



A Study On The Effect Of Phytochemical Composition And Sensory Characteristics Of Ripe Palmyra Fruit

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ABSTRACT

Plants are completely covered in human life for food, shelter, clothes, etc. Palmyra palm is considered as the nature's gift that has ability to withstand adverse climatic conditions. In the present study, phytochemical analysis of ripe palmyra palm fruit revealed the presence of phenolic compounds, flavonoids, saponins and lycopene. Products such as gulab jamun, jelly, kesari and jam were prepared from ripe palmyra palm fruit and sensory evaluation of formulated products were done by 20 selected panel members and its acceptance were noted.

Keywords: sophisticated, nutraceutical, phytochemical

INTRODUCTION

Borassus flabellifer commonly known as Palmyra palm got its name from Greek roots namely 'Borassus' and 'flabellifer' which means fruit with leather covering and fan-bearer respectively. *Borassus flabellifer* is found to have Indian subcontinent and Southeast Asia to be the place of origin. It is also considered to be a nature's perennial gift that could flourish us in arid and semi-arid conditions and also could withstand any adverse climatic conditions. It is a perennial plant that grows up to 30 meters and has a maximum life span of 100 years and starts yield from 15 years in the area with plenty of water source and within 25 years in the arid regions (Veilmuthu P, 2020).

Palmyra fruits are considered as drupes and are highly variable in many morphological characteristics. They are most commonly utilized as a source of therapeutic agents. Palmyra fruits are coconut like structure having three seeds, oval in shape with 12-15 cm wide and capped at the base with overlapping sepals (Morton, 1988). The palmyra palm fruit has been used in both forms (tender and matured). At an early stage, the tender endosperm part is edible, while after ripening, the yellow colored fibrous mesocarp, squeezed to collect the pulp. The ripe fruit pulp contains beta-carotene and has anti-inflammatory effects. Traditionally the matured pulp is used for making pitha and fermented drink preparations (toddy) (Nadkarni, 1954; Vaidyaratnam, 1994).

Traditional cuisines have been employed the fruit pulp of *Borassus flabellifer* and the sap that was collected from the flower section as a sweetener for diabetes patients. Proteins, lipids, carotenoid, vitamin B complex, ascorbic acid and other minerals are found in the palmyra apart from sugars. Besides all, palmyra fruits are also rich in immunosuppressive effects (Kapoor, 2000).

The soft orange-yellow mesocarp of the ripe fruit is sugary, dense and edible, rich in vitamin A and C. *Borassus* also contains bitter compound called flabella ferrins, which are steroid saponins (Sandhya *et al.* 2010).

Ripe fruit pulp can be processed into soft beverages, jam, toffee, delicious food items and sweets (Das and Das 2003). The natural food coloring substance can be extracted from matured ripe husk or mesocarp of palmyra (Selvakumar and Thanapaul, 2020).

Mature ripe fruit is rich source of carbohydrates. The ripe fruit has a soft orange-yellow mesocarp rich in carotenoid and ascorbic acid. The fibrous outer layer of ripen palm fruits can be eaten raw or boiled (Krishnaveni *et al.*, 2020). Palmyra pulp is combined with other fruits to make jam, cordial, fruit leather and other products (Sankaralingam *et al.*, 1999).

The phytochemicals like alkaloids, flavonoids, terpenes, glycosides, saponins, phenolics, tannin, steroids, and sterols are found in palmyra fruit. These compounds are well-known for their cardio-tonic properties, antimicrobial properties, and use in herbal medicines and cosmetics. Flavonoids and tannin are phenolic compounds that act as primary antioxidants and have antimicrobial, anti-inflammatory, anti-allergic, anticancer, anti-neoplastic, and anti-neoplastic activity, as well as the ability to treat intestinal disorders. Saponins are also therapeutically important due to their hyperlipidemia and anticancer activity. Saponins are also required for cardiac output activity. The astringent flavors of fruits are rich in tannin. (Krishnaveni *et al.*, 2020).

In Andhra Pradesh, 15 to 20 million palm trees are available from which 3,000 metric tonnes of the pulp can be extracted every year. (Uluwadge *et al.* 2007).

Palmyra fruit is mostly used as fresh fruit, because of its perishable nature it is traditionally preserved as dried fruit pulp called fruit leather. It contained pectin as well as contain an appreciable amount of saponins, because of that fruit pulp having important medicinal properties (Srishankar *et al.* 2017).

Although palmyra fruits are seasonal, they have excellent chemical and physical properties for the development of food and beverages. Though there is a demand for palmyra ready to serve the beverage, existing commercial products are failed due to their poor quality (Nithiyananthan *et al.* 2018).

Palm fruit has anti-inflammatory and antioxidant properties. The antioxidant activity could be attributed due to the presence of high content of flavonoids, saponins, and phenolic compounds (Pramod *et al.*, 2017). It is also being used in folk medicine to cure various diseases (Kurian *et al.* 2017).

The pinattu, prepared by drying the palmyra fruit pulp could reduce serum glucose levels of mild type-II diabetic patients (Uluwadge *et al.* 2007). The fruit pulp has been used in traditional dishes and herbal medicines due to its pharmacological values along with sweeteners for diabetic patients (Vedapriya *et al.*, 2016).

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Objectives:

- To determine the phytochemical compounds present in *Borassus flabellifer*.
- To evaluate the nutrient content of the sample
- To evaluate the sensory parameters of the formulated products.

METHODOLOGY

Collection of Sample

The sample used in the study was ripe palmyra palm fruit. *Borassus flabellifer* fruit were collected from a palm grove, Chenbagaramanputhoor, Kanyakumari District. The other ingredients were purchased from the nearby supermarket, Nagercoil.



Cleaning and Washing

The selected fruits were cleaned and washed thoroughly in order to remove impurities and then the peel of the fruit is removed for further process.

Extraction of Fruit Pulp

The cleaned fruit is then separated into nutlets. The pulp was then squeezed. A white cloth was used to strain and separate the pulp from the fibers using minimum amount of distilled water with hands and transferred into a bowl.



Figure 3.2 Fruit Pulp

Weighing and Measuring

The Palmyra fruit pulp and other ingredients are measured using a weighing machine.

Phytochemical Analysis

Qualitative analysis of the phytochemical constituents of ripe palmyra palm fruit was analyzed for the presence of secondary metabolites such as phenolic compounds, flavonoids, saponins and lycopene. The phytochemicals which showed positive in qualitative analysis were subjected to quantitative analysis. Quantitative analysis showed the presence of phenol, flavonoid, saponin and lycopene.

Formulation of the Products

Palmyra fruit pulp was selected for the preparation of the products. Products such as gulab jamun, jelly, kesari and jam were selected for the formulation. The products were prepared based on the following method.

Palmyra fruit Gulab Jamun

Ingredients for gulab jamun

Ingredient	Amount
Gulab jamun mix	100g
Water	2 Cup
Sugar	50g
Cardamom	1tsp
Palm fruit extract	50g

Method

In a mixing bowl put the flour, and palm fruit extract, mix gently to make a soft dough, and divide the mixture into 30-35 portions and gently roll into round gulabjamun . Fry in the oil at very low flame until golden brown in colour. Then put the fried gulab jamuns in the prepared sugar syrup.



Figure 3.5 Ingredients for Gulabjamun



Figure 3.6 Gulab jamun

Palmyra Fruit Jelly

Ingredients for Palmyra fruit jelly

Ingredients	Amount
Agar Agar	50g
Water	2cup
Sugar	25g
Palm fruit	50g

Method

Soak the agar agar strip in water for about 20 to 30 minutes to soften them and then cook them until they dissolve. Add sugar to the agar agar solution and finally add palm fruit extract, mix well and refrigerate.



Ingredient for Jelly



Jelly

Palmyra Fruit Kesari

Ingredients for palmyra fruit Kesari

Ingredients	Amount
Sooji	100g
Sugar	50g
Water	2cup
Cashew nuts	1tsp
Raisins	1tsp
Ghee	50ml
Palmyra fruit	50g

Method

Heat 2 tbsp ghee in a heavy bottom pan and fry cashews until light golden. Add raisins and fry until they swell up. Remove to a plate and set aside. In the same ghee add the rava and fry on a low to medium heat until aromatic and then mix with palm fruit pulp and allow to cool.



Ingredients for Kesari



Kesari

Palmyra Fruit Jam

Ingredients for palmyra fruit jam

Ingredients	Amount
Palmyra fruit	100g
Sugar	50g
Lemon	1 ml

Method

In a pan, add the puree along with sugar and cook on medium flame by stirring continuously till it comes to a boil. Keep the flame low and let it simmer until the puree thickens. Stir at regular intervals. Once the puree starts to thicken it will become like a semi-solid jam. Then add the lemon juice and mix well. Cook until the jam becomes thick. Keep stirring at regular intervals. It will take about 30-40 minutes on low heat.



Ingredients for Jam



Jam

Sensory Evaluation of the Formulated Products:

Sensory assessment was evaluated based on the quality description that is appearance, colour, flavour, taste, texture, and over all acceptability using a score card. The sensory evaluation was carried out for the products such as gulabjamun, palmyra fruit gulabjamun, jelly, palmyra fruit jelly, kesari, palmyra fruit kesari, jam and palmyra fruit jam. The products were evaluated by 20 panel members from PG and Research Department of Nutrition and Dietetics, Muslim Arts College, Thiruvithancode, Kanyakumari District.

Sensory Evaluation of Gulabjamun, Jelly, Kesari and Jam



Sensory Evaluation of Gulabjamun



Sensory Evaluation of jelly



Sensory Evaluation of Kesari



Sensory Evaluation of Jelly

Statistical Analysis

Statistical analysis of the data obtained from different variables was carried out through arithmetic mean and standard deviation.

RESULT AND DISCUSSION

Characterization of Phytochemicals from palmyra fruit pulp

The Palmyra fruit were subjected to standard chemical test for the detection of different phyto constituents. Results on the presence of phenols, flavonoids, saponins and lycopene were reported in this table

Qualitative Analysis of palmyra fruit pulp

S.No	Name of the test	The sample code PFP
1	Phenol	+
2	Flavonoids	+
3	Saponin	+++
4	Lycopene	+++

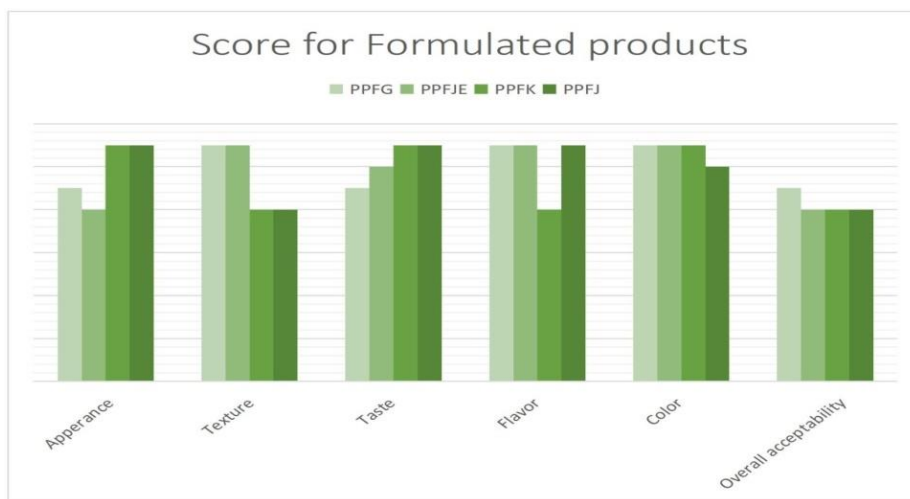
+ indicates presence

The above table shows the presence of phenol, flavonoid, saponin and lycopene. The phytochemical that showed positive in qualitative analysis were subjected to quantitative analysis. The amount of phytochemicals was determined through proper procedure. The values were tabulated and analyzed.

Quantitative Analysis of Phytochemicals

S.No	Phytochemicals	Concentration of Phytochemicals(µg) of Sample
1	Phenol	46.33
2	Flavonoids	36.5
3	Saponin	98.25
4	Lycopene	78.1

SENSORY EVALUATION



The sensory evaluation of the formulated products

CONCLUSION

Palmyra fruits are available in abundance and an alternative season to other tropical fruits. Palm fruits have limited cultivation, consumption and trade. A large number of these fruits can grow under adverse conditions and are also known for its nutritive value and can satisfy the demands of the health conscious of consumers as it has numerous health benefit properties. Hence there is a need to concentrate on research in diversification and popularization of palmyra fruits. Thus, the phytochemical rich raw palmyra palm fruit pulp can be exploited for further drug development and value added products.

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