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PHYTOCHEMICAL SCREENING OF STEM OF *COUROUPITA GUIANENSIS*

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ABSTRACT

Couroupita guianensis (Lecythidaceae), is a medicinal plant which is endowed with curative properties including anti-fungal, anti-biotic, anti-septic, analgesic, anti-malaria, stomach-ache, tooth-ache, scabies, gastritis, bleeding piles, dysentery and scorpion poison. The study deals with the preliminary phytochemical screening of the stem of *Couroupita guianensis* with various extracts such as petroleum ether, benzene, ethanol and water. This includes the powder characteristics studies, fluorescence studies and thin layer chromatographic studies of the stem powder. The qualitative analysis of some secondary metabolites, to ascertain medicinal claims of this widely used medicinal plant. The results showed that the moderate presence of alkaloids, flavonoids, steroids, amino acids, phenols and triterpenoids.

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INTRODUCTION: *Couroupita guianensis* (Lecythidaceae), whose common name include 'ayahuma' and the 'cannonball tree', is an evergreen tree allied to the Brazil nut (*Bertholletia exelsa*). In India, it has been growing for the past three thousand years at least; hence it is possible that it is native to India also. The "cannonball tree" is so called because of its brown cannonball-like fruits. It grows upto 25m (82 ft) in height. Its flowers are orange, scarlet and pink in color, and form large bunches measuring upto 3m in length. They produce large spherical and woody fruits ranging from 15 to 24cm in diameter containing upto 200 or 300 seeds a piece.

The main aim of the present investigation was the preliminary phytochemical screening of the stem of *Couroupita guianensis* with various extracts such as petroleum ether, benzene, ethanol and water. This includes the powder characteristics studies,

fluorescence studies and thin layer chromatographic studies of the stem powder.

MATERIALS AND METHODS: The experimental procedures employed in the present study to analyze the stem of *Couroupita guianensis* are as follows.

Collection of Plant Material: The stem of *Couroupita guianensis* were collected from a single tree at Thiruavinankudi temple in Palani, Tamil Nadu, South India.

Preparation of Extract: Fresh stem was washed thoroughly under running tap water and shade dried. Dried stems were homogenized to a fine powder and stored in airtight bottles. Powder characteristics analysis was done. 10gm of stem powders was extracted with 100ml of solvents (petroleum ether, benzene, ethanol and water) for 24 hours by using Soxhlet apparatus. Extracts were used for different tests.

- Powder characteristics of stem of *Couroupita guianensis*:** The powder characteristics such as color, odor, taste and texture of stem of *Couroupita guianensis* were observed. The observation was given in **table 1**. The fluorescence analysis of the powdered drug in day light, short UV, and long UV were evaluated by reported methods. The observations are given in **table 2**.
- Fluorescence analysis of different extracts of stem of *Couroupita guianensis*:** Consistency, color and fluorescence analysis of different extracts (petroleum ether, benzene, ethanol and water) of *Couroupita guianensis* is given in **table 3**.
- Qualitative phytochemical screening of different extracts of stem of *Couroupita guianensis*:**

Qualitative phytochemical screening of plant was done following the standard procedures adapted by the various workers ^{1,2}. The result are tabulated in **table 4**.

- TLC analysis of stem powder of *Couroupita guianensis*:** Screening of phytochemical components such as alkaloids, phenolics, flavonoids and saponins was done by employing thin layer chromatography by different methods ^{3,4}. The results of TLC in secondary metabolites screening of stem powder of *Couroupita guianensis* are given in **table 5**.

RESULTS:

TABLE 1: POWDER CHARACTERISTICS OF STEM

S. No.	Characters	Properties
1.	Color	Gray color
2.	Taste	Sweet taste, acceptable
3.	Odor	Acceptable
4.	Texture	Rough. After pressing a little amount of powder between filter paper, no greasy stain was found, indicates the absence of fatty oils

TABLE 2: FLUORESCENCE ANALYSIS OF POWDERED STEM OF *COUROUPITA GUIANENSIS*

Samples	Color in day light	Color in short UV	Color in long UV
Powder	light brown	light brown	light brown
Powder + NaOH in MeoH	Greenish color	Fluorescent green	Greenish black
Powder + NaOH in H ₂ O	Dark brown	Greenish	Dark brown
Powder + HCl	Reddish brown	Greenish	Dark fluorescent green

TABLE 3: CONSISTENCY, COLOR, AND FLUORESCENCE ANALYSIS OF DIFFERENT EXTRACTS OF *COUROUPITA GUIANENSIS* STEM

Extracts	Consistency	Color in day light	Color in Short UV	Color in long UV
Petroleum ether	Sticky mass	Light green	Green	Dark green
Benzene	Resinous	Pale brown	Greenish brown	Dark brown
Ethanol	Solid	Greenish brown	Greenish black	Greenish black
Water	Semi solid	Light brown	Brown	Light brown

TABLE 4: PHYTOCHEMICAL ANALYSIS OF SUCCESSIVE EXTRACTS OF STEM OF *COUROUPITA GUIANENSIS*

S. No.	Chemical Constituents/tests.	Extracts			
		Petroleum ether	Benzene	Ethanol	Water
1.	Alkaloids	++	++	++	-
	A) Dragendroff test B) Wagner test	++	++	++	-
2.	Flavonoids	++	++	+	++
3.	Tannins	-	-	-	-
4.	Steroids	-	++	++	+
5.	Saponins	+	+	-	-
6.	Glycosides	-	-	-	-
7.	Amino acids	-	++	-	++
8.	Phenols	++	-	++	++
9.	Anthraquinones	-	-	-	-
10.	Triterpenoids	++	+	++	++

Note; ++: moderate presence; +: weak presence; -: absent

TABLE 5: QUALITATIVE SECONDARY METABOLITE SCREENING BY TLC ANALYSIS

Chemical compounds	Solvent system	Color	R _f value	Total bands	Spray reagent
Alkaloids	CHCl ₃ : MeOH (15:1)	-	0.97	2	Dragendroff's Reagent
Flavonoids	CHCl ₃ : MeOH (19:1)	Pink	0.88	3	No reagent, UV light
Phenols	CHCl ₃ : MeOH 27:0.3	Dark blue	0.98	3	Folin -ciaoiteu's Reagent
Saponins	CHCl ₃ : glacial acetic acid : MeOH: water (64:35:12:8)	-	0.34	2	Iodine vapor

DISCUSSION: The medicinal plants used in traditional medicine have led to the discovery of many new drugs and hundreds of pharmacologically active substances. The present investigation has stated the standardized parameters of powder characteristics, fluorescence studies, phytochemical profiles and TLC analysis of *Couroupita guianensis* stem and it would be of immense help in authenticating.

Phytochemical screening of the different extracts (petroleum ether, benzene, ethanol, and water) of *Couroupita guianensis* stem used in this study revealed that the extracts contained the moderate presence of alkaloids, flavonoids, steroids, amino acids, phenols and triterpenoids. *Couroupita guianensis* showed a broad spectrum of anti-bacterial, anti-fungal activities. The leaves of *Couroupita guianensis* possess the herbal hand wash formulation⁶ and yielded an aliphatic triterpene, it is used as an anti-depressant activity, using in rats⁷. The leaves and flowers of *Couroupita guianensis* showed significant anti-oxidant activity⁸.

Analysis of Thin Layer Chromatography: Alkaloids are low – molecular weight, nitrogen containing compounds that are found in approximately 20% of the plant species and high biological activities. The TLC plate detected with the alkaloid- specific Dragendroff's spraying reagent, showed a two bands with the R_f value of 0.97. Over the last few years, several experimental studies have revealed that biological and pharmacological properties of phenolics compounds, especially their antimicrobial activity⁹, antiviral, anti-inflammatory and cytotoxic activity¹⁰. Phenolics are active in curing kidney and stomach problem as well as helpful as anti-inflammatory in action¹¹. The presence of phenolics in TLC plate showed three bands with the R_f value of 0.98.

Flavonoids showed that the TLC plate with the R_f value of 0.88 and three bands respectively. The biological

function of flavonoids, apart from their antioxidant properties, include protection against allergies, inflammation, platelet aggregation, microbes, ulcers, hepatotoxins, viruses and tumors. Recent studies at Toronto, Department of Nutritional Sciences, Canada, have indicated that, dietary source of saponins offer preferential chemical preventive strategy in lowering the risk of human cancer. The results for the presence of saponins were found to be the R_f value of 0.34 and two bands in TLC plate.

CONCLUSION: Plants are the basic source of knowledge of modern medicine. Almost all the parts of the plant, namely leaves, flowers, fruit, bark, roots, stem and seeds are known to have various medicinal properties. The trend of using natural products has increased and the active plant extracts are frequently screened for new drug discoveries. The present investigation reported, this plant is warehouse of chemo-diversity which will be useful in screening for medicines.

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