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## Antimicrobial activities of *Careya arborea*: A review

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### Abstract

*Careya arborea* Roxb, commonly known as wild guava is known as Padmaka, Kumbhi in Ayurveda. It belongs to the family Lecythidaceae. This plant extensively used in Indian-traditional medicine for the treatment of different diseases. *Careya arborea* Roxb. Was useful in tumours, cough, bronchitis, tooth ache, wounds, epilepsy, ulcer, colic, dysentery, leucoderma, smallpox, intestinal worms. It is a significant medicinal plant though, most of the plant parts used in traditional systems of medicine. It is used as antimicrobial, astringent, demulcent, antitumour, antipyretic and antipruritic, hepatoprotective, CNS activity, antileishmanial, antidiarrhoeal, anticoagulant, analgesic, antitumour, cytotoxic activity. The antimicrobial activity depends upon the Chemical constituents present in the plants. The present review gives an account of the updated information on its antimicrobial activities of the plant *careya arborea*.

**Keywords:** antioxidant, *Careya arborea*, geographical, pharmacological, antimicrobial

### Introduction

*Careya arborea* is a species of tree in the Lecythidaceae family, native to the Indian Subcontinent, Afghanistan, and Indochina. It is known as Kumbhi in Hindi, and Slow Match Tree in English. *Careya arborea* is a deciduous tree that grows up to 15m-45 ft high. Its leaves turn red in the cold season. Flowers are yellow or white in colour that become large green berries. The tree grows throughout India in forests and grasslands.

### Geographical distribution

*Careya arborea* is widely distributed in India, Srilanka, Malaya peninsula, occasionally planted in gardens and along roadsides. In Karnataka it is distributed in Belgaum, Bellary, Chikmagalur, Chitradurga, Coorg, Hassan, Mysore, North kanara, Shimoga, South kanara districts.

Is a deciduous, small to medium-sized tree growing up to 20 metres tall. The bole can be straight when the tree is growing in good conditions, but is often stunted in poor sites. The plant is a popular herbal remedy in India, where it is often harvested from the wild for local use and trade. The tree also supplies a dye, fibre, gum, tannins and wood for local use. It is sometimes grown as a shade-providing ornamental.

### Description of the Plant

A small to medium-sized, deciduous tree, with spreading branches. Leaves up to 30 cm long, broadly obovate or obovate-oblong, rounded or shortly acuminate. Flowers large, white, ill-smelling, sessile, in thick, swollen, hard, few-flowered terminal spikes, 7.6-20 cm long. Fruit are 6.3-7.5 cm across and globose.

### Botanical description

This tree can be identified by its thick dark grey bark. The large showy flowers and leaves which turn red in winter. Characteristics-it is deciduous tree, about 9-18m high. Leaves-They are simple, glabrous and broadly obovate; found in cluster at the end of branches. Flowers-these are yellowish white; borne in thick, hard terminal spikes. The fruits-large, green, fleshy, globous and rounded.

### Chemical Constituents

It contains terpenoids, flavonoids, coumarins, saponins, tannins. Particularly the stem bark contains betulin and betulinic acid. Root bark contains-metformin as an active hypoglycemic principle. Leaves-contains triterpene ester, beta-amyrin, hexacosanol, taraxerol, beta-sitosterol, quercetin and taraxeryl acetate. Seeds contain  $\alpha$ -spinasterol,  $\alpha$ -spinasterone, sterols and saponins.

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Fig 1: Different Parts of *Careya arborea* tree

### USES of *Careya arborea*

#### Ethnopharmacological actions

Bark: Astringent, demulcent, emollient embrocations, snake bite, antipyretic and antipruritic, anthelmintic, antidiarrhoeal, epileptic fits, treatment of tumour, bronchitis.

Leaves: Treatment of ulcer and astringent.

Fruit: used as decoction to promote the digestion, aromatic, astringent, demulcent.

#### Using Information

Plant is used in *prolapses ani* and *fistula ani*. The bark is alexiteric, diuretic and anthelmintic; useful in tumours, dyspepsia, colic, bronchitis, piles, leucoderma and skin diseases. It is used for diarrhoea in Rema-Kalenga. Bark after moistening, prescribed for emollient mbrocations. It is also used as a demulcent in coughs and cold. Leaves are used as vulnerary and maturant. Leaf paste is used as poultic to heal obstinate ulcers. Flowers in sherbat or in infusion are used to heal ruptures caused during child birth. Decoction of furits is digestive.

#### Pharmacological actions

Hepatoprotective, antimicrobial, antioxidant, anticoagulant activity, CNS activity, Antileishmanial activity, antidiarrhoeal, analgesic, antitumour, cytotoxic activity, antiulcer activity<sup>[1]</sup>.

#### Antimicrobial Investigations

The antibacterial activity of ethyl acetate, ethanol and hexane extracts of the fruits of *Careya arborea* Roxb by using Agar diffusion assay. All the tested bacterial strains viz., *Escherichia coli*, *Salmonella typhimurium*, *Listeria monocytogenes*, *Staphylococcus aureus* and *Staphylococcus epidermidis* were found to be sensitive to all the 3 concentrations of ethyl acetate and ethanolic extracts of fresh and dry fruit, in ascending order<sup>[2]</sup>.

The antibacterial activity of 70% ethanolic extracts of *Careya arborea* Roxb. The antibacterial activity of the extract was done on some standard and wild pathogenic bacterial strains such as *staphylococcus aureus*, *E. coli*, *Pseudomonas aeroginosa*, *Candida albicans*. The testing was done by the agar cup plate method using sterile top agar. Zone of inhibition of extracts was compared with that of standard streptomycin for bacteria and nystatin for fungi prepared in distilled water. The results shows that the inhibition of the bacterial as well as fungal growth was found in bark and tuber extracts<sup>[3]</sup>.

*Careya arborea* Roxb is a plant traditionally used for cure and treatment of tumors, bronchitis, epileptic fits, diarrhoea, pyrexia, dysentery toothache, haemorrhoids, leucoderma, and eruptive fever particularly in smallpox. The present

investigation was carried out to evaluate *in vitro* antitumour and antibacterial activities *Careya arborea* ethanolic leaves extract (CAELE). The cytotoxicity of CAELE based on inhibition of Vero cell line was screened by MTT assay. The IC<sub>50</sub> of HEP-2 cells by CAELE was found to be 671.9 µg/ml. Four different concentrations of CAELE (10, 20, 40, and 80 mg/disc) were used to study antibacterial activity by disc diffusion and tube dilution method against gram positive and gram negative bacteria. Amongst the test bacteria CAELE induced highest zone of inhibition against *S. typhimurium* (20.33±0.33mm) followed by *E. coli* (19.66±0.33mm), *B. cereus* (18.33±0.33mm), *Z. mobilis* (18.00±0.57mm), *P. aeruginosa* (17.66±0.88mm) and *S. Pyogenes* (17.66±0.33 mm). The active phytoconstituents like alkaloids, amino acid Proteins, saponins, sterols, tannins and phenols, were found in extracts of *C. arborea*. The present investigation points out that CAELE can be a potential source to probable antitumour and antibacterial agent<sup>[4]</sup>.

Antimicrobial activity of *Careya arborea* Roxb, leaf extracts was determined using cup-plate diffusion, two-fold serial dilution method. In cup-plate method, inhibition zone sizes were used to determine the susceptibility to extracts. The results showed that *C. arborea* leaf extracts showed potential antibacterial activity against *S. aureus* and *B. subtilis*. Ethyl acetate and ethanol extracts showed the highest zones of inhibition for Gram positive and Gram negative bacteria and for fungus *C. albicans*. *Careya arborea* leaf extracts were able to have a MIC range of 0.938-15 mg mL<sup>-1</sup>, in two-fold dilution method. The ethyl acetate extract exhibited significantly better inhibition compared to other extracts. Gram-positive *B. subtilis*, Gram-negative *E. coli* and fungus *C. albicans* were found to be most susceptible to ethyl acetate extract. The extracts have shown to be bacteriostatic and fungi static at low concentrations. Phytochemical screening of the extracts revealed the presence of phyto-compounds such as triterpenoids, steroids, flavonoids and tannins as major phytoconstituents with known antimicrobial agents. These phyto-constituents may be responsible for the antimicrobial activity of *C. arborea*<sup>[5]</sup>.

In the present study, the dried powdered bark of *careya arborea* Roxb. Was successively extracted by using successive solvents such as pet-ether, chloroform, methanol, ethanol, water. By using continuous hot extraction using soxhlet assembly. The respective percentage yield was recorded with the regular intervals. All the extracts were subjected to antimicrobial activity by agar diffusion method out of which methanolic extract showed the significant antimicrobial activity against Gram positive bacteria such as *Micrococcus luteus*, *Staphylococcus aureus*. Gram negative such as *pseudomonas aerogenosa*, *E. coli*. And fungi such as *Aspergillus niger*, *Candida albicans*, by using Streptomycin

(100µg/ml) as a standard for bacteria and fluconazole (100µg/ml) for fungi. The highest zone of inhibition for bacteria found in *E. coli* and for fungi in *Candida albicans* <sup>[6]</sup>.

*Careya arborea* were analyzed for their pesticidal activity by leaf dip and diet bioassay techniques against *Spodoptera litura* and *Helicoverpa armigera*. *Spodoptera litura* and *Helicoverpa armigera* are the devastating pests of numerous wild and cultivated plants throughout the world. It has been reported to attack more than 150 species of agricultural crops including cotton, groundnut, tobacco, maize, bean, potatoes, soybean, rice, sunflower, tomato etc. Management of these insect has been largely based on insecticides, but the development of resistance to most of the synthetic insecticides and an associated environmental problem has necessitated searching for some alternative natural pesticides. New types of herbal pesticides originating from natural products, targeting *Spodoptera litura* and *Helicoverpa* could be a useful alternative for integrated pest management. Herbs were extracted successively with pet ether, chloroform, methanol, ethanol, and water. Extracts were standardized and estimated for their flavonoid content by aluminum chloride assay. The pesticidal activity of all the extracts was evaluated by leaf dip and diet bioassay techniques against *Spodoptera litura* and *Helicoverpa armigera*. Methanol and ethanol extracts of *Careya arborea* showed optimum mortality rate at 72 hours at the concentration of 50µg/ml. The *Careya arborea* showed high flavonoids content <sup>[7]</sup>.

### Conclusion

The present study reveals that the review on antimicrobial activity of aerial parts of *Careya arborea*, Use of herbal medicinal plants has been distinctive in our lives right from the primitive period till today and provided us with the data on the use of plants or plant products as therapeutic agents in treating various ailments by virtue of their phytoconstituents. *Careya arborea* Roxb. is an important medicinal plant. Extensive literature survey revealed its the drug is enriched with flavonoids, tannins, terpenoids and sterols. The plant exhibits many pharmacological activities like antioxidant, antitumor, analgesic, hepatoprotective, antidiarrhoeal, anticoagulant and diuretic properties.

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