

ANTIBACTERIAL STUDY OF LEAF EXTRACT OF THE PLANT *Couroupita guianensis*.

¹Sujit Kumar Patro, ²Ch.Niranjan Patro, ³Deepak Kumar Sarangi, ⁴Suman Kumar Mekap, ⁵Rabinarayan Rana

Department of Phytochemistry

^{1,2,3,4,5}Roland Institute of Pharmaceutical Sciences, Brahmapur, Odisha, INDIA

*Address for Correspondence: *Roland Institute of Pharmaceutical Sciences, Brahmapur, Odisha, INDIA*

ABSTRACT

The antimicrobial activity of the different extracts of this cannon ball tree was assessed against various human pathogenic bacteria. Plant based antimicrobial have enormous therapeutic potential as they can serve the human with lesser side effects and boon for the development of chemotherapy. There is growing interest in correlating the phytochemical constituents of a medicinal plant with its pharmacological activities. The present study was carried out with a vision to setup standards that could be beneficial for detecting the authenticity of this vital medicinal plant^{1,2}. Numerical standards reported in this work could be useful for the compilation of a suitable monograph of *Couroupita guianensis*. As the plant produce secondary metabolites in order to protect themselves from microorganism, herbivores and insects, thus antimicrobial effect is somehow expected from plants namely flavonoids, alkaloids, tannins, saponins and glycosides are producing a better opportunity for testing wide range of microorganism. The results obtained from this work revealed that the plants contained bioactive agents which are connected with antimicrobial properties in plants^{3,4,5}.

KEY WORDS: Antibacterial, alkaloids, extraction, chemotherapy

INTRODUCTION

Plants have been used for medicinal purposes for as long as history has been recorded. China, India, Egypt, and Assyria appear to have been the places which cradled the use of herbs, but herbalism was common in Europe by medieval times. Despite the progress in orthodox medicine, interest in alternative medicine, including herbalism, is on the increase in the West and for 80% of the world herbal medicine is still the only kind to which ordinary persons have ready access. A great variety of plants are used for medicinal treatments^{6,7,8}.

PLANT PROFILE

Scientific Name:

Couroupita guianensis Aubl.

Common Names:

Cannon ball tree, Sal tree, Ayauma tree

Vernacular Names:

Hindi – Shivaling Ayahuma, Kailashpathi

Tamil – Nagalingam

Telugu – Mallikarjuna, Nagamalli

Taxonomical Classification:

Kingdom: Plantae - Plants

Subkingdom: Tracheobionta - Vascular plants

Superdivision: Spermatophyta - Seed plants

Division; Magnoliophyta - Flowering plants

Class: Magnoliopsida – Dicotyledons

Subclass: Dilleniidae

Order: Lecithidales

Family: Lecithidaceae

Genus: *Couropita*

Species: *Couropita guianensis*
(National plant base.2004)

Habit:

Couropita guianensis is a large evergreen tree growing to a height of 20 meters. Leaves are alternate, oblong-obovate, up to 20 centimeters long, entire to slightly serrate and hairy on the veins beneath. Inflorescence is racemose, arising from the trunk and other large branches. Flowers are reddish with a yellow tinge on the outside, fragrant, with stamens borne on an overarching androphore^{9,10}. Fruit is a large, reddish-brown globose, 15 to 24 centimeters, with a woody capsule, and each containing 200 to 300 seeds. Pollination is done by bees and bats. The tree bears, also directly on the trunk and main branches, large globose woody fruits; they look like big rusty cannonballs hanging in clusters, like balls on a string^{11,12,13}.

Habitat:

Couropita guianensis is native to tropical northern South America, especially the Amazon rainforest and the southern Caribbean. Also occurs in India, where it is probably native, and Thailand. Its propagation requires Full sun / partial shade, moist soil, needs high humidity. It is a plant in frost free locations because it is very susceptible to frost^{14,15}.

Ethno medicinal uses:

Leaves of *C. guianensis* are widely used as an analgesics by the Brazilian rural population. Juice made from the leaves is used to treat skin disorders and the Shamans of South America have even utilized tree parts for curing malaria. *Couropita guianensis* infusions or teas obtained from different parts of the tree used traditionally to treat hypertension, tumours, pain and inflammatory processes^{16,17,18}. *Couropita guianensis* flowers are used to cure

cold, intestinal gas formation and stomach ache In orissa, decoction of flowers has been used to boost the immune system to fight number of diseases^{19,20}.

AIM & OBJECTIVE

The research was performed systematically for leaf extract of *Couroupita guianensis* with the following schedule:

Pharmacognostical study

- a) Microscopy
- b) Powder drug analysis
- c) Physical evaluation

Phytochemical evaluation of *Couroupita guianensis* leaves

- a) Collection and extraction of leaves
- b) Qualitative tests of chloroform and aqueous extracts

METHODOLOGY

POWDER MICROSCOPY

A little quantity of powder drug was boiled with methanolic KOH solution. The cleared powder removed in a watch glass and stained with one drop of phloroglucinol and Conc HCl. Then mounted a little of the treated powder in dilute glycerin and observed the slide under low power.

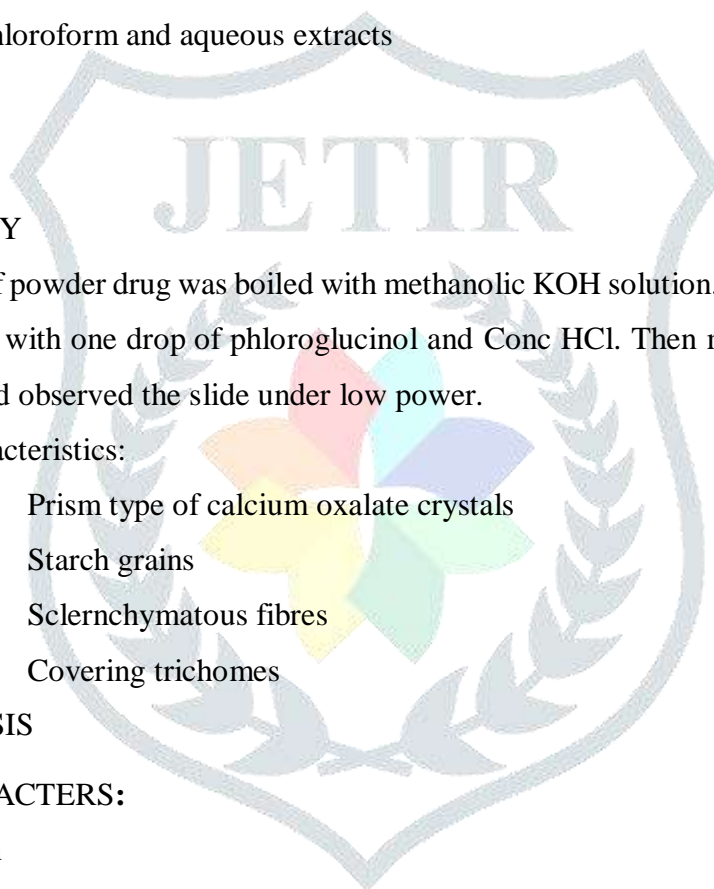
Powder characteristics:

- Prism type of calcium oxalate crystals
- Starch grains
- Sclernchymatous fibres
- Covering trichomes

POWDER DRUG ANALYSIS

ORGANOLEPTIC CHARACTERS:

- Colour: Dark Green
- Odour: characteristic
- Taste: characteristic



RESULT & DISCUSSION

Inhibition zone diameter of different extracts of *Couroupita guianensis* against different fungus

Effect of Chloroform extract on *Aspergillus niger*

Concentrations (mg/ml)	DAY- 1	DAY- 2	DAY- 3	DAY- 4	DAY- 5	DAY- 6	DAY- 7
50	0.72	0.89	1	1.15	1.38	1.57	1.65
100	0.93	1.23	1.55	1.78	1.93	2.18	2.35
150	1.21	1.53	1.96	2.11	2.33	2.64	2.85
200	1.18	1.74	2.22	2.48	2.63	2.87	3.1
Chloroform	0.56	0.71	0.87	0.91	0.98	1.07	1.2
CLOTRIMAZOLE (10µg/ml)	1.38	2.02	2.64	2.85	3.01	3.23	3.6

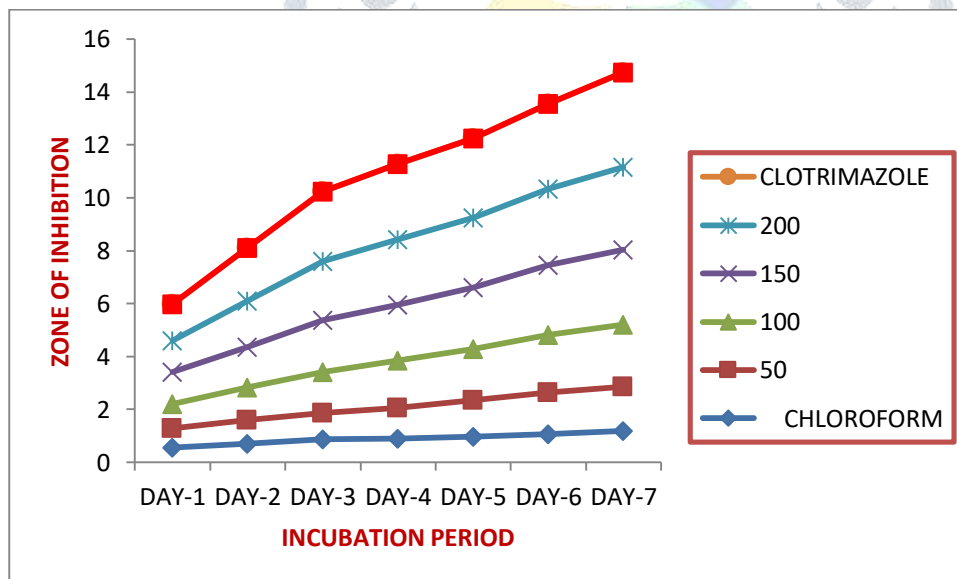


Figure No : 1 Graph showing zone of inhibition of *Couroupita guianensis* against *Aspergillus niger* in different time intervals

Effect of Chloroform extract on *Candida albicans*

Table No 1

Concentrations (mg/ml)	DAY-1	DAY-2	DAY-3	DAY-4	DAY-5	DAY-6	DAY-7
50	1.74	2.39	2.71	2.95	3.14	3.56	3.8
100	2.23	2.57	2.89	3.26	3.60	3.87	4.2
150	2.56	3.29	3.53	3.82	4.12	4.52	4.8
200	3.12	3.95	4.21	4.43	4.76	5	5
CONTROL	0.74	0.82	0.86	0.93	1.02	1.21	1.4
CLOTRIMAZOLE µg/ml	2.12	2.49	2.74	2.96	3.21	3.34	3.65

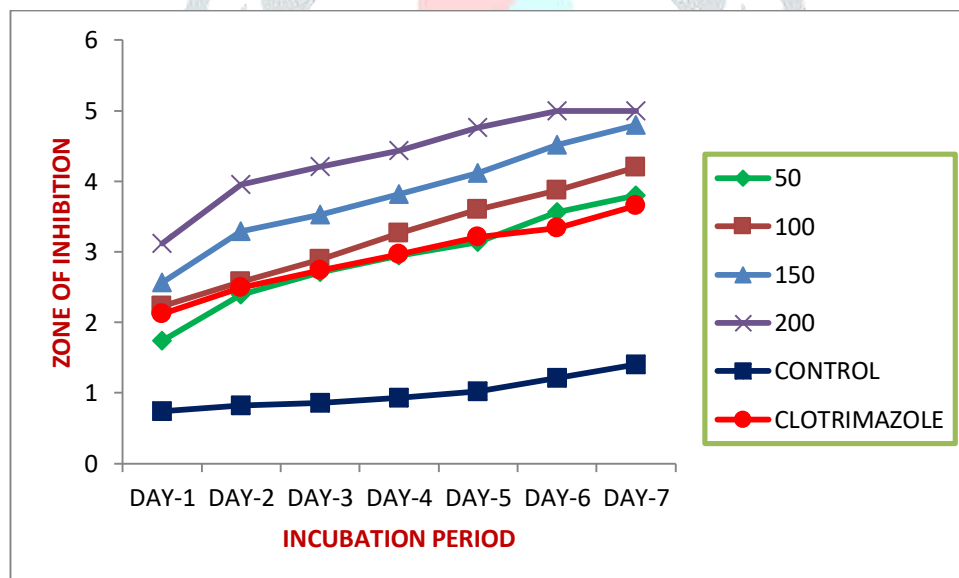


Figure No : 2 Graph showing zone of inhibition of *Couroupita guianensis* against *Candida albicans* in different time intervals



Figure No : 3 Zone of inhibition of *Couroupita guianensis* against *Aspergillus niger* & *Candida albicans*

Effect of different extracts of *Couroupita Guianensis* against selected bacteria

Table No 2

Organism				Organism			
Staphylococcus aureus				E.Coli			
CHLOROFORM		AQUEOUS		CHLOROFORM		AQUEOUS	
Concentration (mg/ml)	Zone of Inhibition (cm)	Concentration (mg/ml)	Zone of Inhibition (cm)	Concentration (mg/ml)	Zone of Inhibition (cm)	Concentration (mg/ml)	Zone of Inhibition (cm)
50	0.5	50	-	50	1.2	50	-
100	1.5	100	0.5	100	1.85	100	0.3
150	1.8	150	0.95	150	2.2	150	0.5
200	2.2	200	1.2	200	2.67	200	0.96
Penicillin 10µg/ml	3.5	Penicillin 10µg/ml	3.5	Doxycylin 10µg/ml	2.8	Doxycylin 10µg/ml	2.8

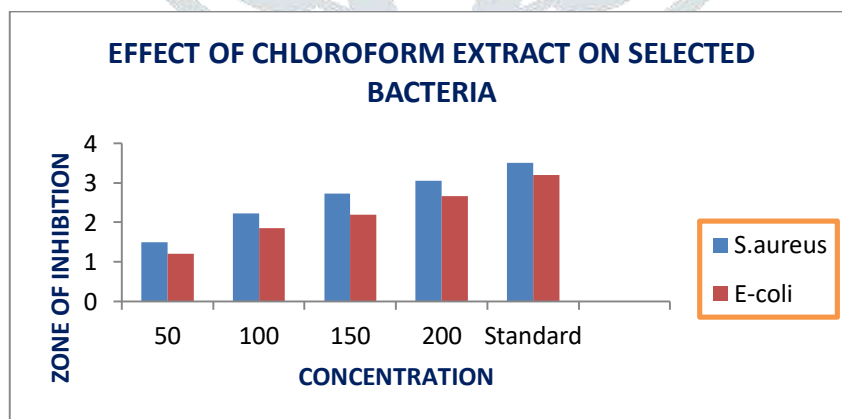


Figure no 4 Effect of Chloroform extract on bacteria

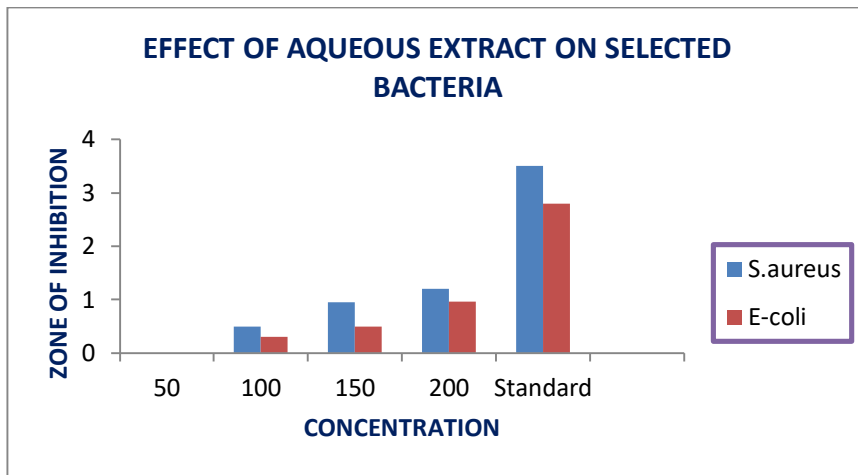


Figure no 5 Effect of Chloroform extract on bacteria



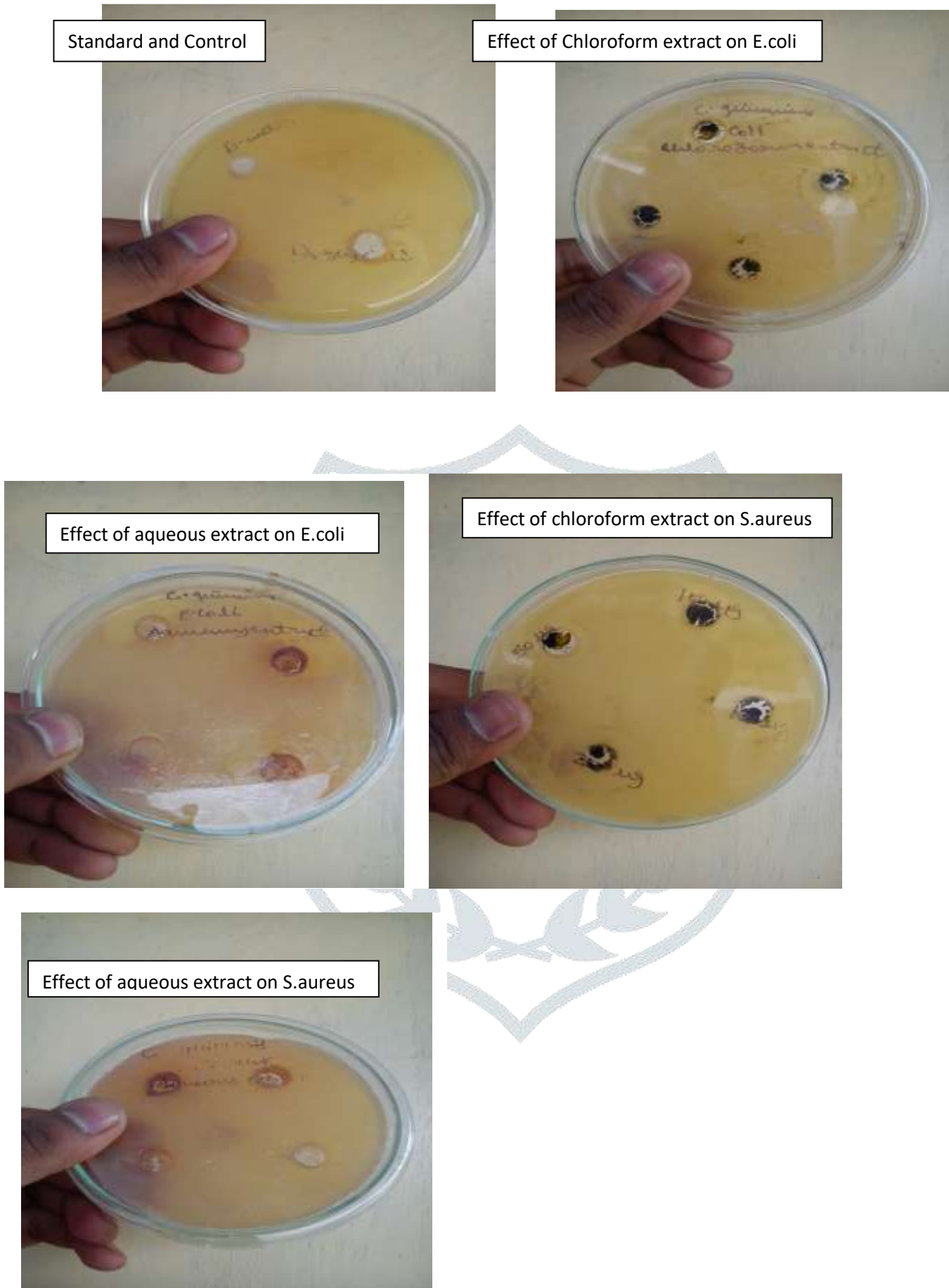


Figure No : 6 Photographs showing zone of inhibition of selected bacteria's of extraction of *Couroupita guianensis*

SUMMARY & CONCLUSION

The leaf extracts of *Couroupita guianensis* were screened for its antimicrobial and pharmacological activities. The solvents used for the leaves extraction were chloroform and water. The extract was tested against infectious diseases causing fungal pathogens such as *Aspergillus niger*, *Candida albicans* and Bacterial pathogens such as *Staphylococcus aureus* and *Escherichia coli* using the Agar well diffusion method. The chloroform extract of *Couroupita guianensis* showed more activity against fungus like *Candida albicans* and the zone of diameter 2.8985 ± 0.701 , 3.2314 ± 0.72 , 3.8057 ± 0.77 & 4.36 ± 0.84 for the concentrations 50,100,150,200 mg/ml respectively whereas on *Aspergillus niger*, the zone of diameters are 1.942 ± 0.352 , 1.7071 ± 0.457 , 2.09 ± 0.584 & 2.3127 ± 0.668 for the concentrations 50,100,150,200mg/ml respectively and bacteria like *Staphylococcus aureus*, the zone of diameter is 2.2 by chloroform extract, *Escherichia coli* zone of diameter 2.67 by chloroform extract, and on *Staphylococcus aureus* zone of diameter is 1.2 by aqueous extract and on E.coli zone of diameter is 0.96. The chloroform extract of *Couroupita guianensis* showed better activity against the fungus like *Candida albicans* with the zone of 4.36 ± 0.84 followed by *Aspergillus niger* with zone of diameter 2.3127 ± 0.668 and the aqueous extract shows better activity against the bacteria like, *Staphylococcus aureus* zone of diameter is 2.2 *Escherichia coli* the zone of diameter 2.67. In the present study, both in bacteria and fungi chloroform and aqueous extracts showed a varying degree of inhibition of the growth against tested organism. The results confirmed that presence of antibacterial activity in the shade dried extract of *Couroupita guianensis* against the human pathogenic organisms. The present study was carried out with a vision to setup standards that could be beneficial for detecting the authenticity of this vital medicinal plant. Numerical standards reported in this work could be useful for the compilation of a suitable monograph of *Couroupita guianensis*. The results obtained from this work revealed that the plants contained bioactive agents which are connected with antimicrobial properties in plants. The wide spectrum of activity of *Couroupita guianensis* extracts has been documented earlier. This study evaluated the inherent antifungal activity of chloroform as well as the antifungal activity of aqueous extract of *Couroupita guianensis*. From the obtained results it can be concluded that although chloroform in itself has antifungal activity, chloroform extract of *Couroupita guianensis* has a synergistic activity. Since *Couroupita guianensis* is easily available and well-tolerated, it can be incorporated into medications for topical antifungal therapy. However, further studies for its incorporation into oral preparations, safety and cost-effectiveness has to be conducted.

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