



A BRIEF REVIEW ON PHARMACOLOGICAL POTENTIAL OF *POUTERIA CAMPECHIANA*

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ABSTRACT

Pouteria campechiana is a genus of tropical fruit trees belonging to the family Sapotaceae commonly known as the eggfruit tree, canistel. It is native to Central America and some regions of Southeast Asia. It is an evergreen tree having not more than 8 m tall, but it may, reach height of 27-30 m. It bears fruit, which is flavourful, nutritious, and useful. *P. campechiana* contains a broad spectrum of nutrients and plant bioactive. Several *Pouteria* species have been used in folk medicine to treat inflammation, skin eruptions, ulcers and back pain. The decoction from *P. campechiana* bark is utilized as an antipyretic and to treat skin blisters and soreness. Unripe fruit is taken for controlling diarrhoea. The leaves are reported to be anti-inflammatory and *P. campechiana* seeds are also used as a remedy for ulcers. It is also used as a remedy for coronary trouble, liver disorders, epilepsy, and skin disease in traditional medicine.

KEYWORDS: *Sapotaceae*, Canistel, Bioactive, Decoction, *Pouteria campechiana*.

INTRODUCTION

Pouteria campechiana or canistel is a tropical fruit and belongs to the family Sapotaceae. It is a native to the southern parts of Mexico in the Yucatan Peninsula. Canistel is distributed well around the region including Nicaragua, Costa Rica, Panama, Puerto Rico, Jamaica, and Cuba. Eggfruit is cultivated in Maharashtra throughout the Western Ghats, Kerala, limited parts of Tamil Nadu, and it's also a hobby fruit in a few gardens of Auroville. The fruit does not have any serious farming efforts, and it generally sulks in the shadow of its immensely popular brother, the sapota. It needs a moderate precipitation, and able to tolerate well a long hot dry season such as that seen in the South Asia region. Canistel has a high tolerance to various soil

types, the soil types needed for canistel growth ranged from acidic sandy to limestone sandy soil.^[1]

The canister is tolerant of a diversity of soils—calcareous, lateritic, acid-sandy and heavy clays. It makes best vegetative growth in deep, fertile, well-drained soils but is said to be more fruitful on shallow soils. It can be cultivated on soil considered too thin and poor for most other fruit trees. It grows well in maritime areas, where it shows good wind resistance.^[2] It has been used as a folk medicine in several countries as antimicrobial, antioxidant, anti-fungal, neuro-protective, immunostimulatory, anti-platelet, anti-diabetic and anti-inflammatory. It can be used to cure liver disorder, skin disease, coronary trouble, kidney disorders and ulcers. The fruit pulp and peel are used as an appetizer, stomach-tonic, inflammation, cardiac stimulant. The fruit juice has potential in promoting eye health and fever reduction.^[3]

VERNACULAR NAMES^[4]

Table 1: Vernacular names of *Pouteria campechiana*.

English	Canistel
Sanskrit	Anda phal
Kannada	Motte hannu
Malayalam	Muttappazham.
Hindi	Kainistal phal.
Tamil	Kenistel palam

TAXONOMICAL CLASSIFICATION^[5]

Table 2: Taxonomical classification of *Pouteria campechiana*.

Kingdom	Plantae
Subkingdom	<u>Viridiplantae</u>
Infrakingdom	<u>Streptophyta</u>
Superdivision	<u>Embryophyta</u>
Division	<u>Tracheophyta</u>
Subdivision	<u>Spermatophytina</u>
Class	<u>Magnoliopsida</u>
Subclass	<u>Asteranae</u>
Order	Ericales
Family	Sapotaceae
Genus	Pouteria
Species	<i>P campechiana</i>

HABITAT

Canistel has a high tolerance to various soil types, the soil types needed for canistel growth ranged from acidic sandy to limestone sandy soil. The canister is tolerant of a diversity of soils—calcareous, lateritic, acid-sandy and heavy clays. It makes best vegetative growth in deep, fertile, well-drained soils but is said to be more fruitful on shallow soils. It can be cultivated on soil considered too thin and poor for most other fruit trees. It grows well in maritime areas, where it shows good wind resistance.^[2]

DISTRIBUTION

This fruit is a native plant to Central America region, namely the Bahamas, Belize, El Salvador, Guatemala, and Southern Mexico. The distribution is well spread around the region including Nicaragua, Costa Rica, Panama, Puerto Rico, Jamaica, and Cuba. Previously the spread was as far south as to reach Brazil. In the United States, this fruit was introduced in Florida. It is also planted in East Africa countries such as Kenya Tanzania, and Uganda, Egypt, in the Middle East, South Asia countries such as Sri Lanka and India and also introduced into the Philippines, and later in most countries in South East Asia region, Thailand, Cambodia, Vietnam, Malaysia, Indonesia. The introduction of this fruit has reached further east to Taiwan.^[2, 6]

BOTANICAL DESCRIPTION

Erect tree, 8 m tall, in favourable situations, reach height of 27-30 m and the trunk may attain diameter of 1 m. Slender in habit or with a spreading crown, it has brown, furrowed bark and abundant white, gummy latex. Young branches are velvety brown.^[7]

Leaves

Evergreen, grouped at branch tip leaves are thin, glossy and petiolate oblanceolate, bluntly pointed, bases are sharply tapered.^[8]

Flowers

Flowers bisexual, solitary or in small clusters and fragrant. Borne at leaf axils or leafless nodes, the flowers are 5 or 6 lobed, cream colour, silky hairy and about 8-11 mm long.^[7, 8]

Fruit

Nearly round to Ovoid, ovate, spindle shaped. 7.5 To 12 in (1030 cm) wide.^[8]

Peel

When unripe, the fruit is green, hard and gummy inside, going on to turn lemon-yellow, golden yellow or orange-yellow on ripening with a smooth and glossy skin sometimes with light-brown to reddish-brown roughed patches.^[7]

Pulp

Flesh is yellow, firm and pasty, becoming softer towards the seeds, resembling the texture of the yolk of a hard-boiled egg or to some, and the flesh of pumpkin.^[8]

Seed

1-4, hard and free-stoned, near-oval to oblong-oval, glossy and chestnut brown, except for the straight or curved ventral end, which is dull light-brown to greyish- white. Both tips of the seed are sharp.^[8]

CHEMICAL CONSTITUENTS

There are plenty of reports about the constituents in the different parts of *Pouteria campechiana* including alkaloids, carbohydrate, glycosides, proteins and amino acids, flavonoids, steroids, and tannin's. Compared to other fruits, edible part of this fruit is rich in nutrients as it contains lipids, fats and fibers, vitamin C and high level of carotenoids, tannins, reducing sugar. The *Pouteria campechiana* is reported to contain carbohydrates such as glucose, pectin and reducing sugar. Flavonoids such asprotocatechuic acid, quercetin, myricetin, and myricetin-3-O- β -galactoside, gallic acid and myricetin-3-O- α -L-rhamnoside, carotenoids such as zeta-carotene, beta-carotene 5,6-epoxide, beta-carotene and phytofluene.^[8,9]

PHARMACOLOGICAL ACTIVITIES**Antimitotic Activity**

This study was undertaken to determine the compound responsible for the antimitotic activity of ethyl acetate extracts obtained from the leaves of *Pouteria campechiana* Baehni. Six stilbenes and six flavonoid glycosides were purified and identified after chromatographic separation and spectroscopic analysis. The distilbene ampelopsin B was found to arrest mitosis in a cell-based primary screen to monitor cell-cycle progression and was also determined to beat weak microtubule depolymerize in a secondary assay.^[9]

Antimicrobial activity

The study showed that essential oil from *P. campechiana* seeds had potent antimicrobial activity against both Gram-positive and Gram-negative bacteria. In the findings of the essential oil appeared active against 4 microorganisms, namely *Micrococcus tetra* genus, *Bacillus cereus*, *Staphylococcus albus*, and *Escherichia coli* with zone of inhibition in the range of 11.03–16.23 mm. The essential oil presented no bacteriotoxicity against *Bacillus subtilis*.^[10]

Anti-diabetic activity

Study of a methanolic extract of *P. campechiana* leaf and fruit showed inhibition of Amylase and Glucosidase enzymes, which concluded that methanolic leaf and fruit extract of *P. campechiana* possess antidiabetic activity.^[11]

Antioxidant activity

To differentiate the antioxidant capacity in parts of *P. campechiana* fruit, conducted a study concerning different extracting solvents. The solvent of 70% ethanol exhibited highest antioxidant capacity in all parts of the fruit. However, there were no significant differences in antioxidant capacity among the extracts of peel, pulp, and seed observed in DPPH testing.^[12]

The authors found that the *P. campechiana* bark extract exhibited high anti-radical activity in ABTS, DPPH, PLO, hydroxyl radical scavenging, and superoxide radical scavenging activity.

Analgesic activity

Analgesic activity of *P. campechiana* seed and leaf extracts based on the hot plate test in male albino Wistar rats.

The analgesic activity observed in the ethanolic extracts from leaves was more potent than that in the extracts from the seeds.^[3]

Hepatoprotective activity

Study evaluated a fruit extract of polyphenolic rich *P. campechiana* for antioxidant and hepatoprotective effect against acetaminophen-intoxicated rats. Results showed concentration-dependent scavenging of free radicals. Treatment significantly reduced elevated liver marker enzymes, with restoration of normal functional ability of hepatocytes. Results showed strong antioxidant and significant hepatoprotective effect.^[13]

Anti-inflammatory

Study evaluated de-fatted ethanol extracts and n-hexane fractions of *P. campechiana* seeds and leaves. Seed ethanolic extract showed 85% inhibition of inflammation in rat paw oedema test and maximum analgesic activity after 90 min ($p < 0.05$) in hot plate test. Both seeds and leaves ethanolic extract showed significant decrease in gastric ulcer number and severity ($p < 0.05$).^[3]

Immunomodulatory activity

Study evaluated the immunomodulatory properties of a MeOH extract of *P. campechiana* leaves in peritoneal macrophages of Balb/c mice. Results showed MeOH extract of leaves stimulated phagocytic activity and increased NO, H₂O₂, and cytokine production. The extract showed strong immunomodulatory effect in a concentration-dependent manner without affecting cell viability.^[14]

CONCLUSION

Pouteria campechiana belonging to family Sapotaceae is widely accepted for its traditional medicinal uses and pharmacological potential. Various parts of *Pouteria campechiana* have reported the presence of several phytochemicals such as alkaloids, carbohydrate, glycosides, proteins and amino acids, flavonoids, steroids, tannin's and other constituents. *Pouteria campechiana* revealed various pharmacological activities such as anti-microbial, anti-inflammatory, anti-diabetic, anti-oxidant, a, anti-obesity, anti-ulcerogenic and hepatoprotective activity. Each and every part of canistel tree possesses medicinal and nutritional value, with numerous other applications. Further scientific investigation on different parts of *Pouteria campechiana* must to be undertaken to unveil additional pharmacological properties.

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