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BIOACTIVE COMPOUNDS FROM MANGROVE BARK

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Abstract

The aim of the present study was carried out to determine the possible chemical compounds of methanolic extract of outer bark of *Cynometra iripa* (Fam. Leguminoceae) and *Lumnitzera racemosa* (Fam. Combetaceae). The phytochemical compound screened by GC-MS method from stem bark by using GCMS technique. The GCMS analysis revealed that the presence of bioactive compounds. The main constituents were 9-12 Octadecadienoic acid, 4-Methylmannose, 7-Tridecanone in higher Area % and , Sitosterol, Ergosta-8, 24(28)-dien-3-ol, 4, 14-dimethyl, Glycerin, 2 Heptanone-3 methyl, α-L-Galactopyranoside, methyl6-deox, 3-O-Methyl-d-glucose in lower Area %. The bioactive compounds are found active against antimicrobial and anti-inflammatory activities.

***Index Terms* – Antimicrobial, Bark, *Cymnometra*, GCMS, *Lumnitzera*.**

I.INTRODUCTION

In the tropics and subtropical regions of world, types of plant called, Mangroves are present. They contain variety of trees and shrubs that grow in saline coastal habitats mainly between latitudes 25° N and 25° S. The forests of mangroves occupy near about only 1% of area of the world (Saenger, 2002). Kathiresan and Bingham, (2001) described that mangrove have recognized in variety of plants distributed in 22 genera from 16 families and 65 different Mangrove *species*. Due to excess types of stresses such as high and low tide, extreme humidity and salinity found in Mangroves. To defend this type of conditions they produce high sources of bioactive compounds. Variety of secondary metabolites like alkaloids, tannins, terpenoids, phenolics, flavonoids, steroids etc. have been characterized from mangroves which have prime importance in pharmacological, toxicological, and ecological types (Kokpal *et al*., 1990 and Bandaranayake, 2002), they further reported that Mangrove sources are commonly traditionally useful in folklore medicines and The plant part extracts obtained from large species of mangrove have recognized activities against pathogens of plant , animals including human being. The outermost covering of stem found in woody plants is called as bark. These are the mass of tissues found outer side to the *vascular cambium* or it is present over the central bundle of vascular cylinder. Therefore, there is an imperative necessity to find out phytochemical compounds present in the bark of stem of Mangroves.

II. MATERIAL AND METHODS

The bark samples of mangrove bark of *Cynometra iripa* (Fam. Leguminosae) and *Lumnitzera racemosa* (Fam. Combretaceae) were collected from estuaries of Sindhudurga and Ratnagiri Districts in the month of December.

2.1 Preparation of powder and extract

Stem bark were shade dried, powdered and extracted with Methanol for 6-8 hours using Soxhlet apparatus. The extract was then filtered through muslin cloth, evaporated dried to get the viscous residue. The methanolic extracts of the plant was used for GC-MS analysis. 1 µl of the methanolic bark extract of root and stem was employed for GC-MS analysis.

2.2 GC MS Analysis

GC-MC Plays a key role in the analysis of unknown components of plant origin. The methanolic extract obtained from mangrove bark was subjected to Gas Chromatography and Mass Spectroscopy for the quantitative determination of phytochemicals extracted from mangrove bark. Some of the important features are summarized below.

III. Instrumentation

GC: Shimadzu Make QP-2010 with non-polar 60 M RTX 5MS Column
MS: Quadra pole detector with NIST Library
Software: GC MS Solution.

3.1 Chromatographic conditions

Column:	Non-Polar 60 M RTX 5MS
Column Temperature:	750C for 2 min.
Flow rate:	1 ml/min.
Injection volume:	1µl
Carrier Gas:	Helium (3ml/min)
Mode:	Split ratio.

IV. RESULTS AND DISCUSSION: -

Mass spectra of methanolic extract of mangroves is shown in Table No. 4.1**.** While the mass fragments of unknown sample and Library standards are shown in Fig. 1 and 2. The mass spectra of mangrove bark extracts shows different peaks and the identification was made by retention time (R.T.) and National Institute of Standards and Technology (NIST) library search.

The mass spectra of *Cynometra iripa* show 4-Methylmannose, and 3-0- methyl-d-glucose in the methanol extract with percent area 62.16% and 37.84% respectively and their retention time are 28.211 and 27.317min. The compound like 9-12 Octadecadienoic acid (Linoleic acid), Ergosta- 8,24(28)-dien-3-ol,4,14-dimethyl and sitosterol with percent area, 58.22%, 19.48% and 14.48% respectively are abundantly found in methanolic extracts of *Lumnitzera racemosa.*

Many reports of antimicrobial properties are reported with isothiocyanates (Dornberger *et al.*,1975 and Iwu *et al.*,1991), polyamines (Spermidine) (Flayeh and Sulayman, 1987), Thiosulfinates (Tada *et al.*,1988) and glycosides (Murakami *et al.*,1993 and Rucker *et al.*,1992). Polyacetylenes deserve special mention. Form *Bapleurum salicifolium* Estevez- Braun *et al.*, (1994) extracted a C_{17} polyacetylene compounds, native of the Canory Islands. The compounds named as 8s-heptadeca-2(z), 9(z) diene-4, 6diyne-1, 8-diol, shows their inhibitory effects over bacteria like, *S. aureas* and *B. subtilis* but found inert effects over Gram positive bacteria as well as the fungus, Yeasts. Phytochemical studies of Abeysinghe and Wanigatunge (2006) proved that the mature leaf extract of *A. marina* shows the presence of bioactive compounds like, alkaloids, flavonoids, steroids and triterpenoids. phytochemical investigation of *Rhizophora stylosa* Griff. (Rhizophoraceae) reported one acetylated flavanol,3,7,0-diacetyl (-) eplcatechin (Anjuaneyulu *et al.*, 2002). Gupta *et al*. (1980) extracted from the stem 5,7-dihydroxyflavanone 4'-02-1 rhamnopyranosyl-β-D-glucopyranoside (I). The stem contains β-sitosterol, lupeol, Kempferol-3-glucoside and 5,7- dimethyl ether 4' rhamnoglucoside. The stem bark of *B. variegata* yields four substances viz. hentriacontane, octacosanol, β-sitosterol and sigmasterol (Anandaprakash, 1978). The known compounds from *Rhizophora stylosa* are 1,2,4-8 were characterized as (-) epicatechin (Lin *et al.*,2001b) (Foo *et al.*,1997) 3-0 acetyl(-) epicatechin (de Bruyne *et al.*,1999) (Ramesh *et al.*,2003) 3-3', 4' 5,7-0 pentacetyl (-) epicatechin (Laphookhieo *et al.*,2004) (Wan and Chan, 2004), (+) – afzelechin (Melchor *et al.*,2001 and Foo *et al.*, 1997) Cinchanain Ib (Marerro *et al.*, 2006) and proanthocyanidin B2 (Berenguer *et al.*, 2006) (Foo *et al.*, 1997), respectively, based on the detailed comparison of the H- and C-NMR spectral data with those of the literature reports (Li *et al.*, 2007). Chifu *et al.* (2010) reported that esters of fatty acids have strong antimicrobial activity against oral pathogens like *Streptococcus mutans*, *Candida albicans*, *Aggregatibacter actinomycetemcomitans*, *Fusobacterium nucleatum*, and *Porphyromonas gingivalis. Reports of* Dewi *et al*. (2020) are also same of the earlier that fatty acid ethyl esters like linoleic acid and α-linolenic acid exhibited strong antibacterial activities against *S. aureus* and *B. subtilis*.

The presence of 9-12 Octadecadienoic acid / Linoleic acid present in the stem bark of *Lumnitzeara racemose* may be responsible for antimicrobial activity. While the observations of Matthew *et al.* (2019) shows a strong anti-inflammatory and antibacterial activity due to

presence of linoleic acid while results of Stella *et al.* (2010) reported that presence of Sitosterol shows anti-inflammatory activity. The useful chemicals like 9-12 Octadecadienoic acid / Linoleic acid and Sitosterol are present in *Lumnitzera racemose* than *Cynometra iripa.* So, it may be having more antimicrobial activity in them. Further this study progresses towards antimicrobial and anti-inflammatory study.

Phytochemical analysis of the methanolic extracts of mangroves revealed that the presence of flavonoid, tannin, phenols, terpenoids and saponin derivatives. The antimicrobial properties of these secondary metabolites and from other extracts have also been reported. The presence of these compounds in the methanolic extracts could be the antimicribialy and anti-inflammatory active phytochemicals. Further study progresses over antimicrobial and anti-inflammatory activities of *Lumnitzera racemose* is essential.

Table No. 4. 1 Relative percentage composition of plant extracts of mangroves.

Sr. No.	Constituents	Retention Time (R. T.) (Min.)	Area %	Activity
Cynometra iripa.				
1	4-Methylmannose	28.211	62.16	Unknown
2	3-O-Methyl-d-glucose	27.317	37.84	Unknown
Lumnitzera racemosa.				
1	9-12 Octadecadienoic acid / Linoleic acid	33.307	58.22	**Antibacterial activity** (Venkatesalu *et al*., 2004; McGaw *et al.*, 2002)
2	Ergosta-8,24(28)-dien-3-ol,4,14- Dimethyl	34.101	19.48	Unknown
3	Sitosterol	30.717	14.48	**Anti-inflammatory activity** (Stella *et al.*, 2010.)

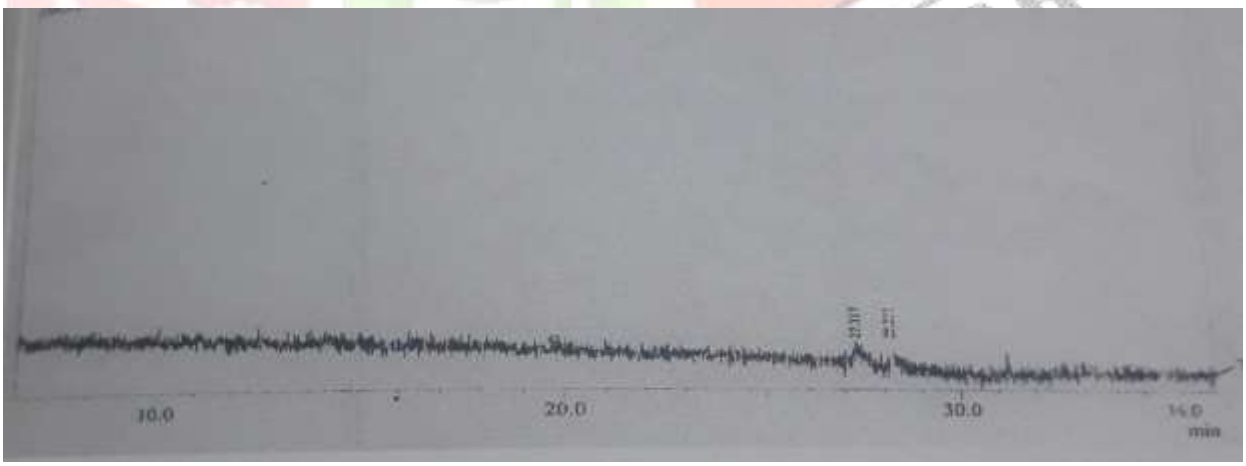

Figure 1. GCMS analysis of *Cynometra iripa*

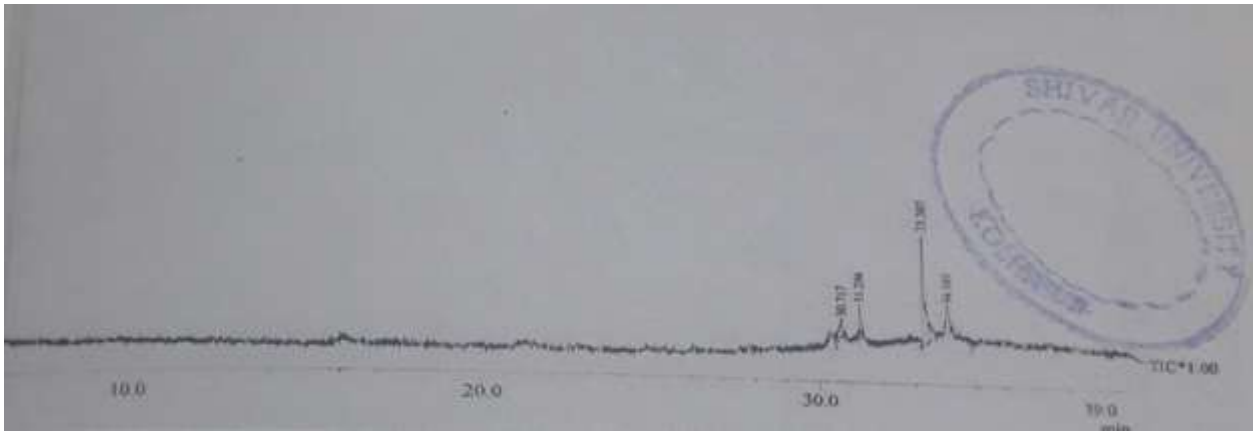

Figure 2. GCMS analysis of *Lumnitzera racemosa*

Phytochemical analysis of the methanolic bark extracts of mangroves revealed the presence of flavonoid, tannin, phenols, terpenoids and saponin derivatives. The antimicrobial properties of these secondary metabolites and from other extracts have also been reported. The presence of these compounds in the methanolic extracts could be the antifungally and anti-inflammatory active phytochemicals. The bark extract of *Lumnitzera racemosa* may be having more active phytochemicals with antimicrobial and anti-inflammatory activities due to presence of linoleic acid and sitosterol than the *Cynometra iripa*.

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