

Review

A Comprehensive Review on the Medicinal Properties of *Borassus flabellifer*

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Abstract

Plants play a major role in health as medicine since the human era began. Plants and trees have been used partly and as whole plant or trees for many medicinal purposes. In this regard, Palmyra tree has got its own specificity with gallons of medicinal stuff in it. This review article is focused attentively on medicinal property of the plant *Borassus flabellifer*. Palmyra palm tree belongs to the 'palme' family. The Palmyra tree is the official tree of Tamil Nadu state in India. In Dravidian culture it is called karpaha, nungu, celestial tree and is highly respected by people. All its parts could be used for medicinal properties. This magnanimous tree is found with gums, albuminoids, steroidal glycosides, fats, and carbohydrate like sucrose, spirostane type steroids like borassosides and dioscin. Few noted antimicrobial activity is noted in seed coat extract of the *Borassus flabellifer*. Its male inflorescence shows a significant anti-inflammatory activity and analgesic property. Different parts of this plant have biological activities and pharmacological functions, including anthelmintic, diuretic, antioxidant and antibacterial activities of the fruits, wound healing, immunomodulatory, and even antimalarial properties. The chemical constituents produce free radicals that regulate biochemical processes by acting as an antioxidizing agent. It is known that leaves of this plant are rich in an abundant number of phytochemicals. The varied parts of the plant is used for the countless ailments like secondary syphilis, antiperiodic, heart burns, liver and spleen enlargement etc. The fruits of the tree found to be cold, laxative, anthelmintic and sedative. They are used as aperients and to progress the digestion. Hence this review focuses on the mentioned properties of the different plant parts of *Borassus flabellifer*.

Keywords: *Borassus flabellifer*, Palmyra palm tree, medicinal properties, pharmacological functions.

Introduction

Plants play a major role in health as medicine since the human era began. Plants and trees have been used partly and as whole plant or trees for many medicinal purposes. Trees such as Neem, papaya, Calihariare the few well renowned trees serve more than a hundred years with lots of potential against diseases and enhancing the life of the people. Plants like tulsi, Ginger, garlic, coriander also have been used for health and medical purposes for several thousands of years. All these play a vital role in the human health care system. Knowledge on the Medicinal plants opens a new horizon for modern drugs development. The safety, efficacy and minimized side effects make the herbal medicines to their greater level and they are in great demand in forming the primary health of the being in the world. Their sensitive to unwanted effects over synthetic medicines led increasing demand for natural resources and awareness for maintaining quality and purity of raw materials around the world.

In this regard palmyra tree has got its own specificity with gallons of medicinal property in it. In this scenario, detailed review on medicinal property of the plant *Borassus flabellifer* has been discussed on the medicinal property. Contemporary science has proved that consumption of fruits, leaves, bark, roots have role to play in promoting as well as disease preventing benefits because of a few substances namely phytochemicals viz. polyphenols, vitamins, minerals, proteins, etc. (Prasad et al., 2016). The dietary phytophenolics like phenolic acids and flavonoids have been recognized greatly as beneficial antioxidants which can delete harmful active oxygen species, such as O₂, H₂O₂, and -OH (Chayanika Sahni et al., 2014). Palmyra tree is a tall in stature commonly known as "*Borassus flabellifer*". The word 'Borassus' is a Greek word means the leathery covering of the fruit and 'flabellifer', which means fan-bearer. Palmyra palm tree belongs to the 'palme' family (Fig. 1).

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Fig. 1. *Borassus flabellifer* in its natural habitat.



Different parts of this plant have been reported to include biological activities and pharmacological functions, including anthelmintic, diuretic, antioxidant and antibacterial activities of the fruits, wound healing, immunomodulatory, and anti-malarial (Sahni *et al.*, 2014). The chemical constituents of the plant produce free radicals that regulate biochemical processes by acting as an antioxidizing agent. It is known that leaves of this plant are rich in an abundant number of phytochemicals (Prasad *et al.*, 2016). The diverse parts of the plant is used for the various ailments like secondary syphilis, antiperiodic, heart burns, liver and spleen enlargement etc. (Paschapur *et al.*, 2009).

Medicinal Properties

All things that are created by God are good in their own way. There are few trees, animals, birds, reptiles, insect have extraordinary role to play in the universe. One of such role is being medicinal. This is greatly valued by everyone under the sun. Trees are in general medicinal as we know from our indigenous knowledge. This knowledge is expanded when we go for research part by part and inch by inch. The numerous researches undergone with the Palmyra tree is praise worthy. The parts of the tree and their medicinal properties are compiled here.

Roots: Young roots are diuretic and anthelmintic and a decoction is given in certain respiratory diseases (Hiralal Jana *et al.*, 2017). The roots of the plants are cooling, curative and diuretic (Arunachalam *et al.*, 2011). The nutritional analysis of the roots has shown 8.54% protein content, 23.53% carbohydrates, 7.29% crude fibre and negligible fat content. These roots are found to be high in calories (Sahni *et al.*, 2014).

Bark or Stem: The bark decoction, with salt, is used as a mouth wash, and charcoal made of the bark serves as a dentifrice (Morton, 1988).

Fruit: Palm fruit has anti-inflammatory and antioxidant properties. The antioxidant activity could be attributed due to the presence of high content of crude flavonoids, saponins and phenolic compounds (Prasad *et al.*, 2017). The fruit pulp helps to cure skin inflammations. It is used to treat nausea and vomiting as well as worm infestation. It is used as an expectorant and also as a liver tonic. A thin layer of sugar palm fruit jelly applied on the affected area has a soothing effect and immediately alleviates the itchiness associated with prickly heat. Being rich in minerals and vitamins, sugar palm fruits are a healthy option for people on diet or suffering from diabetes. It is a rich source of vitamins such as B, C and rich in minerals such as iron, zinc, potassium, calcium, phosphorus, thiamine, and riboflavin.

The Palmyra tree is the official tree of Tamil Nadu state in India. In Tamil culture it is called karpaha, nungu, celestial tree and is highly respected by the people. All its parts could be used (Jana *et al.*, 2017). It grows to a tallness of about 30 m, with a black stem and crown of leaves at the top; leaves would be around 0.9-1.5 m in diameter. It has unisexual flowers, large fruits, fan shaped palmate and hard horny spinescent serratures over the petiole edges. The life span of this tree is up to 100 years (Sahni *et al.*, 2014). The other common names for this tree are (a) Sugar palm, (b) Asian Palmyra palm, (c) Toddy palm, (d) Fan palm, (e) Cambodian palm, (f) Kerigi, (g) Mak tan kok, (h) *Borassus* palm, (i) Taan, (j) African fan palm, (k) Doub palm, (l) Ron palm, (m) Wine palm, (n) Panna-maram, (o) Great fan palm, (p) Than, (q) Lontar palm, (r) Tala palm etc. (Hiralal Jana *et al.* 2017). We could find this tree in regions of Africa, Asia, New Guinea, Combia, India, Jawa, Laos, Lesser Sunda Island, Malaya, Socotra, Parts of China, Philippines, Thailand, Sri Lanka, Myanmar, Queens land and Australia (Jana *et al.*, 2017).

Richness of *Borassus flabellifer*

The countless constituents of *Borassus flabellifer* are gums, albuminoids, steroidal glycosides, fats, and carbohydrate like sucrose, spirostane type steroids like borassosides and dioscin are found in the plant. Antimicrobial activity is noted in seed coat extract of the *Borassus flabellifer*. Its male inflorescence shows a significant anti-inflammatory activity.

Fig. 2. Leaves of *Borassus flabellifer*.



Palm jaggery is also known as Palmyra palm sugar and is a natural sweetener. It is also a low calorie sugar. It is used extensively in cooking and has many health benefits; Low glycemic index sugar in the palm sugar is exceedingly helpful in reducing obesity and diabetes, it also provides a sustained and uniform energy supply to the body, and it is rich in many nutrients such as vitamins B1, B2, B3, B6 and C (Vivek et al., 2011).

Spadix: Dennis et al. (2011) in his work on the Palmyra tree has found that the ash of the spadix of the *Borassus flabellifer* is taken to relieve heartburn and enlarged spleen and liver.

Flower: Sap from the flower of the matured tree stalk is prized as a tonic, diuretic agents, stimulant, laxative and anti-phlegmatic and amebicide that are considered to be the best for day to day life. Sugar made from this sap is said to counteract poisoning, and it is fairly prescribed for liver disorders. The ethanolic extract of male flowers (inflorescences) of *Borassus flabellifer* L. (Arecaceae) has analgesic activity (Shirisha et al., 2018), (Gummadi et al., 2016). Inflammation is a local response of living mammalian tissues to the injury and a body defense reaction in order to eliminate the spread of injurious agents. The ethanolic extract at doses of 150 and 300 mg/kg showed the antiinflammatory response in the mice (Paschapur et al., 2009).

Sap and Toddy: It is obtained by tapping the top shoots and collecting the dripping juice in hanging earthen pots tied with the trees. The juice early morning is refreshing and is light. The drink has high nutrient value and is good for health (Bhaskar et al., 2017). This drink is called Thaati Kallu in Telugu, Neera in Marathi and Pathaneer in Tamil. It is extremely cool in sensation and it is sweet in taste. The juice collected in the evening or after fermentation becomes sour. It is consumed mostly by coastal villagers of Maharashtra as a raw alcoholic beverage. Antifungal activity on *Candida albicans* and *Aspergillus niger* was determined by zone of inhibition at specific volumes (0.25, 0.50, 0.75 and 1.0 mL) of Sap of *Borassus flabellifer*. The significant antifungal activity was determined by using nutrient agar media and cup plate method (Singh et al., 2016). Another sugary sap called toddy is obtained from the young inflorescence of male and female trees. Toddy is fermented to make a beverage called arrack. It is known as Pana Vellam or Karuppukatti among Tamils. Arrack or Pana Vellam is one of the highly sold product in many of the places especially in Tamil Nadu in the name of organic food in the shops named as "Namma Kadai" which means "Our Shop" where all the products that are produced or cultivated organically.

During summers use palm fruit, to keep body hydrated. It also replenishes the lost minerals and nutrients of the body and prevents painful urination and tiredness in the body. It is used effectively to treat digestive problems and other stomach ailments. It is also used as a laxative. Sugar palm fruit is a good option for those who are on a diet. It also prevents malnutrition in children and adults. It is found that this tree has ascorbic acid the natural vitamin (Vengaiiah et al., 2013). The fruits are cooling, laxative, anthelmintic and sedative and also used as aperients and to improve the digestion (Rajendran et al., 2008).

Leaves: Present researches show that consuming leaves, bark, roots have role to play in promoting as well as disease preventing benefits because of a few substances namely phytochemicals viz. polyphenols, vitamins, minerals, proteins, etc. (Prasad et al., 2016) (Fig. 2).

Palm sugar: Sugar palm fruit is also beneficial in treating inflammatory skin problems such as redness due to intense heat. A face pack made from sugar palm fruit is excellent for the skin even for people with sensitive skin. It prevents prickly heat, boils and redness of-the-face.

Fresh toddy heated to promote fermentation is covered onto all kinds of ulcers (Jana et al., 2017). In addition to these, the tree sap is taken as a laxative and is believed to possess medicinal virtues have also been ascribed to other parts of the plant. The 'neera' and toddy are good for controlling gastric troubles and ulcers. The inflorescences are widely used in Ayurvedic medicines. Wine was produced using the toddy of *Borassus flabellifer* in Sri Lanka and it has antimicrobial activity (Theivendirarajah et al., 1987). Toddy contains nutritive value with Vitamin A, Ca, Fe, Zn, Cu and the fermented sap results in increased levels of Thiamine, riboflavin and niacin (Merugu et al., 2014).

Seed: The antibacterial activity of methanol extracts of *Borassus flabellifer* L. (Arecaceae) seed coat (soft outer shell) was noted by agar well diffusion method *in vitro*. The antibacterial potential was examined against Gram-positive bacteria, i.e., *Staphylococcus aureus*, *Bacillus subtilis* and Gram-negative bacteria, *Klebsiella pneumoniae* and *Serratia marcescens*. The methanol extract of the seed coat showed consistently significant inhibitory activity on different bacterial species tested (Shirisha et al., 2018).

Sprouts: The sprout is known as Thegalu or Gaygulu in Telugu, as Panai Kizhangu or Panang kizhangu in Tamil in India particularly Tamil Nadu, Andhra Pradesh, Telangana and Bihar, and in Jaffna, Sri Lanka, the seeds are planted and made to sprout and the fat stems (below the surface) are boiled or roasted and eaten. The stem of the sprout is very fibrous and nutritious (Shirisha et al., 2018).

Conclusion

The golden words of the elders who have lived and gone are fulfilled with current science in many ways especially with regard to the medicinal properties of many trees on the earth. Palmyra tree is one such type of the tree highly foreseen by the people. There were times people considered this palm tree as God because of their benefits. It is one of the trees which used completely for various needs such as housing, medicine, shade and food. The pathetic situation is that they are drastically reduced in number due to amassing lands for buildings and other purposes in many of the places particularly in Tamil Nadu where it is considered as the tree of the people. This review threw some light on the antimicrobial activity, anti-inflammatory, anti-oxidant and analgesic activity. It is also used as a medicine for wound healing, immunomodulatory, malaria, syphilis, antiperiodic, heart burns, liver and spleen enlargement. Thus Palmyra tree is one of natural medicine that the parts of it can be used for treatment of various ailments.

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