

TWO DAYS NATIONAL LEVEL CONFERENCE

ON

**ROLE OF
PHYTOCHEMICALS AND
ADVANCED MATERIALS IN
CANCER PREVENTION
AND RESEARCH**

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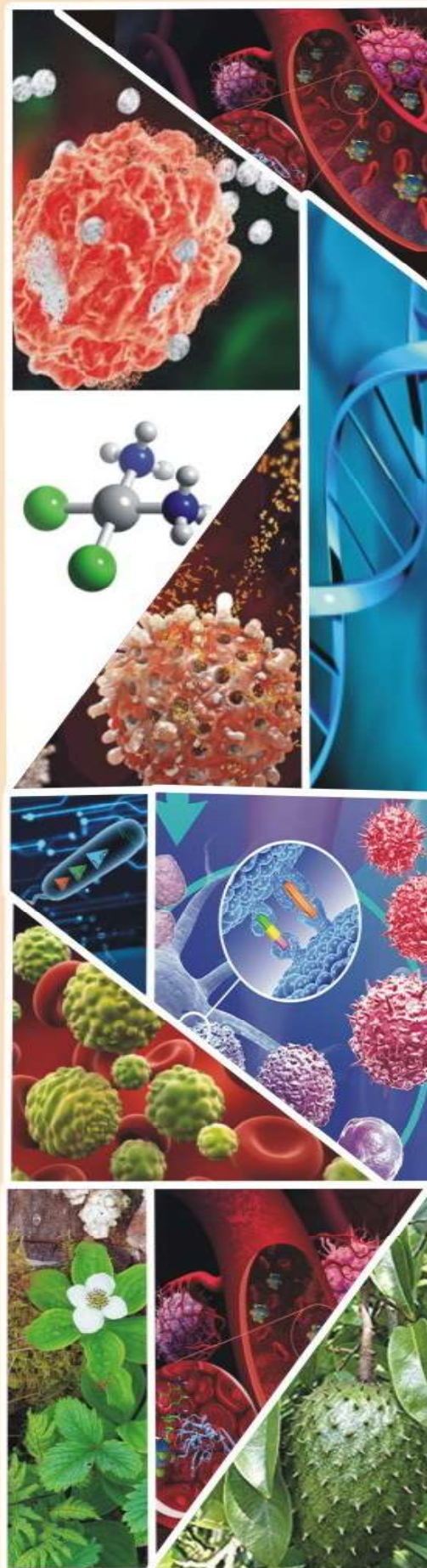


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A REVIEW ON PHYTOCHEMICAL PROFILING OF *Couroupita guianensis* AUBL.

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ABSTRACT

Plants and their active constituents plays an important role in the prevention of a variety of ailments. The Genus *Couroupita* belongs to family Lecythidaceae are used therapeutically in ancient system Indian medicine especially in Ayurveda and Siddha. The genus contains about 10 species distributed all around the world. These species contain a variety of potential bioactive molecules, such as triterpenes, steroids, alkaloids, phenolic compounds, heterocyclic compounds and other phytoconstituents. This work reviews the various phytoconstituents present in the couroupita guianensis.

Introduction

Medicinal plants are used as traditional form of providing relief to several diseases. Presently, millions of adults are depending on medicinal plants for their primary health care needs *Couroupita guianensis*, whose common names include Ayahuma and the Cannonball Tree, is an evergreen tree allied to the Brazil nut (*Bertholletia excelsa*), and is native to tropical northern South America and to the southern Caribbean. In India it has been growing for the past two or three thousand years at least, as attested by textual records hence it is possible that it is native to India also. It's rare, but also found in Bangladesh. It's part of the family Lecythidaceae and grows up to 25 m (82 ft) in height. The "Cannonball Tree" is so called because of its brown cannon-ball-like fruits. The majority of these trees outside their natural environment have been planted as a botanical curiosity, as they grow very large, distinctive flowers. Its flowers are orange, scarlet and pink in color, and form large bunches measuring up to 3m in length. They produce large spherical and woody fruits ranging from 15 to 24 cm in diameter, containing up to 200 or 300 seeds apiece.

Plant description

C.guianensis Aubl. belongs to the family Lecythidaceae (about 25 genera and 400 species) distributed in tropical regions of the world (Lorenzi, 2000). The flowers are four to five inches in diameter, and the fruits, six to eight inches in diameter, are round and encased in a hard shell. The pulp fills the entire shell and apparently varies in color according to the degree of maturity but the odor is peculiar and disagreeable to most people. According to Dahlgren the fresh pulp is said to be used by the natives in the preparation of a cooling, medicinal drink. The fruit contains a small amount of volatile oil, composed of a phenolic substance and acids, to which the characteristic odour of the fruit is due. A red color is present, which is evidently a carotenoid pigment. The acids consist chiefly of citric acid with small amounts of malic and isocitric acids. This is the

second fruit examined in which citric acid has been identified, although it is not the predominating acid as is the case with blackberry. The Tree possesses antibiotic, antifungal, antiseptic and analgesic qualities.

Phytoconstituents- *Couroupita guianensis*

Several researchers isolated and identified various types of compounds like terpenes, phenolic compounds, heterocyclic compounds, steroids, alkaloids, etc. from different parts (leaves, flowers and stem etc.).

Flowers

Rane and his co workers reported the presence of stigmasterol (7) in the *C. guianensis* flowers (Rane *et al.*, 2001).

Leaves

Rane and his co workers, Bergman and and his co workers reported the eugenol (20), linalool (21), farnesol (22), nerol (23), tryptanthrin (14), indigo (15), indirubin (13), isatin (12), linoleic acid (19), α , β -amirins (1, 2), carotenoids and sterols (Rane *et al.*, 2001 and Bergman *et al.*, 1985). Rahman Mohammed reported that secondary metabolites from the *C. guianensis* were isolated and identified Betulin caffeate (3) Lupeol caffeate (4) (Rahman Mohammad *et al.*, 2009).

Ana Martinez *et al.* (2012) reported that the hydroalcoholic leaf extracts of *C. guianensis* compounds were isolated named the flavonoids 2', 4'-dihydroxy-6'-methoxy-3', 5'-dimethylchalcone (9), 7-hydroxy-5-methoxy-6, 8-dimethylflavanone (10) and the phenolic acid 4-hydroxybenzoic acid (11). Row and Suryanarayana (1996) reported the presence of α -amyrin (1), β -amyrin (2), β -sitosterol (6), tannins. Anjaneyalu and his co workers reported the presence of ketosteroids (Anjaneyulu *et al.*, 1998). Eknat and shivchandrachatterji (2002) reported the triterpenoid esters of fatty acids as β - amyrin palmitate (5) where characterized in the leaves. Sidnei reported Triptantria (14) and Loliolida (17) from the acetate extract of leaves of *C. guianensis* (Sidnei Bessa de oliveira Fernandes de Oliveira *et al.*, (SBQ

Fruits

Jan Bergman reported that the *C. guianensis* fruits contains 6, 12-dihydro-6, 12-dioxindolo [2, 1-b] quinazoline (tryptanthrin) (14), indigo (15) indirubin (13) and isatin (12) (Jan Bergman *et al.*, 1985). Sen reported two alkaloids from the mature fruit of *C. guianensis* and named as Couroupitine A (17) and Couroupitine B (18) from the chloroform extract and steroids like stigmasterol (7) and campesterol (8) from the petroleum ether extract (Sen *et al.*, 1974). Some chemical works have already been done on the fruits (Nelson and Wheeler, 1937), flowers (Lewis, 1964) and the stem bark (Row *et al.*, 1966).

Triterpenes

Triterpenes α , β -amirins (1, 2), betulin caffeate (3), lupeol caffeate (4) and β -amyrin palmitate (5) were isolated and identified from *C. guianensis*. Amyrin and Lupeol derivatives are found to be the dominant triterpenes (Fig 1).

Steroids

So far only 3 sterols β -sitosterol (6), stigmasterol (7) and campesterol (8) were isolated and identified from the whole of the plant material (Fig 2).

Phenolic compounds

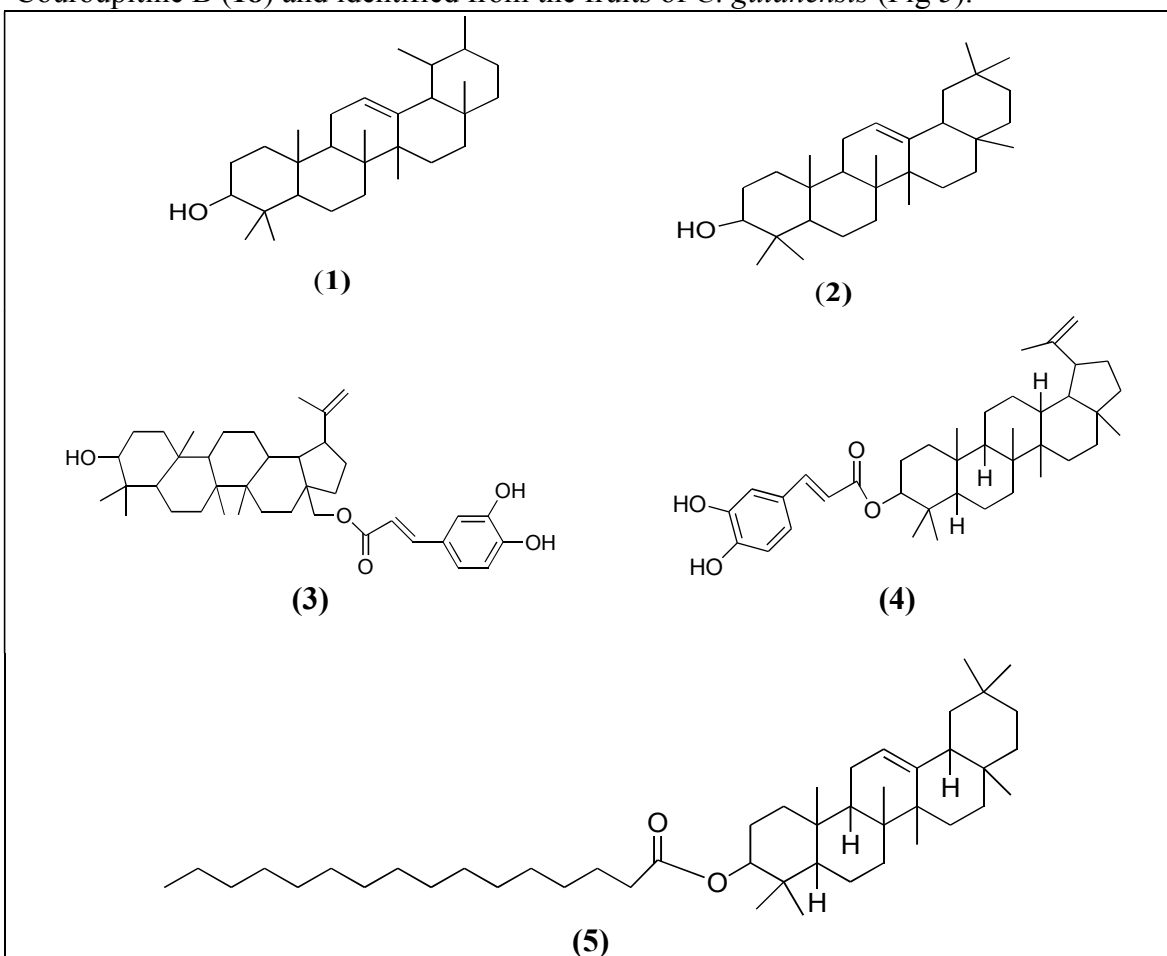
Till now only 3 phenolic compounds 2',4'-dihydroxy-6'-methoxy-3',5'-dimethyl chalcone (9), 7-hydroxy-5-methoxy-6,8-dimethyl-2-phenylchroman-4-one (10) and 4-hydroxy benzoic acid (11) were isolated and identified from the leaves of *C. guianensis* (Fig 3).

Heterocyclic compounds

So far only five heterocyclic compounds isatin (12), indirubin (13), tryptanthrin (14), indigo (15) and loliolida (16) has been isolated and identified from the leaves and fruits of *C. guianensis* (Fig 4).

Alkaloids

Interestingly few Indole alkaloids were isolated Courouputine A (17) and Courouputine B (18) and identified from the fruits of *C. guianensis* (Fig 5).



Other compounds

Linoleic acid (19), eugenol (20), linalool (21), farnesol (22) and nerol (23) were isolated and identified from the leaves of *C. guianensis* (Fig 6).

Fig 1. The triterpenes isolated from the leaves of *C. guianensis*

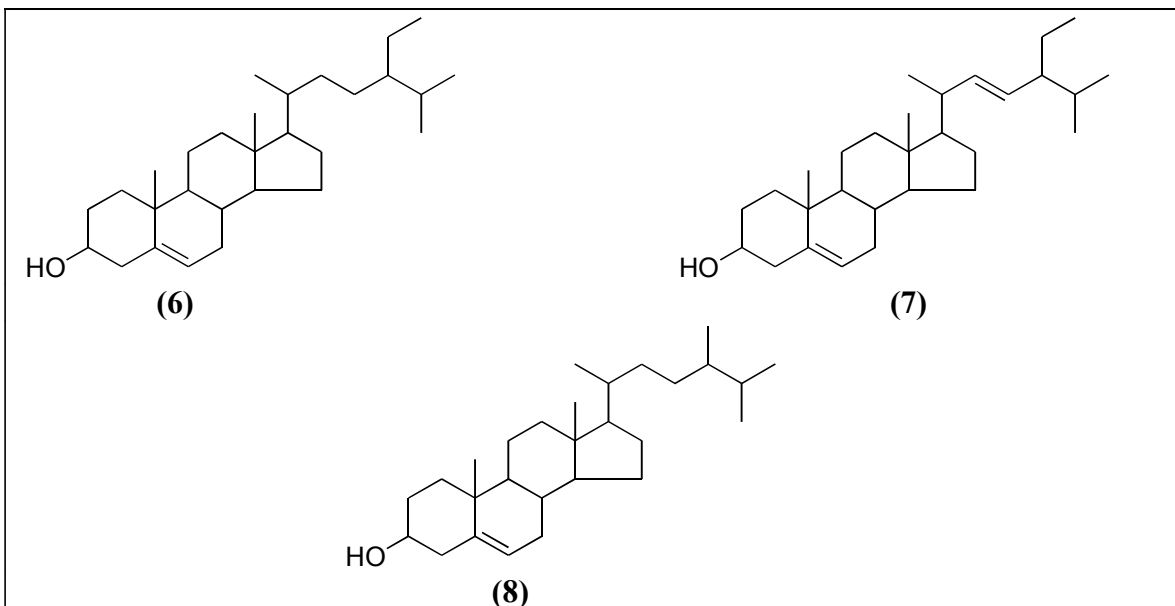


Fig 2. The steroids isolated from the leaves, flowers and fruits of *C. guianensis*

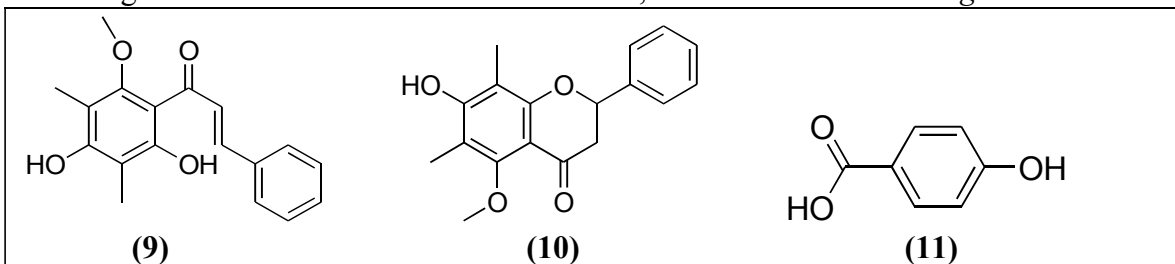


Fig 3. The phenolic compounds isolated from the leaves of *C. guianensis*

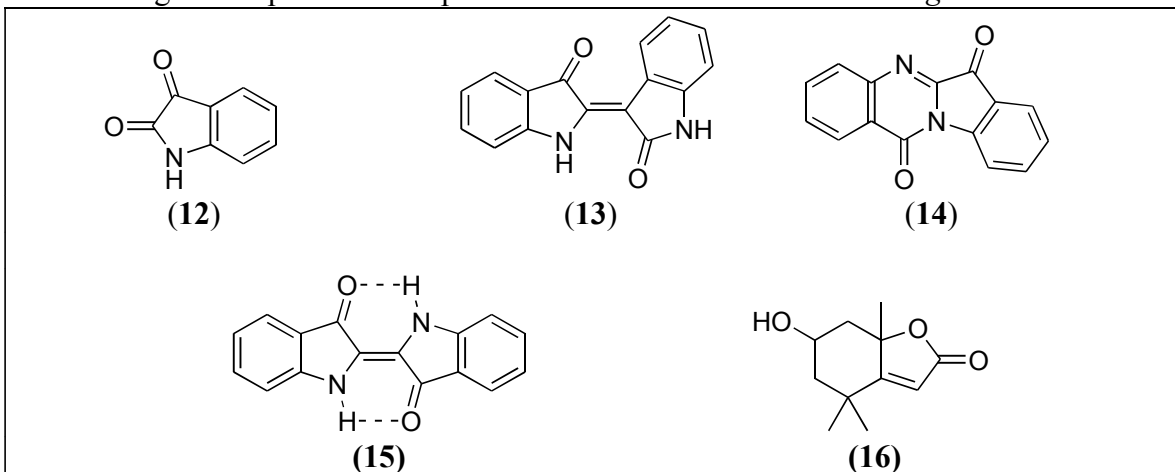


Fig 4. The heterocyclic compounds isolated from the leaves and fruits of *C. guianensis*



Fig 5. The alkaloids isolated from the fruits of *C. guianensis*

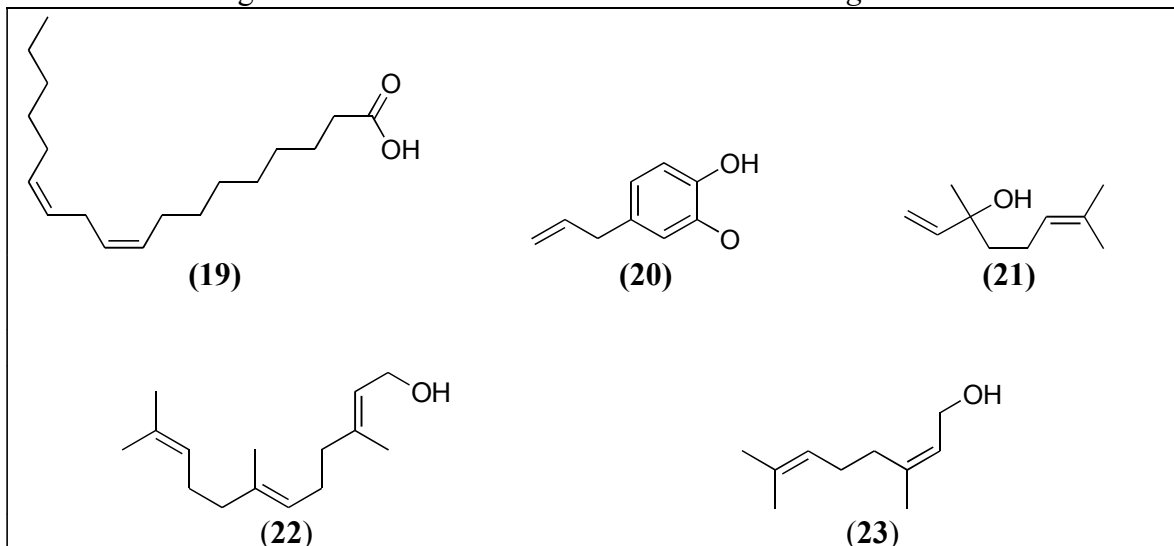


Fig 6. The other compounds isolated from the leaves of *C. guianensis*

Conclusion

This review summarizes the known phytochemical constituents of the *Couroupita guianensis*. The studies conducted to date have demonstrated that the *Couroupita guianensis* plant contain many number of phytoconstituents. These types of phytoconstituents very useful to further biological activities and help to identify the novel phytoconstituents from the *Couroupita guianensis*.

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