

Phytochemical screening of *Calophyllum inophyllum* Linn

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Abstract— *Calophyllum inophyllum* L. belongs to the family *Clusiaceae* (Guttiferae) and plant parts have various medicinal uses. It was reported with therapeutic activities, such as anti-inflammatory, anti-microbial, antiviral etc. In the present investigation, we analysed the phytochemicals of Benzene, Diethyl ether, Distilled water and Ethyl acetate extracts of *C. inophyllum* L. The results revealed that ten bioactive constituents such as alkaloids, amino acid, carbohydrates, fats, flavonoids, glycosides, phenols, protein, sterols, saponins, tannins and triterpenoids were observed in the plant extracts. The present study provides evidence that leaf extracts of *C. inophyllum* L. contains various primary and secondary metabolites and this justifies the use of plant species as traditional medicine for treatment of various diseases.

Key words: *Calophyllum inophyllum* L., therapeutic activities, bioactive constituents, traditional medicine

I. INTRODUCTION

Calophyllum inophyllum L. belongs to the family *Clusiaceae* and is a tree that can grow 8 to 20 meter tall with a broad spreading crown of irregular branches which exudes white latex when bruised. The leaves have opposite arrangements, and are petiolate, thick and shiny with numerous parallel secondary veins. It is globally distributed. In India, it is distributed in the coastal regions of Orissa, Andhra Pradesh, Maharashtra, Karnataka, Kerala, Tamil Nadu and Andamans (Friday and Okano, 2006).

The *Calophyllum inophyllum* L. plant parts have various medicinal uses. An infusion of gum, bark and leaves is used for sore eyes. The leaves soaked in water are applied to inflamed eyes (Nadkarni and Nadkarni, 1999). The plant has anti-inflammatory and pain relieving properties. Oil extracted from the crushed seeds is used for lamps, as well as medications. It is used medicinally to treat a variety of ailments, mostly skin related. This oil can be used on either mucosa or epidermal lesions. It has been effectively used to cure chapped feet and hands, chilblain and skin cracks, vaginitis, erosions and ulceration of the cervical matrix, breast cracks, bites, stings, acne and acne scars, diabetic sores, herpes lesions, and anal fissures. It has also been used for hair and scalp conditions, eczema, psoriasis and facial neuralgia. Oil has an amazing capacity to accelerate wound healing and the growth of new tissue (Quisumbing, 1951).

The medicinal value of a plant lies in some of its chemical substances (phytochemicals) that produce a definite physiological action on the human body. The most important bioactive compounds of plants are alkaloids, flavonoids, tannins and phenolic compounds. The phytochemical analysis of the medicinal plants are important and have commercial interest in both research institutes and pharmaceuticals companies for the manufacturing of the new drugs for the treatment of various diseases. Consequently, the present research work focused on qualitative and quantitative phytochemical analysis of *C. inophyllum* L.

II. MATERIALS AND METHODS

A. Collection of plant leaves:

The fresh leaves of *C. inophyllum* L. were collected from Punnai Nallur Mariamman Kovil in Thanjavur District of Tamil Nadu, India (Figure 1).

B. Identification of plant:

The collected plant leaves were carefully examined and identified with the help of regional floras (Matthew, 1983; Nair and Henry, 1983).

C. Preparation of plant extracts:

Plant extracts were prepared according to the methodology of Indian Pharmacopoeia (Anonymous, 1996).

D. Qualitative phytochemical screening:

Qualitative phytochemical analyses of Benzene, Diethyl ether, Distilled water and Ethyl acetate extracts of *C. inophyllum* L. were done by following the procedures of Trease and Evans (1983).

E. Quantitative estimation of phytoconstituents:

Total carbohydrate content of the extracts was determined by anthrone reagent method (Plummer, 1971). Total protein content was calculated according to the method of Lowry et al. (1951). Aluminium chloride colorimetric method (Chang et al., 2002) was followed to estimate total flavonoids. Total phenol content was estimated by the method of Mc Donald et al. (2001). Ascorbic acid (Vitamin C) was estimated following the procedure of AOAC (1980). Vitamin E was estimated by phosphomolybdate method (Prieto et al., 1999).

III. RESULTS AND DISCUSSION

In the present study, the phytochemicals were separated from dried leaf powder using Benzene, Diethyl ether, Distilled water and Ethyl acetate which showed the presence of many bioactive compounds in the plant selected. The results of qualitative phytochemical screening of the leaf extracts of *C. inophyllum* L. were given in Table 1. In the four forms of extract, ten bioactive constituents such as alkaloids, amino acid, carbohydrates, fats, flavonoids, glycosides, phenols, protein, sterols, saponins, tannins and triterpenoids were observed. Out of these eight were present in the ethyl acetate extract. The results of phytochemical screening of *C. inophyllum* L. were in concurrence with other reports (Ha et al., 2009; Isaivani et al., 2012, Praveena et al., 2013). There were a similarity between their results and the obtained results in this study.

Quantitative analysis is very essential for identifying the compounds present in the medicinal plants. The primary and secondary metabolites produced by plants constitute a source of bioactive substances and nowadays scientific interest has increased due to the search for new drugs of plant origin (Paiva et al., 2003).

In the present study, *C. inophyllum* L. was quantitatively estimated for primary and secondary metabolites like carbohydrate, protein, Flavonoid, Phenol, Vitamin C and Vitamin E. The results of quantitative phytochemical estimation of tested extracts of *C. inophyllum* L. were tabulated in Table 2. The maximum total carbohydrate content was present in distilled water extract, at the same time total protein was maximum level present in ethyl acetate extract. Carbohydrates and their derivatives include many other important biomolecules that play key roles in the immune system, fertilization, preventing pathogenesis, blood clotting, and development (Anthea et al., 1993).

In the present study, quantitative estimation of secondary metabolites revealed that the flavonoid, phenol and vitamin C content in ethyl acetate leaf extract was higher and vitamin E content in benzene extract was higher. Flavonoids have been reported to exert wide range of biological activities such as anti-inflammatory, antibacterial, antiviral, anti-allergic, cytotoxic anti-tumour, treatment of neurodegenerative diseases and vasodilatory action (Tsuchiya, 2010). Phenolic compounds have been reported to serve as antioxidants, and exhibit a wide range spectrum of medicinal properties such as anti-cancer, anti-inflammatory and diabetes (Hamzah et al., 2013).

The results obtained from the present study provides evidence that leaf extracts of *C. inophyllum* L. contains various primary and secondary metabolites and this justifies the use of plant species as traditional medicine for treatment of various diseases.

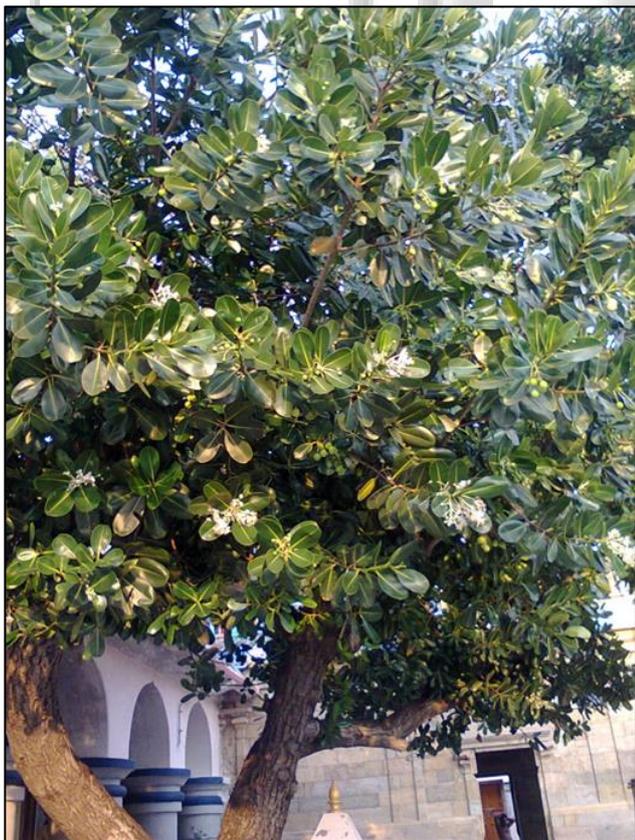


Fig. 1: Aerial view of *Calophyllum inophyllum* L.

S. No.	Phytocompounds	Benzene extract	Diethyl ether extract	Distilled water extract	Ethyl acetate extract
1	Alkaloids	-	+	-	+
2	Amino Acid	-	-	-	+
3	Carbohydrate	+	+	+	+
4	Flavonoids	+	+	+	+
5	Glycosides	+	+	-	-
6	Phenols	+	+	+	+
7	Protein	+	+	+	+
8	Saponins	-	+	+	-
9	Sterols	+	-	-	+
10	Tannins	-	+	+	+

Table 1: Qualitative phytochemical analysis of *C. inophyllum* L.
(+) presence, (-) absence

S. No.	Phytocompounds	Benzene extract	Diethyl ether extract	Distilled water extract	Ethyl acetate extract
1	Carbohydrate	1.41 ± 1.10	1.23 ± 1.50	5.52 ± 0.50	1.50 ± 1.25
2	Protein	12.29 ± 1.48	10.65 ± 0.50	9.12 ± 1.20	17.55 ± 0.90
3	Flavonoid	7.25 ± 0.50	9.60 ± 0.95	4.36 ± 1.25	11.25 ± 0.10
4	Phenol	11.50 ± 0.06	10.95 ± 1.10	5.50 ± 0.02	19.70 ± 0.95
5	Vitamin C	5.15 ± 1.5	4.50 ± 0.50	2.63 ± 0.45	6.50 ± 0.90
6	Vitamin E	8.50 ± 0.45	7.32 ± 0.45	2.62 ± 0.73	5.40 ± 0.15

Table 2: Quantitative phytochemical analysis of *C. inophyllum* L.

Values are expressed as Mean ± SD (n=3)

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