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***Borassus flabellifer* Linn.** (Palmyra Palm): An updated compressive potential overview.

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**ABSTRACT:**

***Borassus flabellifer* Linn.** is a tall tree (palm) belonging to the family Palmae. It is native of tropical Africa. It is a most beautiful gift for the humankind because all of its parts roots, leaves, inflorescence, flowers, fruits and seeds could be utilize for medicinal properties. The focus of the present work was to take an updated compressive potential overview of ***Borassus flabellifer* Linn.** This review article is also focused on medicinal property of different parts of the plant. The review was inferred that the roots of it are having antibacterial and anti-diabetic activity. Leaves of plant are having different pharmacological activities like antibacterial, antifungal, antioxidant, antiinflammatory and anticancer activity. Its male inflorescence shows cogent anti-inflammatory activity, antioxidant, antidiabetic, analgesic and antipyretic property. Fruits of plant are having different pharmacological actions like anthelmintic, diuretic, antioxidant, antimicrobial, antibacterial, wound healing, immunomodulatory and even antiulcer. Seed coat exhibit antimicrobial antibacterial and antioxidant activities. Phytochemical studies shows the

existence of steroidal glycosides like Borassosides, fats, Flavonoids, carbohydrate and Vit.C etc. The present study includes the phytochemical, pharmacological screening and utilization.

Keywords: *Borassus flabellifer* Linn, Phytochemistry, Pharmacological Studies, Traditional uses.

## Introduction: -

Nature always stands store-house of remedies to cure all ailments of humankind. The history of herbal medicine is an old human civilization. <sup>(1)</sup> Number of medicinal plants shows different types of pharmacological actions due to presence of phytoconstituents. *Borassus flabellifer* Linn. is one of them having number of pharmacological activities.



Fig. No. 1 *Borassus flabellifer* Linn. Tree

## CLASSIFICATION

Kingdom: Plantae

Super division: Spermatophyta

Class: Liliopsida

Order: Arecales

Family: Arecaceae

Genus: Borassus L.

Species: *Borassus flabellifer* L. <sup>(2)</sup>

**Different species:-**

*Borassus aethiopium* - African palm

*Borassus akeassii* – Ake Assi’s palm

*Borassus flabellifer* – Asian palm.

*Borassus heineanus* – New Guinea palm.

*Borassus madagascariensis* – Madagascar palm.

*Borassus sanbiranensis* – Sambirano palm <sup>(3)</sup>

**Vernacular Names: -**

The plant names in different languages as follows <sup>(4, 5)</sup>: -

Sanskrit : Tal

English : Palmyra palm

Hindi : Tal, Tar

Kannada : Tale mara

Marathi : Tad

Malayalam : Pana

Tamil : Panai

Telgu : Tadichettu

**Parts used: -**

Roots, buds, toddy (i.e. - juice from buds), spadices, flowering stalk, fruits, leaves and bark, Seed, whole plant etc. <sup>(6,7)</sup>

**Description: -**

***Borassus flabellifer* Linn.** is a tall tree (palm) growing in sandy soil and having 20-30 meters height with a straight trunk. <sup>(8)</sup> The root is hairy with more slender transverse branches. Bark and wood is dark. <sup>(9)</sup> The stem is black and consists of a hard-outer portion mainly composed of stiff longitudinal fibres. Central part contains the pith which is soft and starchy <sup>(6)</sup>. Leaves palmately divided, fan-shaped petioles, 0.6-1.2meter long, terminal, margins, spinulose <sup>(8)</sup>. Flowers yellow, born in spadices, female spadix sparingly branched, bearing few scattered solitary flowers. Male flowers small, mixed with scaly bracts, secund in two series in a small spikelet. Female flowers larger globose. Fruits are large and fibrous, containing usually three nuts like portions each part encloses a seed <sup>(6)</sup>. Plant bears flowers and fruits during December to August <sup>(10)</sup>

**Fruit: -**

The palm produces fruits when 15-20 years old, giving an annual crop of 50-200 fruits in 6-12 bunches per tree. The tender fruits appear from May to August, whereas the ripe ones are available from July to October and duration varies from locality to locality. The seeds contain a soft, sweet, jelly-like endosperm with sap. The gelatinous pulp gradually hardens into a bony kernel and develops a fibrous coat. The ripe fruit varies in colour from a light gold to brow attached to spadix and nearly black at end. <sup>(8)</sup>

**Chemical constituent: -**

Amino acids, sterol and fatty acids: - It contains free amino acids lysine, aspartate, glutamate and phenylalanine dominate one. It also contains steroidal Saponins flabelliferins. The main digestible carbohydrates are simple sugars of which sucrose, glucose and fructose dominate. Carotenoids: - $\beta$ -carotene, mixture of 4 main Carotenoids  $\alpha$  carotene and  $\beta$ -zeacarofene lycopene and zeta-carotene. Minor constituents: - Vitamin C & vitamin B complex. <sup>(11)</sup>

**Traditional uses: -**

**Root: -**

The roots are cooling, restorative, diuretic, stimulant antiphlogistic and anthelmintic. Useful in hyperdypsia, burning sensation, strangury and inflammation. Leaf stalks juice and young root are good for gastric catarrh and hiccup. It is employed as a cure for gonorrhoea. Inflorescence ash is a best antacid, antiperiodic and is applicable in hyperacidity. Also shows

usage in haepatomegaly, heart burn, bilious fever, splenomegaly and skin diseases. Root decoction is used to restore normal physiological activities, promotes flow of urine, expel worms and check respiratory ailments. <sup>(4)</sup>

**Fruit: -**

These are anthelmintic, depurative, styptic, stomachic, sweet, laxative, sedative, aphrodisiac and cooling. Fruits are utilized in flatulence, colic, constipation, intestinal worms, dyspepsia, general debility and in pitta, vata <sup>(4)</sup>. Used as tonic for asthmatic patients, stimulant, anti-laprotic, diuretic, antiphlogistic and given in gas troubles. <sup>(10)</sup>

**Flower: -**

The juice from the flowering stalks is given in diabetes. The dried flowering stalk shoot is work on bilious affections and enlarged liver. Sweetish juice from flowering stalk is cooling and stimulant; if taken regularly, it reacts as a laxative. <sup>(5,6)</sup>

**Leaves: -**

Green leaves extract is beneficial in secondary syphilis. The leaf juice checks hiccup and relieves gastric catarrh. Palm sugar prepared from toddy is good antidote in poisoning. It is given disorders of the liver and gleet. <sup>(6)</sup>

**Other uses: -**

Young shoots of the palms are reported to contain a toxic factor which is heat stable and insoluble in organic solvents; they are neuro-toxic, but not hepato-toxic to rats. The extract obtained on boiling the central axis of the inflorescence (male) with mustard oil, is reported to be used for joint-pain and swelling due to rheumatic affection.

**Origin and distribution**

*Borassus flabellifer* Linn. is distributed in South-East Asia, Burma (Myanmar), New Guinea and Cambodia. It is grows on dry or sandy localities along river banks, throughout India. It is obtained from Tamil Nadu, Odessa, West Bengal, A. P., Bihar, Karnataka and Maharashtra <sup>(12)</sup>.

**Cultivation**

The palm grows naturally and no particular cultivation is necessary. It requires no artificial irrigation or manuring. Direct sowing method used for propagation. In the earlier stage of germination only the underground stem portion increases in thickness and the airy part of the trunk elongated and develop into its characteristics cylindrical black stem after 15-20 year. The Palmyra usually starts flowering at age of 15 year after the commencement of aerial growth. It flowers during March–May in some areas and during August- Sept fruit get ripe <sup>(8)</sup>.

### **By-product**

There are so many products are formed by the various parts of plant Such as Toddy, jaggery, sugar, Oil, candy, spread, toffee, Toddy palm wine, burfi, Pickle, Canned Palm, Chilling, Cola, Honey etc. Few of them are used from many years ago.

**Toddy:** It is formed by fermentation of sugary sap. Fermentation is done by natural yeast and bacteria. It content approximately 4- 8% alcohol. Toddy is a traditional drink with refreshing quality. It is collected after fermentation becomes sour, in morning or in evening. It is one of the raw alcoholic beverages.

**Jaggery:** Due to its nutritional and medicinal properties its price is high. It gives earthy, intense taste similar to chocolate. It is called as palm gur.

**Sugar:** It is prepared from fruits.

**Oil:** It is obtained from fruit through wet processing.

**Candy:** Candy is preparing by heated the Neera for 2 hours to obtain the thick consistency.

**Spread:** Fruit pulp is extracted by using water and heat (70° C for 10 min). The extracted pulp is mixed with other and heated on a lowest flame with continuous stirring. Cooked material on cooling filled into broad mouth bottles, capped, labelled and stored.

**Toffee:** Palm toffee is prepared by mixing fruit pulp with sugar, skim milk powder, glucose, refined flour and starch. The mixture is cooked for 40 minutes with constant stirring. Mixture is stretch on smeared aluminium tray and left it overnight.

**Wine:** Wine is made by using the fermented flower sap. It is white, alcoholic, sweet having strong smell with mild taste. The sap of flower undergoes fermentation because of natural yeast.

**Burfi:** It is prepare with khoa, butter and lime water. Fruit pulp and sugar is also used for preparation of Burfi.

**Pickle:** It is made with small fruits which are pickled in vinegar. <sup>(13)</sup>.

*Borassus flabellifer* Linn. has a lot of nutritive and nutraceutical values which are well studied and reported by many researchers as like medicine. *Borassus flabellifer* Linn. is a generous source of biopharmaceutical, it exhibits many biological properties and utilized as a remedy for many diseases <sup>(14)</sup>.

## Pharmacological activities.

### Cytotoxic activity

The cytotoxic activity of seed coat was over on HeLa cell by MTT assay. Significantly inhibition of growth of the HeLa cells was found. <sup>(15)</sup>

### Antimicrobial activity

Seed coat extract (Methanolic) was screened for five bacterial strains. Antimicrobial activity screened for *Staphylococcus aureus*, *Escherichia coli*, *Bacillus subtilis*, *Klebsiella sp*, *Pseudomonas aeruginosa* by Disc diffusion and agar well diffusion methods. <sup>(16)</sup>

### **Anthelmintic activity**

Toddy palm Sap shows best Anthelmintic activity. In this experiment earth worms were splits into three groups, tested with extract of various concentrations. Reference standard was Albendazole. Control group is treated with normal saline. <sup>(17)</sup>.

### **Antifungal activity**

Nutrient agar media and cup plate method used for evaluation of antifungal activity on *Candida albicans* and *Aspergillus niger* <sup>(18)</sup>.

### **Antioxidant Activity**

Different extracts such as Petroleum ether, chloroform, methanol and chloroform-water of fruits were evaluated for Antioxidant activity by DPPH and ABTS method. The percentage scavenging activity of fruits of was found to be 80.5, 84.6<sup>(19)</sup>.

### **$\alpha$ -glucosidase inhibitory activity**

It is done by Sukanya and et-al. The results revealed that ethyl acetate extract inhibited  $\alpha$ -glucosidase <sup>(20)</sup>.

### **Haemolytic activity**

Palmyra flour was tested for haemolysis. It is evaluated on human RBC. <sup>(21)</sup>

### **In-vitro anticancer activity using SRB assay**

Dr. Ashok was carried out anticancer activity of methanolic leaves extract which was screened on Human colon cancer cell line, Human hepatoma cell line and Human lung cancer cell line by SRB assay. <sup>(22)</sup>

### **Anti-inflammatory activity**



Root extract (ethanolic) was evaluated for anti-inflammatory activity by using acute and chronic models like; carrageenan-induced rat paw oedema and carrageenan-induced air-pouch model. <sup>(23)</sup>.

### **Analgesic activity**

Acetic acid induced writhing, hotplate, tail-clip method were used for investigation of analgesic activity. The ethanolic extract of male flowers (inflorescences) produced significant inhibition of pain.

### **Antipyretic activity**

The ethanolic extract of male flowers (inflorescences) was investigated for antipyretic activity. It shows significant activity at either dose <sup>(24)</sup>.

### **Hypoglycaemic activity**

Significant reduction in blood glucose levels was found for ethanolic extract of dried inflorescence. <sup>(25)</sup>

### **Anticonvulsant activity**

Alcoholic extract of leaves was evaluated for anticonvulsant activity it is done by maximal electroshock seizure test and pentylene tetrazole seizure test. <sup>(26)</sup>.

### **Antibacterial, antifungal and antioxidant evaluation**

Eight pathogenic strains of bacteria and fungi was investigated for antimicrobial potential by using agar well diffusion method. <sup>(27)</sup>.

### **Antimicrobial Activity of Immature Palmyra Palm**

Ethanol extract of immature Palmyra Palm fruits was evaluated by well diffusion (bacteria), disc diffusion (fungi) methods for antifungal efficacy and antibacterial activity. <sup>(28)</sup>.

The DC conductivity of Activated carbon (AC) Produced from flowers was determined. (29).

### **Anti-diabetic activity**

Ethanollic extract of flowers was screened for anti-diabetic potential against Alloxan induced diabetic rats. There was a significant decrease in fasting blood glucose levels. (30).

### **Anticancer activity of leaf**

Ethanollic leaf extract was evaluated for anticancer activity. The plant showed good cytotoxic effect. (31).

### **Conclusion**

In updated compressive potential overview we concluded that the various parts of the *Borassus flabellifer* Linn. are having different types of pharmacological activities such as anti-inflammatory, analgesic, anticancer, cytotoxicity, anti- hyperglycaemic, antioxidant, anti-bacterial, antifungal, anthelmintic activity, haemolytic activity. Pharmacological studies which explore potentiality of the plant which will be helpful to society and various researchers.

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