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Short Communication

GC-MS Analysis of Bioactive Components of Aerial parts of *Fluggea leucopyrus* Willd. (Euphorbiaceae)

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ABSTRACT

The present investigation was carried out to analyze the active constituents present in aerial parts of *Fluggea leucopyrus* (Euphorbiaceae). Fourteen compounds were identified by Gas Chromatography-Mass Spectrometry (GC-MS) analysis. The prevailing compounds were hexadecanoic acid ethyl ester (46.06%), lupeol (13.62%), vitamin E (8.70%), linoleic acid ethyl ester (5.78%), a-sitosterol (5.66%), 9,12- octadecadienoic acid (Z,Z)-, 2-hydroxy-1- (hydroxymethyl) ethyl ester (3.98%), stigmasterol (3.94%), phytol (2.70%), nonadecane, 2-methyl- (2.27%).

INTRODUCTION

Fluggea leucopyrus Willd. is one of the medicinally important plant belonging to Euphorbiaceae commonly known as Bush weed, Indian snowberry, is a thorny woody shrub. The plant is sweet, cooling, diuretic, aphrodisiac, tonic useful in vitiated conditions of Pitta, burning sensation, strangury, seminal weakness and general debility. Leaves act as a disinfectant (antiseptic) and its paste is used by the tribes to extract any extraneous materials from body tissues without surgery. Paste of *Fluggea leucopyrus* leaves mixed with tobacco is used to destroy worms in sores (Solangaarachchi and Perera, 1993). The leaves were boiled and taken orally twice a day for stomachache (Suresh *et al*., 2011). However, perusal of literature reveals that GC-MS analysis of *Fluggea leucopyrus* is totally lacking and hence the present investigation was undertaken. The main objective of the present study is to analyze the various phytochemical constituents found in aerial parts of *Fluggea leucopyrus*.

MATERIALS AND METHODS

The aerial parts of *Fluggea leucopyrus* Willd. were collected from Vellamadam, Nagercoil, Kanyakumari District, Tamil Nadu. The aerial parts were shade dried and pulverized to powder in a mechanical grinder. Required quantity of powder was weighed and transferred to stoppered flask and treated with ethanol until the powder is fully immersed.

The flask was shaken every hour for the first 6 hours and then it was kept aside and again shaken after 24 hours. This process was repeated for 3 days and then the extract was filtered. The extract was collected and evaporated to dryness by using a vacuum distillation unit. The final residue thus obtained was then subjected to GC-MS analysis.

GC-MS Analysis

GC-MS analysis of the extract was performed using a Perkin-Elmer GC Clarus 500 system and Gas chromatograph interfaced to a Mass spectrometer (GC-MS) equipped with a Elite-I, fused silica capillary column (30mmX0.25mm 1D X 1 µMdf, composed of 100% Dimethyl poly siloxane).

For GC-MS detection, an electron ionization system with ionizing energy of 70 eV was used. Helium gas (99.999%) was used as the carrier gas at constant flow rate 1ml/min and an injection volume of 2µl was employed (split ratio of 10:1); Injector temperature 250°C; Ion-source temperature 280°C.

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The oven temperature was programmed from 110°C (isothermal for 2 min.), with an increase of 10°C/min, to 200°C, then 5°C/min to 280°C, ending with a 9min isothermal at 280°C. Mass spectra were taken at 70 eV; a scan interval of 0.5seconds and fragments from 45 to 450 Da. Total GC running time was 36 minutes. The relative % amount of each component was calculated by comparing its average peak area to the total areas, software adopted to handle mass spectra and chromatograms was a Turbomass. Interpretation on mass spectrum GC-MS was conducted using the database of National Institute Standard and Technology (NIST) having more than 62,000 patterns. The spectrum of the unknown component was compared with the spectrum of the known components stored in the NIST library. The name, molecular weight and structure of the components of the test materials were ascertained.

RESULTS AND DISCUSSION

The components present in the ethanol extract of aerial parts of *Fluggea leucopyrus* was identified by GC-MS (Fig.1).The active principles with their retention time (RT), molecular formula, molecular weight (MW) and concentration (%) in the ethanol extract of aerial parts of *Fluggea leucopyrus* are presented in Table 1. Fourteen compounds were identified in the ethanol extract of aerial parts of *Fluggea leucopyrus*. The prevailing compounds were hexadecanoic acid, ethyl ester (46.06%), lupeol (13.62%), vitamin E (8.70%), linoleic acid ethyl ester (5.78%), a-sitosterol (5.66%), 9,12- octadecadienoic acid (Z,Z)-, 2-hydroxy-1-(hydroxymethyl) ethyl ester (3.98%), stigmasterol (3.94%), phytol (2.70%), nonadecane, 2-methyl- (2.27%), octadecane 2-methyl- (1.97%) and 2,6,10,14,18,22- tetracosahexaene, 2,6,10,15,19,23-hexamethyl-, (all-E)- (1,67%). Fig 2,3,4,5 and 6 show the mass spectrum and structure of hexadecanoic acid ethyl ester, phytol, linoleic acid ethyl ester, stigmasterol and lupeol. Table 2 listed the major phytocompounds and its biological activities obtained through the GC-MS study of the aerial parts of *Fluggea leucopyrus*. Among the identified phytochemicals, hexadecanoic acid has the property of antioxidant activity (Jagadeeswari *et al*., 2012). Phytol is detected in *Fluggea leucopyrus* aerial part which was also found to be effective in different stages of arthritis. It was found to give good as well as preventive and therapeutic results against arthritis. The results show that reactive oxygen species promoting substances such as phytol constitute a promising novel class of pharmaceuticals for the treatment of rheumatoid arthritis and possibly other chronic inflammatory diseases (Ogunlesi *et al.*, 2009). Stigmasterol is used as a precursor in the manufacture of semi synthetic progesterone, a valuable human hormone that plays an important physiological role in the regulatory and tissue rebuilding mechanisms related to estrogen effects, as well as acting as an intermediate in the biosynthesis of androgens, estrogens and corticoids. Lupeol exhibits a broad spectrum of biological activities and can be used as antiprotozoal, anti-inflammatory, antitumour and chemo preventive agents (Gallo *et al*., 2008). The above said compounds found in the ethanol extract of *Fluggea leucopyrus* aerial parts are being used for the pharmacological work. Thus this type of GC-MS analysis is the first step towards understanding the nature of active principles in the medicinal plants and this type of study will be helpful for further detailed study. However, isolation of individual phytochemical constituent and subjecting it to biological activity will definitely give fruitful results. It could be concluded that, *Fluggea leucopyrus* contains various bioactive compounds. So it is recommended as plant of pharmaceutical importance. However, further studies are needed to undertake its bioactivity and toxicity profile.

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Table. 1: Components detected in ethanol extract of aerial parts of *Fluggea leucopyrus* .

S. No.	RT	Name of the compound	Molecular formula	MW	Peak Area %
1	11.22	3,7,11,15-Tetramethyl-2-hexadecen-1-ol	$C_{20}H_{40}O$	296	1.33
2	12.25	Hexadecanoic acid, methyl ester	$C_{17}H_{34}O_2$	270	1.03
3	12.80	Hexadecanoic acid, ethyl ester	$C_{18}H_{36}O_2$	284	46.06
4	14.47	Phytol	$C_{20}H_{40}O$	296	2.70
5	15.11	Linoleic acid ethyl ester	$C_{20}H_{36}O_2$	308	5.78
6	18.76	9,12-Octadecadienoic acid (Z,Z)-, 2-hydroxy-1-(hydroxymethyl)ethyl ester	$C_{21}H_{38}O_4$	354	3.98
7	19.72	Nonadecane, 2-methyl-	$C_{20}H_{42}$	282	2.27
8	21.13	Octadecane, 2-methyl-	$C_{19}H_{40}$	268	1.97
9	23.91	Heptacosane	$C_{27}H_{56}$	380	1.29
10	24.07	2,6,10,14,18,22-Tetracosahexaene, 2,6,10,15,19,23-hexamethyl-, (all-E)-	$C_{30}H_{50}$	410	1.67
11	28.37	Vitamin E	$C_{29}H_{50}O_2$	430	8.70
12	30.27	Stigmasterol	$C_{29}H_{48}O$	412	3.94
13	31.41	ç-Sitosterol	$C_{29}H_{50}O$	414	5.66
14	33.11	Lupeol	$C_{30}H_{50}O$	426	13.62

Table. 2: Activity of phytochemicals identified in the ethanol extract of aerial parts of *Fluggea leucopyrus.*

S. No.	Name of the compound	Nature of compound	**Activity
1	3,7,11,15-Tetramethyl-2-hexadecen-1-ol	Terpene Alcohol	Antimicrobial, Anti-inflammatory
2	Hexadecanoic acid, methyl ester	Palmitic acid methyl ester	Antioxidant, Hypocholesterolemic, Nematicide, Pesticide, Antiandrogenic flavor, Hemolytic,5-Alpha reductase inhibitor
3	Hexadecanoic acid, ethyl ester	Palmitic acid ethyl ester	Antioxidant, Hypocholesterolemic, Nematicide, Pesticide, Antiandrogenic flavor, Hemolytic, Alphareductase inhibitor
4	Phytol	Diterpene	Antimicrobial, Anticancer, Diuretic, Anti-inflammatory
5	Linoleic acid ethyl ester	Linoleic acid ethyl ester	Hypocholesterolemic, Nematicide, Antiarthritic, Hepatoprotective Antiandrogenic , Hypocholesterolemic, 5-Alpha reductaseinhibitor Antihistaminic, Anticoronary, Insectifuge ,Antieczemic,Antiacne
6	9,12-Octadecadienoic acid (Z,Z)-, 2-hydroxy-1-(hydroxymethyl)ethyl ester	Linoleic acid ester	Hypocholesterolemic, Nematicide, Antiarthritic, Hepatoprotective, Antiandrogenic, Hypocholesterolemic 5-Alpha reductaseinhibitor, Antihistaminic, Anticoronary, Insectifuge, Antieczemic,Antiacne
7.	2,6,10,14,18,22-Tetracosahexaene, 2,6,10,15,19,23-hexamethyl-, (all-E)-	Triterpene compound	Antibacterial, Antioxidant, Antitumor, Cancer preventive, Immunostimulant, Chemopreventive, Lipoxygenase-inhibitor, Pesticide
8.	Squalene	Vitamin E compound	Antiageing, Analgesic, Antidiabetic, Anti-inflammatory, Antioxidant, Antidermatitic, Antileukemic, . Antitumor, Anticancer, Hepatoprotective, Hypocholesterolemic, Antiulcerogenic, Vasodilator, Antispasmodic, Antibronchitic, Anticoronary
9.	Stigmasterol	Steroid	Antimicrobial, Anticancer Antiarthritic, Antiasthma Diuretic, Anti-inflammatory
10.	ç-Sitosterol	Steroid	Antimicrobial, Anticancer Antiarthritic, Antiasthma Diuretic,Anti-inflammatory
11.	Lupeol	Triterpene compound	Antimalarial , Antioxidant, Antiflue Antihyperglycemic, Antitumor Antiviral, Pesticide, Cytotoxic Anti-inflammatory

**Activity S~ırce: Dr. Duke's Phytochemical and Ethnobotanical Databases

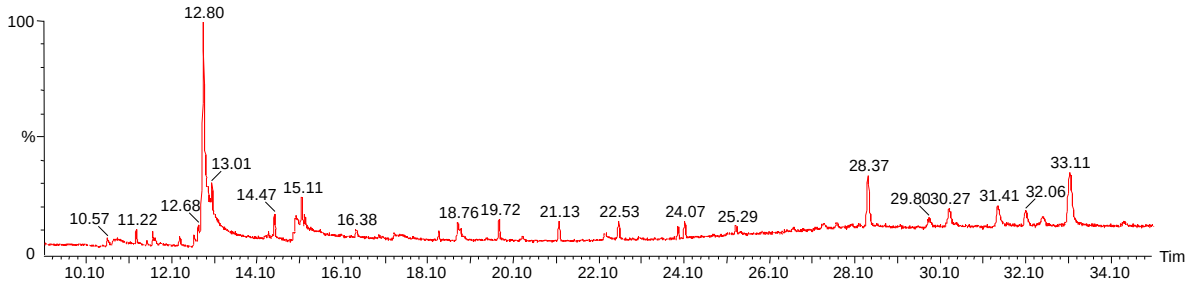

Fig. 1: GC-MS chromatogram of ethanol extract of aerial parts of *Fluggea leucopyrus.*

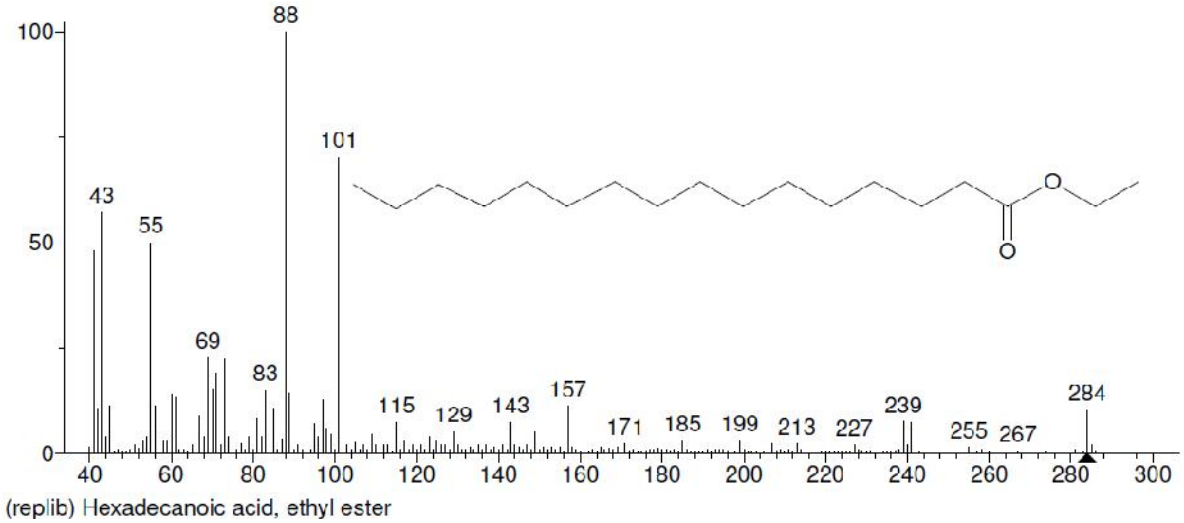

Fig. 2: Mass Spectrum and structure of Hexadecanoic acid, ethyl ester (RT:12.80).

Fig. 3: Mass Spectrum and structure of Phytol (RT: 14.47).

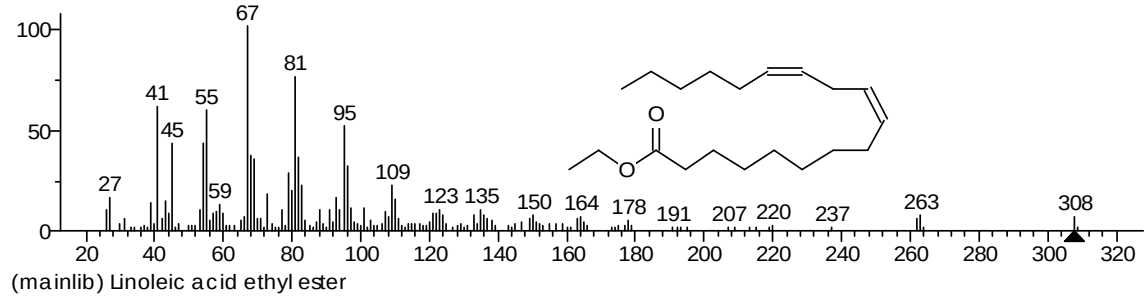

Fig. 4: Mass Spectrum and structure of Linoelic acid ethyl ester (RT:15.11).

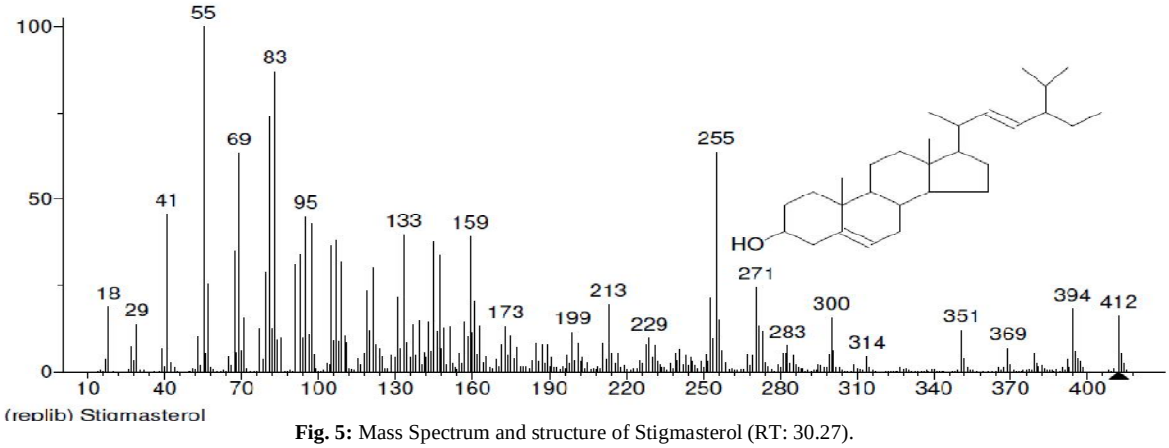

Fig. 5: Mass Spectrum and structure of Stigmasterol (RT: 30.27).

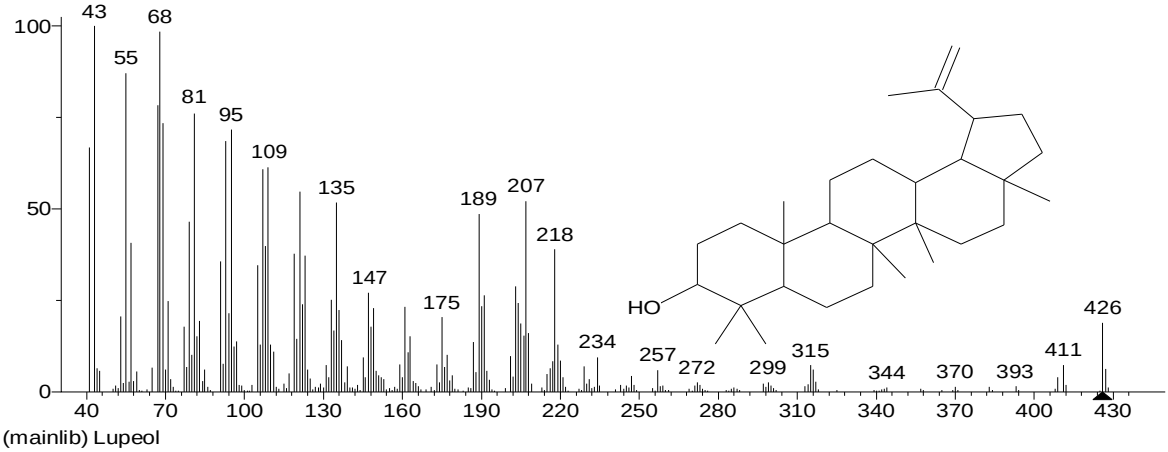

Fig. 6: Mass Spectrum and structure of Lupeol (RT: 33.11).

REFERENCES

Gallo MBC. and Sarachine MJ. Biological activities of Lupeol. Int. J. Biomed.Pharmaceut.Sci. 2009; 3: 46-66.

Jegadeeswari P., Nishanthini A., Muthukumaraswamy S. and Mohan VR. GC-MS analysis of bioactive components of Aristolochia krysagathra (Aristolochiaceae). J. Curr. Chem. Pharm. Sci. 2012; 2: 226-236.

Ogunlesi M., Okiei W., Ofor E. and Osibote AE. Analysis of the essential oil from the dried leaves of Euphorbia hirta Linn (Euphorbiaceae), a potential medication for asthma. African. J. biotech. 2009; 8: 7042-7050.

Solangaarachchi SM. and Perera BMS. Floristic composition and medicinally important plants in the under storey of the tropical dry mixed evergreen forest of the Hurubu reserve of Srilanka. J. National Sci. Counc. Srilanka.1993; 2: 209-221.

Suresh KR., Kottaimuthu R., Norman SJ., Kumuthakalavalli R. and Simon SM. Medicinal plants used by Malayali tribals in Kolli hills of Tamilnadu. Int. J. Res. Ayurveda Pharm. 2011; 2: 502-508.

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