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# A potential review on *Couroupita guianensis* aubl: A sacred botanical treasure of India, known for its numerous medicinal uses

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**Abstract**
Despite having a wide range of medicinal uses and a high phytochemical variety, *Couroupita guianensis* Aubl. is underutilized in Ayurvedic and indigenous medicine. The purpose of this review is to gather the available information on its pharmacological characteristics, phytoconstituents, and ethnobotanical applications. *In vitro* and *in vivo* pharmacological assays and phytochemical studies of different plant parts are examples of experimental methods used to assess the anti-inflammatory, anti-microbial, anti-oxidant, cytotoxic, analgesic, antiulcer, immunomodulatory, antifungal, and wound-healing properties. Results show the existence of phenolic compounds, alkaloids, flavonoids, terpenoids, and essential oils that have important biological activities such microbial suppression, radical scavenging, cytotoxicity against cancer cell lines, and gastroprotective function. According to the review, *Couroupita guianensis* is a promising source of new bioactive chemicals, but in order to confirm and incorporate its therapeutic potential into contemporary medicine, more standardization, mechanistic research, and clinical trials are necessary.

**Keywords:** Medicinal plants, phytochemicals, pharmacological activities, anti-inflammatory, traditional medicine, bioactive compounds

## Introduction
Many of the species utilized in herbal therapy are classified as medicinal plants, and many of them have important therapeutic qualities. These plants have been crucial to the advancement of human civilizations throughout history. More than 3.3 billion people in impoverished countries depend on them as essential resources for drug development and synthesis, making them the cornerstone of conventional medical systems. Many plant species that thrive in various habitats can be found throughout the nation. One of these, the quickly spreading deciduous tree *Couroupita guianensis*, is a significant medicinal plant. It is recognized that this plant has valuable bioactive substances in almost every part of it, including the leaves, flowers, fruits, stems, roots, and seeds [1]. Medicinal plants have historically played an important role in human health, providing both therapeutic and cultural value. Different communities have established their own understandings of health and sickness, and these viewpoints are frequently mirrored in plant-based therapeutic methods. Plant-based medicines continue to play an important role in many traditional medicinal systems, including those practiced in India. Global health data show that a considerable proportion of the world's population relies on traditional medicines, many of which are derived from plant extracts and natural substances. Scientific research has explored the medicinal potential of hundreds of thousands of plant species, often depending on information kept within indigenous populations. *Couroupita guianensis* stands out because of its historical relevance and wide range of applications. Aside from its therapeutic benefits, this species is prized for its ornamental value, bearing unique blooms in brown, pink, green, and white [2]. *Couroupita guianensis* Aubl (cannon-ball tree), native to tropical north-eastern South America.It contains phytochemicals such as alkaloids, flavonoids, terpenoids, saponins, tannins, and carbohydrates that are ready for use by both plants and people, as well as a reservoir of several pharmacological actions. This tree is considered sacred in Hinduism and is commonly seen around Shiva temples. It is often used in tropical and subtropical gardens as an ornamental tree [3]. It's a massive tree with vivid, intensely fragrant blossoms. To meet the growing demand, it is easy to mix low-quality ingredients into natural medications or replace them completely. India has a long history of adopting traditional medicine, such as Siddha, Unani, and Ayurveda. To meet the growing demand, natural remedies can easily be falsified or completely substituted with low-quality

components. As a result, it is necessary to establish standards for the identification of strong medicinal plants used to cure ailments [4]. Traditional plant remedies continue to play an essential role in current drug businesses due to their low side effects and synergistic action of many components. Even now, plants are not only essential in health care, but also the best source of safe future medicines. Agro-industrial technologies are required for medicinal plant cultivation, processing, and herbal medicine production. In Japan, herbal therapeutic treatments outsell modern pharmaceutical medications. Traditional medicine is widely practiced in China, India, Japan, Pakistan, Sri Lanka, and Thailand. Traditional tribal remedies account for around 40% of China's total medicinal usage [5]. Medicinal plants are important sources for new medication discovery and understanding plant toxicity, which helps protect humans and animals from natural poisons. UNESCO has emphasized the widespread use of traditional medicine and medicinal plants as critical to maintaining health in many poor nations. With almost half a million plant species worldwide, the vast majority have yet to be explored for their therapeutic potential. Exploring these plants presents interesting potential, as their bioactive chemicals may play a critical role in current and future treatments, emphasizing the necessity of ongoing research in this area [6]. The use of medicinal plants is a dynamic and expanding field that influences both traditional and modern medicine. The pharmaceutical and biotechnology industries are increasingly using plant-based chemicals to generate new medications and cures. This shift emphasizes medicinal plants as a potential source of novel bioactive chemicals, which drives innovation and provides exciting opportunities for drug discovery and therapeutic breakthroughs in modern healthcare [7]. Aside from their therapeutic effects, medicinal plants have high financial and environmental importance. They continue to be a primary healthcare resource in rural and low-income communities, where access to modern medications is frequently limited [8]. Synthetic medications have gained popularity due to their quick effects, yet there is rising recognition of the benefits of natural therapies. While chemically made medications can act fast, they frequently have long-term negative effects. In contrast, medicinal herbs tend to work holistically, providing probiotic-like properties with few or no side effects. Many developing countries, where access to mainstream pharmaceutical therapies is limited, are increasingly turning to botanicals and traditional medicine. This is partly due to the lower cost and greater accessibility of plant-based medicines, which are frequently available without a prescription. Furthermore, medicinal plants are thought to be more successful in treating specific health disorders because they are natural and less likely to create negative side effects. The usage of medicinal herbs has long been part of human civilization, with magical and religious importance. Different cultures have different perspectives on health and sickness, and medicinal plants have played an important role in these traditions. Today, this ancient knowledge continues to influence health practices, bridging the gap between traditional wisdom and modern medicine, especially in rural and low-income communities where medicinal plants remain a primary healthcare resource [9].

**Table 1:** Vernacular Names: [10-11]

| Language/State/Country | Name |
|---|---|
| English | cannon ball tree |
| Hindi | Kailas Pati |
| Telugu | Mallikarjuna flowers |
| Tamil | Nagalingam flower |
| span | Coco de mono |
| Portuguese | Macacarecuia |
| Dutch | kanonskogelboom |
| Bengali | nagkeshar |
| French Guiana | kouroupitoumou |

**Table 2: Taxonomical Classification:** [12]

| | |
|---|---|
| Kingdom | Plantae |
| Subkingdom | Tracheobionta |
| Super division | Spermatophyta |
| Division | Magnoliophyta |
| Class | Magnoliopsida |
| Subclass | Dilleniidae |
| Order | Lecythidales |
| Genus | Couroupita Aubl |
| Species | *Couroupita guianensis* Aubl |

**Plant Profile**

*Couroupita guianensis*, sometimes known as the cannonball tree, is a fast-growing evergreen endemic to tropical regions such as Brazil, Central and South America, the Caribbean, and India. The tree can grow to be up to 25 meters tall and have a canopy spread of about 3 meters, thanks to its thick, woody branches [13]. Because of its traditional medical use and unique appearance, different portions of the plant, particularly the leaves, flowers, and fruits, have been the subject of pharmacological research aiming at identifying bioactive chemicals and therapeutic potential.

**Leaf:** The leaves are solitary, growing concentrically, spear-shaped, and pointed at the tip. oblong dark green and crowded at the ends of branches. The leaves were normally green and 8-35 cm long, although they might reach up to 57 cm. The leaves have an acceptable odor, a bitter taste, and a silky texture and are used to cure a variety of skin ailments.

**Fig 1:** Leaves of cannonball tree

The transverse section of *Couroupita guianensis* leaves reveals that they are dorsiventral, have covering trichromes, and amniocytic stomata [14].

**Flowers**

*Couroupita guianensis* is a large deciduous tropical evergreen tree, commonly cultivated as an ornamental species due to its striking flowers and distinctive fruit. It is particularly familiar to rural communities and tribal populations, where its cultural and medicinal significance is well recognized. The tree produces large, showy flowers in shades of orange, scarlet, or pink, emitting a pleasant fragrance that is especially strong during the night and early morning hours. The flowers are borne almost year-round and exhibit a unique morphology. Each flower typically contains six short sepals and six broad, uneven petals that are concave in shape pink on the inner surface and a mix of white, yellow, and pink externally. Numerous stamens are arranged on a fleshy, curved androphore that extends from the base of the ovary and arches over it. The ovary is divided into 5-7 chambers, each containing multiple ovules. Fertile stamens are positioned in a ring around the reduced style, while sterile stamens (staminodes) bearing infertile pollen are situated in specialized anther odes. Pollination is primarily facilitated by large black carpenter bees, which enter the flower with their ventral side aligned toward the sterile stamens. The flowers eventually develop into large, woody, spherical, indehiscent fruits ranging from 15 to 24 cm in diameter enclosed in a hard outer shell and possessing a double-fleshy (amphisarcun) structure [15].

**Fig 2:** Flower of *Couroupita guianensis*

*Couroupita guianensis* flowers attracts a variety of insects, with honeybees and carpenter bees serving as its main pollinators. The flower's shape, color, and scent work together to draw in these visitors. Although the plant doesn't produce nectar, it offers pollen as a food reward for pollinators. As bees collect this pollen, fertile grains from the staminal disc are transferred to other flowers, aiding cross-pollination. When cross-pollination doesn't occur, the structural arrangement of the two stamen types enables some self-pollination. Additionally, the flower's bright petals, white hood, and yellow stamen structures reflect ultraviolet light, further enhancing their appeal to pollinators [16].

**Fruit**

*Couroupita guianensis* produces large, striking fruits that are round and rust-colored. Locally, they are sometimes called "ayahuma," meaning "heads of spirits," due to their unusual appearance. The fruits are light brown, about 20 cm in diameter, and take roughly a year to mature. Once ripe, they become soft. A single tree can bear between 50 and 150 fruits, each containing up to 300 small seeds embedded in a yellow pulp that has a foul odor and is toxic. This pulp is used both for propagation and medicinal purposes. After the fruiting season, the tree briefly sheds its leaves but they regrow within about a week. Upon exposure to air, the fruit's flesh undergoes oxidation, changing color from blue to white [17].

**Fig 3:** Fruit of cannonball tree

**Fig 4:** Trunk of *Couroupita guianensis* bearing clusters of flowers

**Table 3:** Phytochemical constituents of *Couroupita guianensis* [17-18] the phytochemical constituents of the cannonball tree are as follows:

| Part of plant | Phytoconstituents | Chemical compounds |
|---|---|---|
| Fruit | Alkaloids | Couroupitine A(tryptanthrin), Couroupitine B (indirubin) |
| | Flavonoids | rutin, quercetin, kaempferol, Farmar cetin, luteolin |
| | Tannins | None reported |
| | Saponins | None reported |
| | Phenols | None reported |
| | Glycosides | None reported |
| Flower | Essential oil | Eugenol, linalool, nerol, geraniol, geranial, limonene, farnesol, (E, E)-farnesyl acetate, (E, Z)-farnesyl acetate, Trans-ocimene |
| | Keto steroids | stigmasterol |
| | Glycosides | None reported |
| | Indirubin | None reported |
| | Indole derivative | Isatin |
| | Phenolic compounds | o-coumaric acid, caffeic acid, quercetin |
| leaves | Flavonoids | kaempferol-3 O-neohesperidoside, 20, 40-dihydroxy-60-methoxy-30,50-dimethylchalcone, 7-hydroxy-5-methoxy-6,8 dimethyl flavanone. |
| | Terpenoids | β-amirin palmitate (Triterpenic ester) |
| | Glycoside | kaempferol-3 O-neohesperidoside |
| | Phenols/phenolic acids | 4-hydroxybenzoic acid, hydroxycinnamic acids, caffeic acid, Rosmarinus acid. |
| | Steroids | None reported |
| | Alkaloids | None reported |
| | Tannins | None reported |
| | Saponins | None reported |
| | Anthraquinones | None reported |
| Seeds | Fatty acids | linoleic acid, oleic acid, palmitic acid, and stearic acid |
| | Alkaloids | Indirubin, tryptanthrin |
| | Terpenoids | Nerol |
| | Phytosterol | stigmasterol, campesterol |
| Stem and Bark | Flavonoids | None reported |
| | Tannins | None reported |
| | Steroids | Phytosterol, Couropitone, stigmasterol, l, ergosta-4,6,8(14), 22-tetraen-3-one, β-sitosterol |
| | Triterpenoids | β-amyrin, betulin-3β-caffeate and lupeol-3β-caffeate, β-amyrone, β-amyrin acetate |
| | Anthraquinones | None listed |
| | Amino acids | None listed |
| | Glycosides | β-sitosterol |

## Chemical Structures of some important phytoconstituents

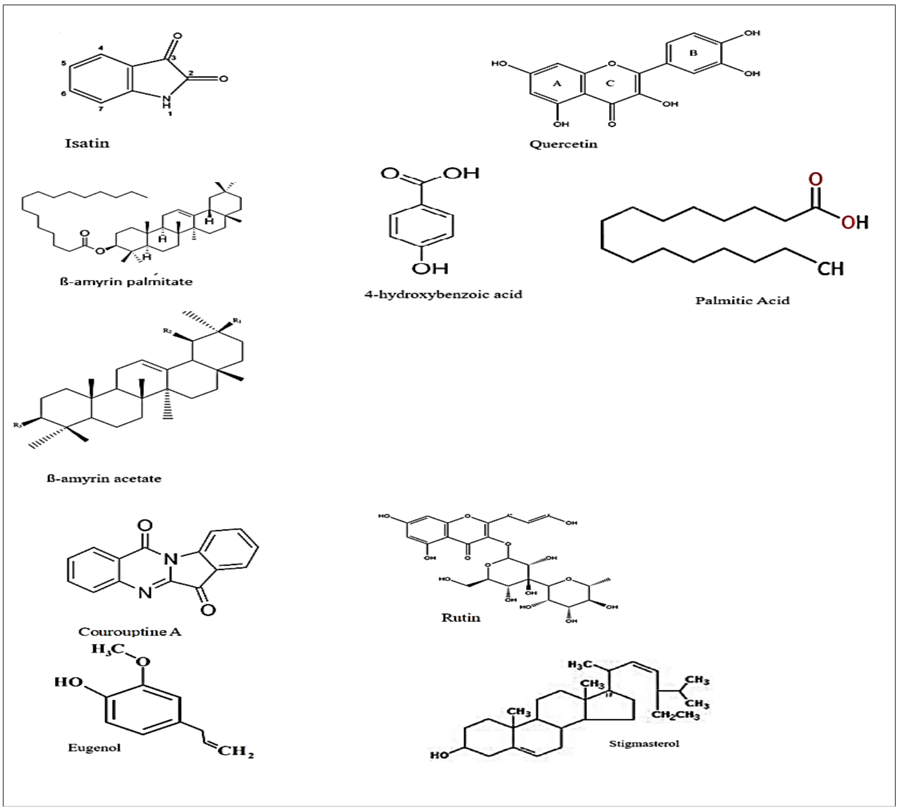


**Fig 5:** Some important isolated phytochemical constituents of *Couroupita guianensis*

## Pharmacological Activities

**Anti-oxidant activity:** The antioxidant activity of the plant extract was assessed using the DPPH (2,2-diphenyl-1-picrylhydrazyl) radical scavenging assay. Test samples and the standard antioxidant, ascorbic acid, were prepared at various concentrations, with each adjusted to 100 µL using methanol. A 0.1 mM DPPH solution was prepared in methanol and 3 mL of this solution was mixed with each test concentration. A control sample was prepared by mixing 3 mL of DPPH solution with 100 µL of methanol. The mixtures were kept in the dark at room temperature for 30 minutes to allow the reaction to take place. Antioxidant activity was indicated by a color shift from violet to yellow, reflecting the neutralization of free radicals. After incubation, the absorbance of each sample was measured at 517 nm against a methanol blank. The percentage of DPPH inhibition was calculated using the formula:

**%Inhibition=Absorbance of control**
**(Absorbance of control−Absorbance of sample) ×100**

$IC_{50}$ values (the concentration required to inhibit 50% of DPPH radicals) were determined for both the test samples and the standard, helping to compare their antioxidant efficacy [19].

**Anti-microbial activity:** The antibacterial and antifungal activities of methanolic and aqueous leaf extracts of *Couroupita guianensis* were assessed using the well diffusion technique. Both extracts showed inhibitory effects against six human bacterial pathogens and four fungal species, as presented in Tables 3 and 4. Among the two, the methanolic extract displayed superior antimicrobial potential compared to the aqueous extract. In antibacterial evaluations, the methanolic extract produced inhibition zones ranging from 12 mm to 31 mm. The highest antibacterial effect (31 mm) was noted with a 200 mg dose against *Salmonella typhi*, followed by 29 mm against *E. coli*. The lowest inhibition (12 mm) was observed against *Streptococcus aureus* at 50 mg. The aqueous extract showed inhibition zones from 12 mm to 30 mm, with the greatest effect (30 mm) also against *E. coli* at 200 mg, and the lowest (12 mm) at the same strain with the lowest concentration. No inhibitory response was observed for *Leuconostoc lactis*, *Pseudomonas aeruginosa*, and *Streptococcus pyogenes* using either extract. For antifungal activity, only the methanol extract was effective, with inhibition zones between 8 mm and 19 mm. The strongest antifungal action (19 mm) was seen against *Aspergillus Niger*, while the weakest (8 mm) was against *Rhizopus indicus* at 50 mg [20].

### Anti-inflammatory activity

Inflammation serves as the body's natural defense response to harmful internal or external factors. Studies conducted both *in vitro* and *in vivo* have suggested that *Couroupita guianensis* (CG) possesses notable anti-inflammatory properties. In one *in vitro* study, the methanolic extract of CG flowers exhibited strong membrane-stabilizing effects on human red blood cells (RBCs) at a concentration of 500 µg/mL. This stabilizing activity was greater than that observed with both the ethanolic extract and the standard anti-inflammatory drug, diclofenac. The extracts effectively prevented hemolysis of RBCs induced by hypotonic stress. Since the structure of red blood cell membranes closely resembles that of lysosomal membranes, such membrane protection is considered a key indicator of potential anti-inflammatory action [21].

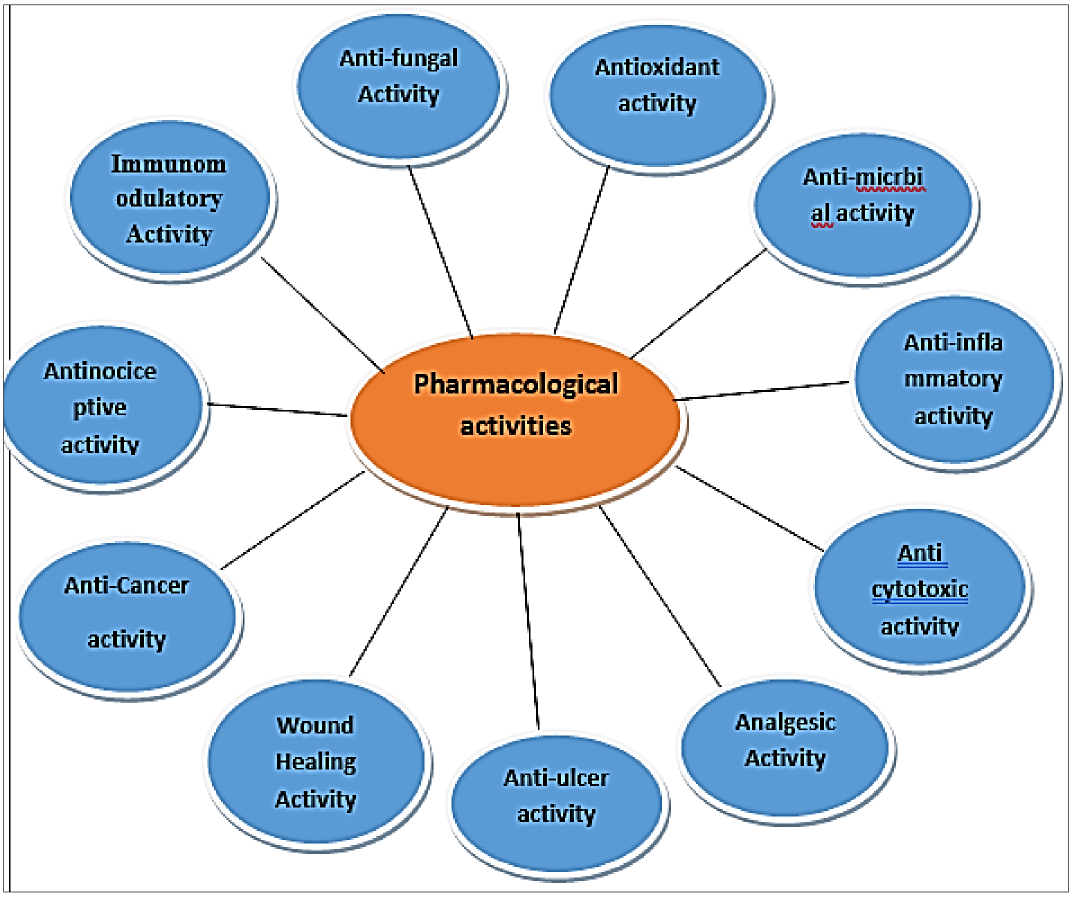


**Fig 6:** Pharmacological activities of *Couroupita guianensis Aubl* Tree

**Anti-cytotoxic activity**

The cytotoxic potential of *Couroupita guianensis* flower extracts was evaluated against MCF-7 breast cancer cell lines. Both ethanolic (ECG) and ethyl acetate (EACG) extracts exhibited significant *in vitro* cytotoxic activity, while the aqueous extract (ACG) showed minimal effect. At 200 µg/mL, ECG and EACG demonstrated 72.73±0.41% and 74±0.046% inhibition, respectively. In contrast, tamoxifen, used as a standard, showed higher inhibition of 84.9±0.17% at the same concentration and 10.5±0.05% at a much lower dose of 2.5 µg/mL. ACG showed only 27.5±0.05% inhibition at 200 µg/mL. $IC_{50}$ values were calculated using GraphPad Prism (version 6), showing ECG at 59.95 µg/mL, EACG at 64.81 µg/mL, ACG at 685.6 µg/mL, and tamoxifen at 37.79 µg/mL. Although ECG and EACG were less effective than tamoxifen, they still exhibited promising cytotoxic effects, likely due to the presence of phenolic compounds. The reduced potency compared to tamoxifen may be attributed to the crude nature of the plant extracts [22].

**Analgesic activity**

Analgesic activity was evaluated using tail flick method and anti-inflammatory activity was screened by measuring the reduction in carrageenan induced hind paw oedema. The potency of various extracts of flower and bark were compared with i) paracetamol (200 mg/kg) for analgesic activity. The peak analgesic effect of flower was seen after 1 hour while bark extracts showed peak effect after 2 hours. Maximum reduction in inflammation by the extracts was observed after 3 hours. They finally concluded that the plant is almost equipotent to paracetamol in its analgesic activity [23].

**Antiulcer activity**

The ethanolic extract of *Couroupita guianensis* leaves (EECG) demonstrated notable anti-ulcer activity in experimental rat models using both pylorus ligation and ethanol-induced ulcer methods. The extract was administered orally at doses of 150 mg/kg and 300 mg/kg. In the pylorus ligation model, EECG significantly reduced the ulcer index, gastric juice volume, and both free and total acidity levels when compared to the control group. The extract provided a protection index of 68.7% at 150 mg/kg and 81.2% at 300 mg/kg, while the standard drug ranitidine showed 85.2% protection. In the ethanol-induced ulcer model, control animals developed typical lesions in the glandular region of the stomach following ethanol administration. Treatment with EECG led to considerable gastric protection, showing a protection index of 67.7% and 71.2% for the respective doses. Ranitidine, used as the reference, exhibited a slightly higher protection index of 79.6%. These results suggest that EECG possesses effective gastroprotective properties, though slightly less potent than the standard drug [24].

**Immunomodulatory Activity**

All the extracts were evaluated for immunomodulatory activity using the PMN function test6. Peripheral venous blood (10ml) was collected from healthy rats in a sterile heparinized tube. Neutrophils were isolated by Ficoll Hypaque density gradient sedimentation4. The RBC-PMN pellet was then subjected to dextral sedimentation. The supernatants containing more than 90% of PMN cells were collected and the cell density adjusted to 1×106 cells/ml using MEM [25].

**Antifungal Activity**

The antifungal efficacy of leaf and flower extracts was assessed using the poisoned food technique. Well-sporulated test fungi were aseptically inoculated onto both control plates (without extract) and poisoned PDA plates containing 1 mg of extract per ml of medium. These plates were then incubated at room temperature for 96 hours. The diameter of fungal colonies on both control and treated plates was measured in two perpendicular directions. The antifungal effect of the extracts was calculated by determining the percentage inhibition of mycelial growth of the test fungi using the following formula:

**Inhibition of fungal growth (%) = (A−B/A) × 100**

where A represents the colony diameter on the control plates and B represents the colony diameter on the poisoned plates [26].

**Antinociceptive activity**

The pain-relieving effects of the crude ethanol extract (CEE) and its various fractions from *Couroupita guianensis* leaves using three different pain models: acetic acid-induced writhing, tail flick, and hot plate tests. All fractions demonstrated antinociceptive effects in the tail flick test, with the hexane and ethyl acetate fractions showing the strongest and longest-lasting effects. In the hot plate test, the greatest pain relief was seen at a dose of 100 mg/kg across all fractions. The administration of naloxone blocked the antinociceptive effects of the fractions. Pretreatment with atropine decreased the pain-relieving activity of CEE and its fractions, except for the dichloromethane fraction. Mecamylamine did not inhibit the effect of the dichloromethane fraction. Naloxone also reduced the anti-hyperalgesic effects of all fractions, with the most significant reduction seen in the antinociceptive effects of the CEE and butanol fractions [27].

**Anti-Cancer Activity**

The flowers of *Couroupita guianensis* contain a compound known as isatin. Derivatives of isatin have demonstrated cytotoxic effects against various human carcinoma cell lines. Isatin initiates apoptosis, which involves the fragmentation of DNA. The induction of apoptosis by isatin was further confirmed through flow cytometry, helping to clarify both the extent and underlying mechanisms of cell death. Isatin, isolated specifically from the floral parts of the plant, showed significant cytotoxic activity against HL60 leukemia cells [28].

**Wound Healing Activity**

The traditional use of *Couroupita guianensis* (CG) in wound healing has been scientifically validated through various studies. In one such investigation, an ethanol extract prepared from the whole plant was assessed for its wound healing potential using excision and incision models in rats. Key parameters including wound contraction, epithelialization rate, tensile strength, and hydroxyproline content were measured. The findings revealed a significant reduction in wound size, along with improvements in tensile strength and hydroxyproline levels, indicating enhanced tissue repair and accelerated healing [29].

**Other pharmacological Activities**

Other biological activities of extracts from *Couroupita guianensis* including ant urolithic, antiarthritic, antifertility and antidiarrheal, have also been evaluated.

Urolithiasis is a common disorder characterized by the formation of various types of urinary stones within the urogenital tract. The most frequent forms are calcium oxalate and calcium phosphate stones, while less common types include uric acid, struvite, and cystine stones. An *in vitro* study demonstrated that an aqueous extract from the leaves of *Couroupita guianensis* was capable of dissolving

40.8±0.032% of calcium oxalate, indicating its potential anti-urolithiatic properties [30].

The antifertility effects of *Couroupita guianensis* were evaluated using benzene, ethyl alcohol, and water extracts from the bark and flowers. These extracts were tested for their influence on different phases of the estrous cycle in female rats, as well as their impact on the number of implantation sites in pregnant rats. Results showed that the ethyl alcohol extract of the bark, along with all flower extracts, significantly reduced the number of implantations. Based on these findings, *Couroupita guianensis* extracts demonstrate potential therapeutic antifertility activity [3]

The leaves of *Couroupita guianensis* have demonstrated significant antidiarrheal activity in experimental models involving castor oil-induced diarrhea in rats. Administration of both methanolic and aqueous leaf extracts at a dose of 100 mg/kg markedly reduced the frequency of diarrheal episodes, showing efficacy comparable to the standard antidiarrheal drug loperamide [32].

**Traditional Uses of couroupita guainensis**

Various parts of the plant have traditionally been used by local populations to manage a broad range of ailments, including bleeding disorders, hemorrhoids, scabies, dysentery, scorpion stings, high blood pressure, kidney and gastrointestinal issues, allergic reactions, ulcers, dental pain, and skin conditions [33]. The fruits of *Couroupita guianensis* are considered edible and are occasionally consumed. however, their unpleasant odor particularly from the white pulp tends to discourage widespread use. Despite this, the pulp, bark, and flowers of the plant are employed in various traditional medicinal practices. Notably, the fruit pulp has been applied topically to treat skin infections, including those found in dogs affected by mange [34]. The fruit of *Couroupita guianensis* is traditionally used for cleansing wounds, while the young leaves are applied to relieve toothache. Additionally, the leaves, roots, and bark have been utilized by South American shamans in the treatment of malaria [35]. The essential oils extracted from the flowers of *Couroupita guianensis* exhibit notable antibacterial and antifungal activities. They are commonly included as components in various traditional formulations used to treat inflammatory conditions such as skin redness [36]. Tribes in India, the Leaves of this plant is used as hair vitalizer [37].

**Ayurvedic Formulations**

The Ayurvedic formulation of Cannonball (Naga Linga) possesses numerous health benefits and is widely recognized for its medicinal properties. It has been incorporated into various traditional Ayurvedic preparations due to its therapeutic potential.

- **Yogaraj Rasayana:** A classical polyherbal formulation renowned for its rejuvenating properties and immune-boosting effects [38].
- **Nagalinga Churna:** A powdered formulation employed in Ayurveda to alleviate toothache, digestive discomfort, and symptoms of the common cold.
- **Nagalinga Taila:** An herbal oil preparation traditionally used to promote healing of wounds, ulcers, and skin infections, as well as to manage various dermatological conditions [39]. It is important to note that Nagalinga is a potent herb and should be used with caution, as it may have certain contraindications and potential side effects.

**Toxicology of *Couroupita guianensis***

Few studies have evaluated the toxicological aspects of *Couroupita guianensis* (CG). Acute toxicity tests of the methanolic flower extract and ethanolic leaf extract were carried out in albino mice. No signs of mortality or behavioral changes were observed in the animals when the methanolic flower extract was administered orally up to a maximum dose of 2 g/kg and the ethanolic leaf extract up to 3 g/kg. These results indicate that both extracts are relatively safe at the tested doses [40].

**Conclusion**

*Couroupita guianensis* Aubl represents a promising medicinal plant with a rich diversity of bioactive constituents and a long history of traditional use. Scientific studies increasingly support its broad spectrum of pharmacological activities, including antioxidant, antimicrobial, anti-inflammatory, cytotoxic, and wound-healing effects. These findings underscore its potential as a valuable source for novel therapeutic agents. However, most available data are preclinical, and there is a lack of standardized preparations and clinical studies. Future research should focus on rigorous phytochemical characterization, mechanism-based pharmacological investigations, safety assessments, and well-designed clinical trials. Bridging traditional knowledge with modern scientific validation could facilitate the integration of *Couroupita guianensis* into evidence-based complementary medicine and pharmaceutical development.

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