sup>[11]</sup>. Palmyra palm is one of the important alternate raw material for production of jaggery (or gur). Price of palm jaggery is determined by its quality, especially the colour, flavour and texture (Madhava *et al.*, 2015) <sup>[11]</sup>. Sap tapped from palmyrah tree known as neera, which is transparent and sweet delicious taste. Neera to be a good supplement to diet in India as it is a rich source of nutrients and mineral. (Vengaiiah Pc. *et al.*, 2017) <sup>[14]</sup>. So far not much research was conducted on nutritional aspects of palm jaggery and comparison with sugarcane jaggery. Hence the present research work is conducted to develop a palm jaggery from neera and to find out the nutritional aspects of palm jaggery.

**Material and Methods****Raw Materials**

Palmyra Palm Sap (Neera) was collected from selected three palmyra palm trees at Rudrur, Nizamabad District to prepare palm jaggery. The palm sap was collected by slicing the spathe below the crown of tree in the early morning 6.00 AM to 7.00 AM. The selected trees age is about 15 years old and height is in the range of 25 to 30 meters. The fresh sap was collected in well cleaned earthen pots tied to the inflorescences in previous day evening. These tied earthen pots were removed on the next day early morning. The collected sap was poured into the water treated 2L recycled cold drink bottle for easy transportation. The yield of sap was 4-5 L from each tree. The view of collection of sap is shown in figure 1 and 2.

The filtration was done through fine muslin cloth for collected palm sap to remove dirt particles and impurities. The filtered palm sap was tested for whether the sap is suitable for preparation of palm jaggery or not. For testing of filtered palm sap the following parameters were found.

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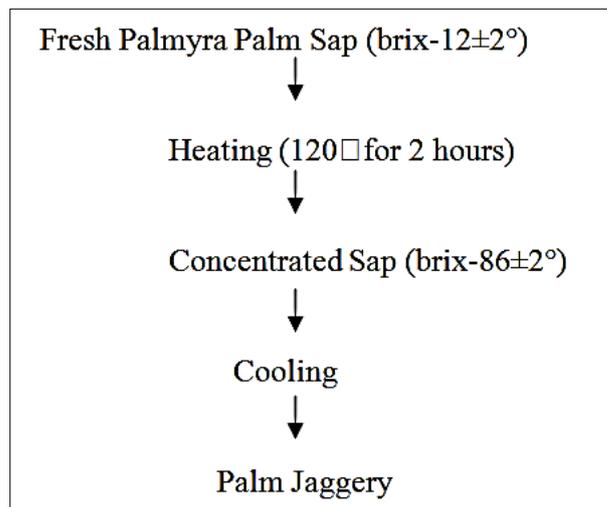
**Fig 1:** Collection of fresh palmyra palm sap from palm tree



**Fig 2:** Transfer the collected sap into cold drink bottle  
Preparation of palm Jaggery

**Preparation of palm Jaggery**

The process of preparation of Palmyra palm Jaggery was carried out at college of Food Science & Technology, Rudrur. The filtered palmyra palm sap was heated at 120 °C and blended until it is brown and thickened in round bottom non-sticky pan on the induction stove. The process was continued up to concentration of sap syrup attained total soluble solids of around 81° brix (Madhava *et al.*, 2015). Then the cooling was done to attain palm Jaggery. The preparation of Palmyra palm Jaggery is shown in the figure 4.



**Fig 3:** Flow chart for preparation of palm Jaggery



(a) Raw Sap



(b) Sap Syrup



(c) Formation of Palm Jaggery



(d) Palm Jaggery

**Fig 4:** Preparation of Palmyra Palm Jaggery

**Testing of Palm Jaggery**

Testing of Prepared palm Jaggery was carried out to estimate Moisture content, Ash content, Fat, Protein, Calcium, carbohydrate and Vitamin C by using AOAC standard methods

**Sensory evaluation**

The sensory evaluation was carried out on palm Jaggery using hedonic 9 point scale at college of Food science & Technology, Rudrur.

**Results and Discussion**

**Estimation of quality parameters of Palmyra palm sap**

The collected palmyra palm sap was filtered through muslin cloth. The filtered palm sap was tested for preparation of

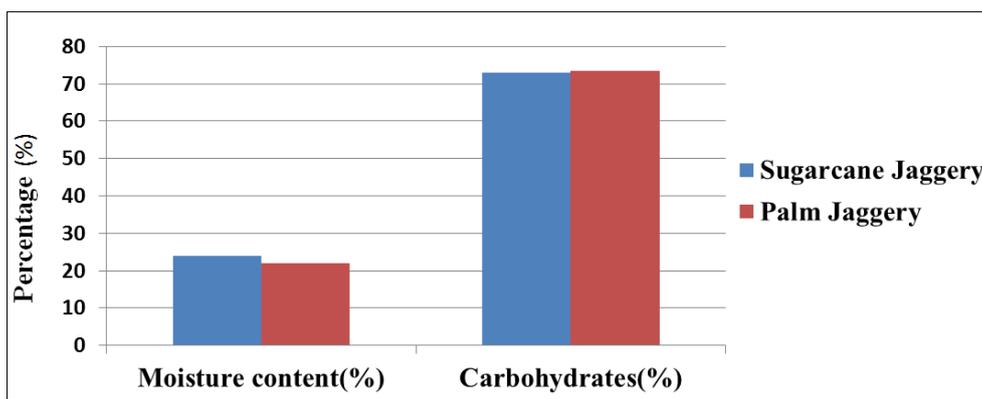
Jaggery. The parameters like Total soluble solids (TSS), pH and temperature were tested. The results were shown in the table 1.

**Table 1:** The quality parametes of filtered palm sap

S. No.	Parameters	Details
1	Total Soluble Solids (TSS), °	13.2
2	pH	5
3	Temperature, °C	31.2

**Estimation of Moisture content**

The moisture content recorded for palm jaggery was 21.90% and whereas in market available sugarcane jaggery was 23.96%.



**Fig 5:** Estimation of moisture content and carbohydrates in sugarcane jaggery and palm jaggery

**Estimation of carbohydrates**

The percentage of carbohydrates recorded for palm jaggery was 73.35% and whereas in market available sugarcane jaggery was 72.88%.

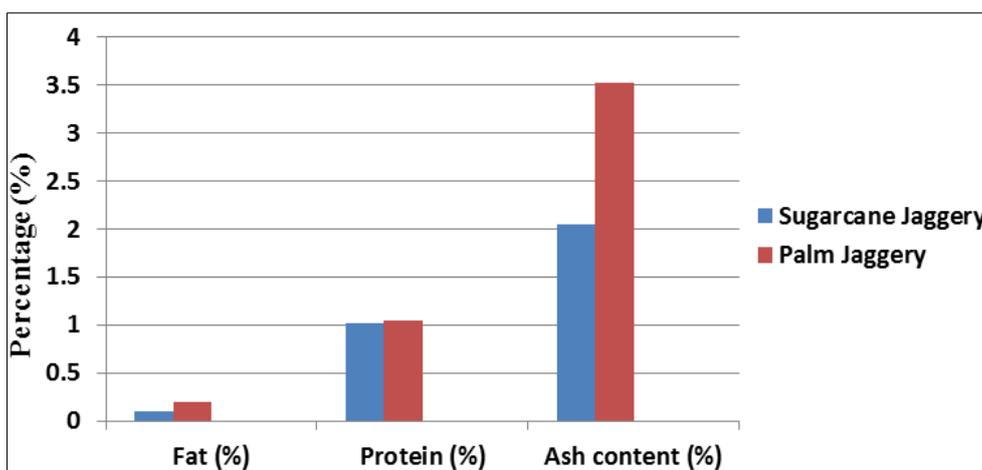
and whereas in market available sugarcane jaggery was 0.10%.

**Estimation of Fat content**

The percentage of fat recorded for palm jaggery was 0.19%

**Estimation of protein content**

The percentage of protein recorded for palm jaggery was 1.04% and whereas in market available sugarcane jaggery was 1.02%.



**Fig 6:** Estimation of Fat, protein and ash content in sugarcane jaggery and palm jaggery

**Estimation of Ash content**

The percentage of protein recorded for palm jaggery was 3.52% and whereas in market available sugarcane jaggery was 2.04%.

**Estimation of Vitamin C:** The results obtained were lowest vitamin C in sugarcane Jaggery recorded for the sample with 5.98mg and the highest vitamin C in palm Jaggery recorded in the sample with 11.04mg.

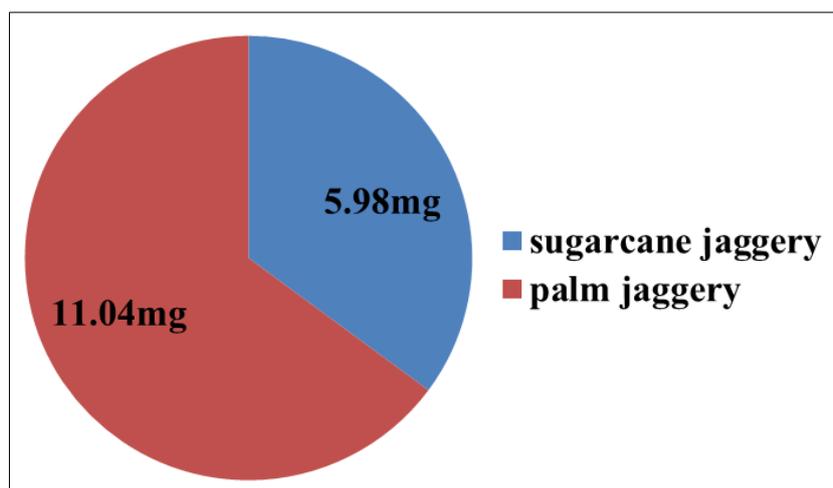


Fig 7: Estimation of vitamin C content in sugarcane and palm Jaggery

### Estimation of Calcium

The results obtained were the results obtained were lowest Calcium in sugarcane Jaggery recorded for the sample with 72 mg and the highest Calcium in palm Jaggery recorded as 84 mg.

### Sensory evaluation

Sensory evaluation acceptance tests were performed for palm Jaggery and sugarcane jaggery. The acceptance scores were assigning for varies sensory parameter like color, flavor, taste, texture, appearance and overall acceptability.

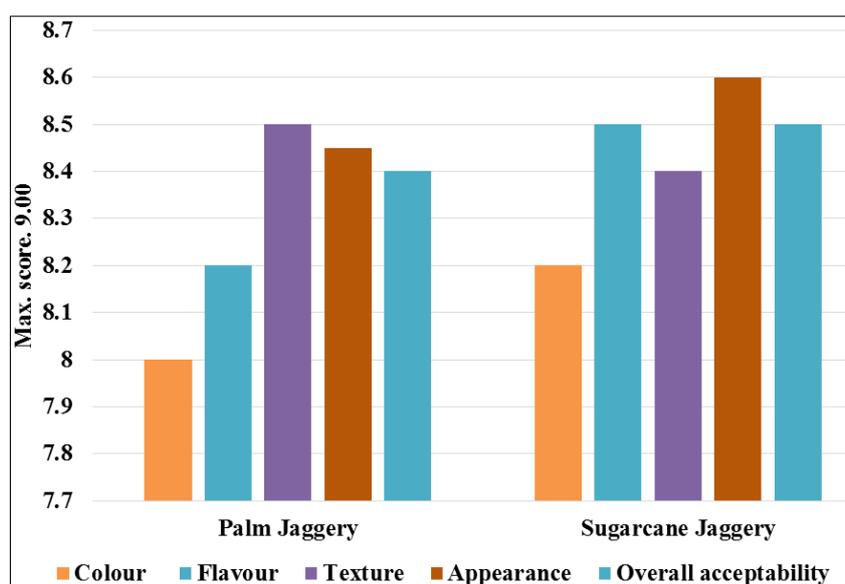


Fig 8: Sensory evaluation of Palm Jaggery and Sugarcane Jaggery

It was observed that the highest overall acceptability score was awarded for sample sugarcane Jaggery i.e. 8.5 whereas for Palm jaggery it was recorded as 8.4. It was concluded that, the overall acceptability of palm jaggery is on par with sugarcane jaggery.

### Conclusion

Palm jaggery was prepared with fresh palmyra sap and compared with sugarcane jaggery. The Palm Jaggery is rich in vitamin C and calcium compared to Sugarcane Jaggery and remaining proximate parameters are on par with sugarcane jaggery. Palm jaggery has on par overall acceptability with sugarcane jaggery. Palm jaggery is best substitute to sugarcane jaggery.

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