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Bioactive Components in leaves of Jatropha tanjorensis J.L. Ellis & Saroja by GC-MS Analysis

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Abstract: The plant *Jatropha tanjorensis* J.L.Ellis & Saroja belonging to the family Euphorbiaceae is an important medicinal taxon. This plant which is primarily used for fencing in districts of Tanjavur, Tiruvarur, Ramnad and Pudukkottai, is now found medicinally important. Present study aimed at the investigation of the active phytoconstituents present in the leaves of the plant. The ethanol extract of the leaf is subjected to Gas chromatography and Mass Spectrometry analysis which revealed the presence of sixteen phytocomponents.
Key words : *Jatropha tanjorensis*, GC-MS analysis, α-sitosterol.

Introduction

Jatropha tanjorensis J.L.Ellis & Saroja (Euphorbiaceae) commonly called "Kattammanakku", is a natural interspecific sterile hybrid between *Jatropha curcas* L. and *Jatropha gossypifolia* L. It is a shrub to 2m with thick stout stem and sparse branching. Leaves alternate, palmately five lobed, light to dark green with no pigmentation except on very young leaves, margins distantly serrate, long petiole with dense pigmentation. Inflorescence cymose with monoecious unisexual and bisexual, pale pink tinged flowers. Stamens 8 with sterile pollen. Fruit not seen[1]. *J. tanjorensis* is popular as a natural remedy against malarial infection and hypertension in some parts of Nigeria[2].Edo people in Nigeria consume the leaves as a vegetable[3]. It used in the treatment of diabetic symptoms[4].

Materials And Methods

Collection Of Plant Materials

The plant was collected from areas of Tanjavur, Tamilnadu. The plant was identified and authenticated by Botanical Survey of India, Southern Circle, Coimbatore as *Jatropha tanjorensis* J.L. Ellis & Saroja[5] (Euphorbiaceae). Voucher specimen (SMCH-3056) was preserved in Department of Botany, St.Mary's College (Autonomous) Herbarium, Thoothukudi, Tamilnadu, India.

Preparation Of Plant And Extract

The leaves were shade dried and pulverized to powder in a mechanical grinder as per Indian pharmacopoeia[6]. The powder was then extracted with ethanol in soxhlet apparatus[7]. Then the filtrate was evaporated to dryness using a rotary evaporator. The final residue obtained was then subjected to GC-MS analysis.

GC-MS Analysis

GC- MS analysis of the extracts were carried out with GC-MS Clarus 500 Perkin Elmer system and gas chromatograph interfaced to a mass spectrometer (GC-MS) employing the following conditions : column Elite - 1 fused silica capillary column (30mm x 0.25 mm ID x 1 μmdf ,composed of 100% Dimethyl poly silaxane), operating in electron impact mode at 70 eV; Helium (99.999%) was used as a carrier gas at a constant flow of 1 ml /min and an injection volume of 0.5 μl was employed (split ratio of 10:1); injector temperature 250°C; Ion-source temperature 280°C. 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 9 minute, isothermal at 280°C. Mass spectra were taken at 70 eV; a scan interval of 0.5 seconds and fragments from 40 to 550 Da. Total GC running time was 36 min[8].

Characterisation Of Compounds

Interpretation on mass spectra of GC-MS was conducted using the database of National Institute of Standard and Technology (NIST). The mass spectra of the unknown compounds was compared with that of the known components stored in the NIST-library. The name, molecular weight and structure of the components of the test materials were ascertained (Table 1 and Fig.1).

Table 1: Phytocomponents detected in the ethanol extract of *Jatropha tanjorensis* leaves by GC-MS analysis

No.	RT	Name of the compound	Molecular Formula	Molecular weight	Peak Area %
1.	5.43	1-Nonene, 4,6,8-trimethyl-	$C_{12}H_{24}$	168	2.73
2.	11.69	Oxirane, [(hexadecyloxy)methyl]-	$C_{19}H_{38}O_2$	298	0.33
3.	13.44	Hexadecanoic acid, ethyl ester	$C_{18}H_{36}O_2$	284	4.96
4.	14.95	Phytol	$C_{20}H_{40}O$	296	14.05
5.	15.71	9,12,15-Octadecatrienoic acid, methyl ester, (Z,Z,Z)-	$C_{19}H_{32}O_2$	292	4.88
6.	16.06	Octadecanoic acid, ethyl ester	$C_{20}H_{40}O_2$	312	0.66
7.	18.88	6,9,12-Octadecatrienoic acid, phenyl methyl ester, (Z,Z,Z)-	$C_{25}H_{36}O_2$	368	0.66
8.	20.86	10-Undecenoic acid, octyl ester	$C_{19}H_{36}O_2$	296	16.36
9.	24.72	Squalene	$C_{30}H_{50}$	410	4.96
10.	25.95	Heptadecanoic acid, heptadecyl ester	$C_{34}H_{68}O_2$	508	2.89
11.	28.02	1,4-Cyclohexadiene, 1,3,6-tris (trimethylsilyl)-	$C_{15}H_{32}Si_3$	296	2.48
12.	28.78	9-Octadecenoic acid (Z)-, phenylmethyl ester	$C_{25}H_{40}O_2$	372	3.06
13.	30.63	2,4,6-Cycloheptatrien-1-one, 3,5-bis-trimethylsilyl-	$C_{13}H_{22}OSi_2$	250	4.55
14.	31.15	1,3-Bis(trimethylsilyl)benzene	$C_{12}H_{22}Si_2$	222	4.55
15.	32.41	á-Sitosterol	$C_{29}H_{50}O$	414	22.40
16.	33.19	á-Amyrin	$C_{30}H_{50}O$	426	10.50

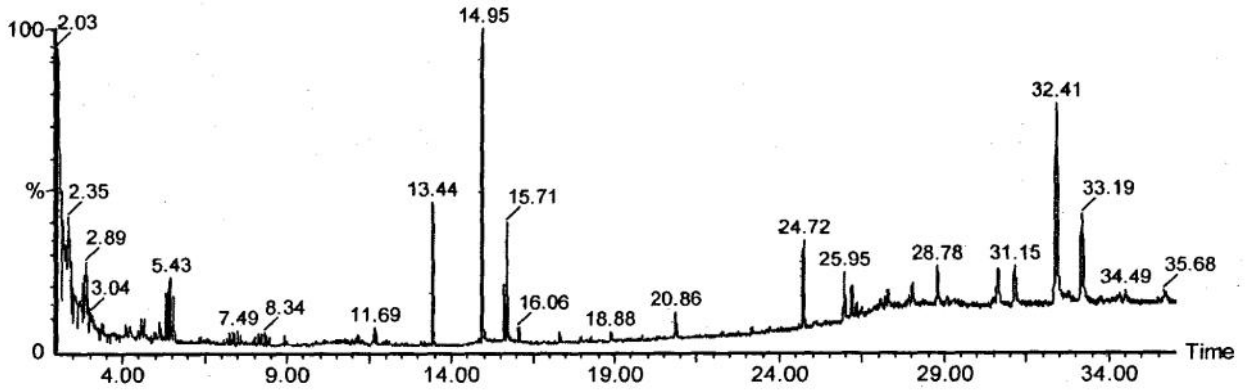

Fig.1 GC-MS chromatogram of the ethanol extract of leaves of *Jatropha tanjorensis*

Table 2: Bioactive phytocomponents identified in the ethanol extract of leaves of *Jatropha tanjorensis* by GC-MS analysis

RT	Name of the compound	Molecular	MW	Peak Area %	Nature of compound	*Activity
13.44	Hexadecanoic acid, ethyl ester	$C_{18}H_{36}O_2$	284	4.96	Palmitic acid ester	Antioxidant, Hypocholesterolemic, Antiandrogenic, Hemolytic
14.95	Phytol	$C_{20}H_{40}O$	296	14.05	Diterpene	Antimicrobial, Anticancer, Anti-inflammatory, Diuretic
15.71	9,12,15-Octadecatrienoic acid, methyl ester, (Z,Z,Z)-	$C_{19}H_{32}O_2$	292	4.88	Ester	Antiinflammatory, Hypocholesterole, Cancer preventive, Hepatoprotective
18.88	6,9,12-Octadecatrienoic acid, phenylmethyl ester, (Z,Z,Z)-	$C_{25}H_{36}O_2$	368	0.66	Ester	Antiinflammatory, Hypocholesterole Cancer preventive, Hepatoprotective
24.72	Squalene	$C_{30}H_{50}$	410	4.96	Triterpene	Antibacterial, Antioxidant, Antitumor, Cancer preventive, Immunostimulant, Chemo preventive
28.78	9-Octadecenoic acid (Z)-, phenylmethyl ester	$C_{25}H_{40}O_2$	372	3.06	Ester	Anti-inflammatory
32.41	α-Sitosterol	$C_{29}H_{50}O$	414	22.40	Steroid	Anticancer Hepatoprotective Antimicrobial Antiasthma Diuretic
33.19	α-Amyrin	$C_{30}H_{50}O$	426	10.50	Triterpene	Antimicrobial Antioxidant, Anticancer Anti-inflammatory

* Activity source: Dr. Duke's Phytochemical and Ethnobotanical databases

Result And Discussion

GC-MS chromatogram of ethanolic extract of leaves of *Jatropha tanjorensis* is presented in Table 1. Sixteen phytoconstituents were identified with the retention time ranging from 5.43 to 33.19. The compounds identified were 1-Nonene, 4,6,8-trimethyl-Oxirane, [(hexadecyloxy)methyl]-Hexadecanoic acid, ethyl ester, Phytol, 9,12,15-Octadecatrienoic acid, methyl ester, (Z,Z,Z)-Octadecanoic acid, ethyl ester, 6,9,12-Octadecatrienoic acid, phenyl methyl ester, (Z,Z,Z)-10-Undecenoic acid, octyl ester, Squalene, Heptadecanoic acid, heptadecyl ester, 1,4-Cyclohexadiene, 1,3,6-tris (trimethylsilyl)-9-Octadecenoic acid (Z)-, phenylmethyl ester, 2,4,6-Cycloheptatrien-1-one, 3,5-bis-trimethylsilyl-1, 3-Bis(trimethylsilyl)benzene, á-Sitosterol and á-Amyrin. The compounds with maximum peak area were phytol (14.05%), Sitosterol (22.40%) and á-amyrin (10.5%). Squalene is a triterpene found to occur in leaf extract. It is a main unsaturated lipid shows advantages for skin as an emollient, antioxidant, for hydration and for its antitumor activities. Biological and pharmacological activities of squalene and its related compounds makes it an potential compound in Cosmetic Dermatology[9]. Amyrin, Phytol and α-Sitosterol are compounds with antimicrobial and anticancerous properties (Table 2, Dukes Phytochemical and Ethnobotanical Databases) Octadecatrienoic acid identified from the extract was found to have anti-inflammatory and hepatoprotective property. Further exploitation of the taxon is essential to explore the bioactive phytoconstituents of pharmaceutical importance.

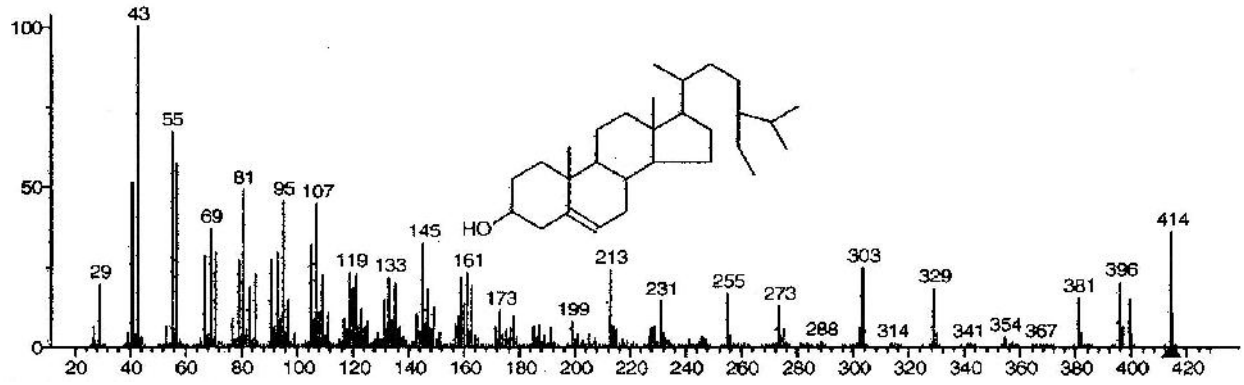

Fig.2 Mass spectrum of á-Sitosterol

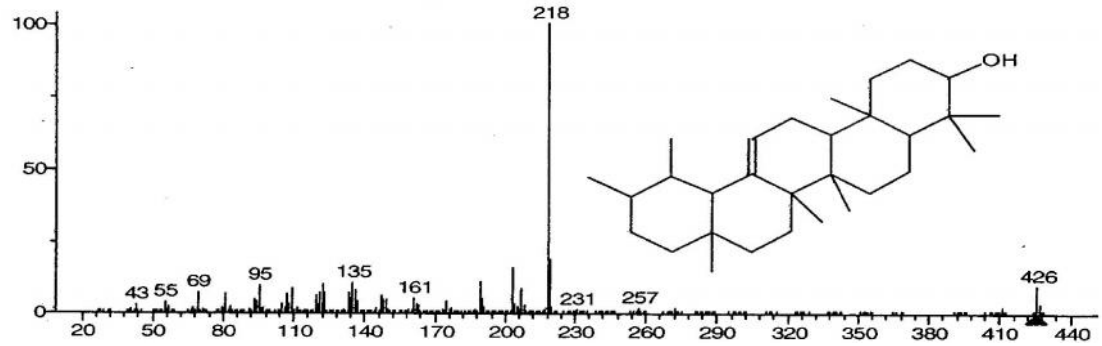

Fig.3 Mass spectrum of á-Amyrin

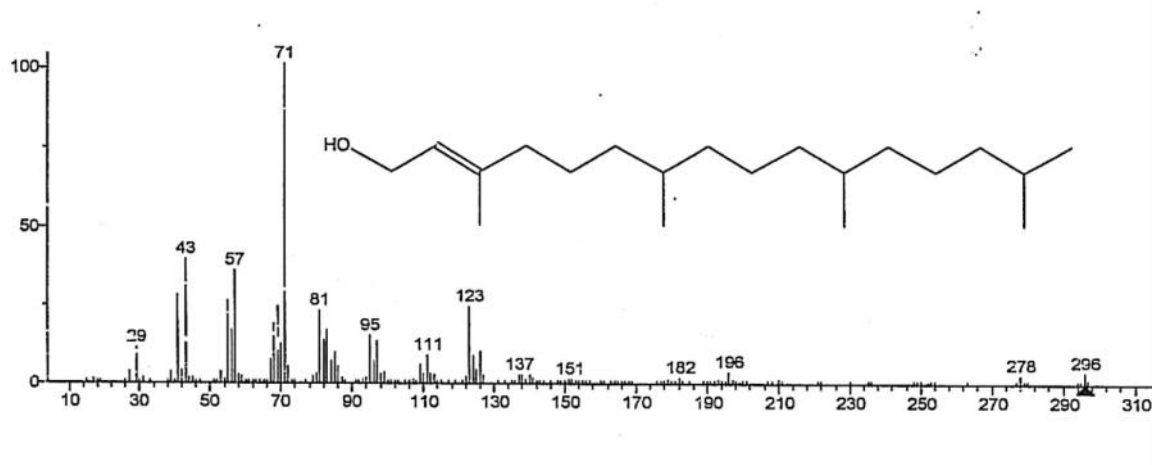

Fig.4. Mass spectrum of Phytol

Conclusion

Jatropha tanjorensis has phytoconstituents of pharmaceutical importance. It has antioxidant property and nutraceutical value. Detailed study on the bioactive compounds is necessary for further exploitation of this taxon.

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