DETERMINATION OF PHYTOCOMPONENTS BY GC – MS IN LEAVES OF *JATROPHA GOSSYPIFOLIA L.*

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ABSTRACT

Jatropha gossypifolia L., belonging to the family Euphorbiaceae is traditionally used in curing various ailments. The present study deals with the evaluation of bioactive components of *Jatropha gossypifolia* L. by using Gas Chromatography – Mass Spectrum Technique. The results revealed the presence of eighteen compounds of which Lanosterol (32.47%) and (-) - Globulol (18.96%) were the phytocomponents with high peak areas.

KEY WORDS: *Jatropha gossypifolia* L., GC-MS analysis, folk medicines, Phytocomponents, Lanosterol, (-) Globulol, Sitosterol

INTRODUCTION

J. gossypifolia of Euphorbiaceae family is commonly called "Cotton leaf, Physic nut, Wild physic nut, Belly ache" in English, "Ratan jyoti" in Hindi and "Seemayamanakku, Kattamanakku" in Tamil. It is a perennial shrub reaching 3 m height with purplish stems. Leaves are palmately lobed, alternate; leaf margins, petioles and stipules covered with glandular hairs and are featured with red to purple tinges, Inflorescene corymb. Flowers small, 5 unisexual, monoecious, deep maroon coloured with yellow centres. Fruit trilobed and green. It is seen almost in all parts of India (Agarwal, 1986). It founds much importance in folk medicines. It is used by the Yoruba folklore in South Nigeria in the management of malaria. These people macerate leaves with local black soap and bath with it twice in three days (Oladele *et al.,* 2008). The rural communities of Churu districts in the Thar Desert, India use these leaves to cure Guinea worm leaves are tied locally in the affected areas. In Latin America and the Carribbean, the leaves *J.gossypifolia* are boiled and the decoction is used for washing wounds. The leaf bath is used for sores, sprains and rashes (Lans *et al.,* 2001). Also the decoction of the leaves is useful for stomach ache, veneral diseases and as a blood purifier (Banerji *et al.,* 1993). The leaf extract has been used as an anticoagulant for biochemical and haematological analysis. (Oduola *et al*., 2005). It founds importance in treatment of oral candidiasis in Tanzania (Kizangau *et al.,* 2007) *Jatropha gossypifolia* leaf extact has antimicrobial and insecticidal properties (Das and Das, 1995).

MATERIALS AND METHODS

The plant was collected from areas of Thoothukudi, Tamilnadu. The plant was identified and authenticated by Botanical Survey of India, Southern Circle, Coimbatore as *Jatropha gossypifolia L.,*(Euphorbiaceae). Voucher specimen (SMCH-3073) was preserved in Department of Botany, St.Mary's College (Autonomous) Herbarium, Thoothukudi, Tamil Nadu, India. The leaves were shade dried and pulverized to powder in a mechanical grinder. The powder was then extracted with ethanol in soxhlet apparatus. 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.

CHARECTERISATION OF COMPOUNDS

Interpretation on mass spectra of GC-MS was conducted using the database of National Institute of Standard and Technology (NIST). The mass spectrum 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).

RESULT AND DISCUSSION:

The present study identifies that presence of eighteen phytocomponents in the ethanol extract of *J.gossypifolia* with the retention time ranging from 8.91 to 32.43. Lanosterol (32.47%) and (-) - Globulol (18.96%) were the phytocomponents with high peak areas (Fig 1 and 2).

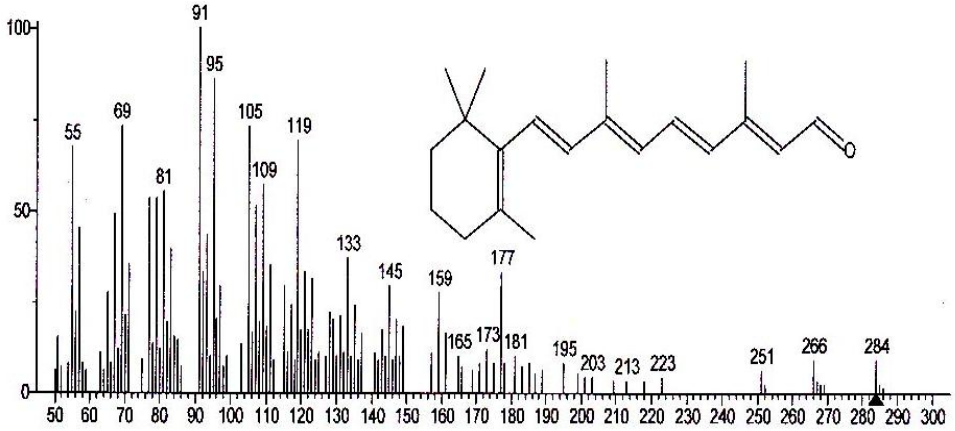

Fig. 1: Mass spectrum of Lanosterol

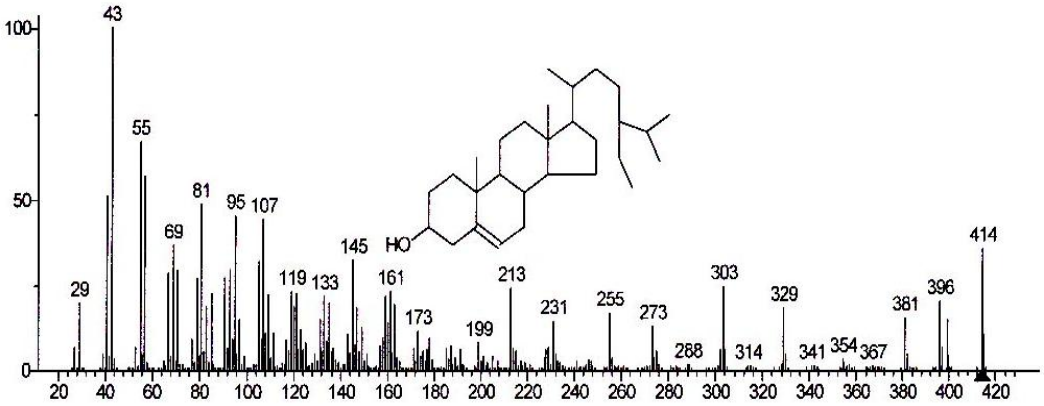

Fig. 2: Mass spectrum of Sitosterol

Table 1: Phytocomponents identified in the leaf ethanol extracts of *Jatropha gossypifolia*

No.	RT	Name of the compound	Molecular	MW	Peak Area %
1.	8.91	Vitamin d3	$C_{27}H_{44}O$	384	0.09
2.	9.30	3-Hexadecyloxycarbonyl-5-(2-hydroxyethyl)-4-methylimidazolium ion	$C_{24}H_{45}N_2O_3$	409	0.18
3.	10.14	9-Octadecenoic acid (Z)-, phenylmethyl ester	$C_{25}H_{40}O_2$	372	0.13
4.	11.44	6,9,12-Octadecatrienoic acid, phenylmethyl ester, (Z,Z,Z)-	$C_{25}H_{36}O_2$	368	0.18
5.	11.69	Oleic Acid	$C_{18}H_{34}O_2$	282	0.13
6.	12.64	Cyclopentaneundecanoic acid, methyl ester	$C_{17}H_{32}O_2$	268	0.09
7.	13.07	1,2-Benzenedicarboxylic acid, butyl octyl ester	$C_{20}H_{30}O_4$	334	0.31
8.	13.45	E-11-Hexadecenoic acid, ethyl ester	$C_{18}H_{34}O_2$	282	0.09
9.	14.96	Phytol	$C_{20}H_{40}O$	296	2.11
10.	20.86	E,Z-2,15-Octadecadien-1-ol acetate	$C_{20}H_{36}O_2$	308	1.54
11.	23.05	d-Mannitol, 1-decylsulfonyl-	$C_{16}H_{34}O_7S$	370	2.33
12.	23.76	9,12,15-Octadecatrienoic acid, 2-(acetyloxy)-1-[(acetyloxy)methyl]ethyl ester, (Z,Z,Z)-	$C_{25}H_{40}O_6$	436	8.12
13.	23.91	(-)-Globulol	$C_{15}H_{26}O$	222	18.96
14.	25.84	d-Mannitol, 1-decylsulfonyl-	$C_{16}H_{34}O_7S$	370	3.64
15.	27.12	1-Monolinoleoylglycerol trimethylsilyl ether	$C_{27}H_{54}O_4Si_2$	498	9.17
16.	28.05	Vitamin A aldehyde	$C_{20}H_{28}O$	284	7.99
17.	31.99	Lanosterol	$C_{30}H_{50}O$	426	32.47
18.	32.43	ç-Sitosterol	$C_{29}H_{50}O$	414	12.51

The compounds identified were Vitamin d3, 3-Hexadecyloxycarbonyl-5-(2-hydroxyethyl)-4 methylimidazolium ion, 9- Octadecenoic acid (z) - phenyl methyl ester, 6, 9, 12-Octadecatrienoic acid, phenylmethyl ester, (Z, Z, Z) - , Oleic Acid, Cyclopentaneundecanoic acid,methyl ester, 1, 2 - Benzenedicarboxylic acid, butyl octyl ester, E-11-Hexadecenoic acid, ethyl ester, Phytol, E,Z-2,15-Octadecadien-1-ol acetate, d-Mannitol, 1-decylsulfonyl-, 9,12,15-Octadecatrienoic acid, 2-(acetyloxy)-1-(acetyloxy) methyl)ester,(z,z,z)-, (-)-Globulol, d-Mannitol,1-decylsulfonyl- 1-Monolinoleoylglycerol trimethylsilylether Vitamin A aldehyde, Lanosterol, c-Sitosterol. The compound that occurred with highest peak area was Lanosterol (32.47%) and the compound with lowest peak area was Vitamin d3. Vitamin d3 is the most effective form of vitamin D,it is believed to play a role in controlling the immune system , increasing neuro-muscular function and calcium absorption (PamelaEgan, 2007). Phytol is a diterpene with antimicrobial properties, significantly against many bacterial strains.Sitosterol is an important phytosterol that is said to reduce cholesterol levels. Table 2 lists the important phytocomponents with their activities.

Table 2. Phyto components identified in the leaf ethanol extract of *Jatropha gossypifolia*

Sr. No.	RT	Name of the compound	Nature of compound	**Activity
1.	8.91	Vitamin d3	Vitamin compound	Skin care products Anti cancer Reduce blood pressure Increases insulin secretion
2.	9.30	3-Hexadecyloxycarbonyl-5-(2-hydroxyethyl)-4-methylimidazolium ion	Amino compound	Antimicrobial
3.	10.14	9-Octadecenoic acid (Z)-, phenylmethyl ester	Unsaturated fatty acid ester	Anti-inflammatory,Cancer preventive
4.	11.44	6,9,12-Octadecatrienoic acid, phenylmethyl ester, (Z,Z,Z)-	Linolenic acid ester	Anti-inflammatory, Cancer preventive, Hepatoprotective
5.	11.69	Oleic Acid	Unsaturated fatty acid	Anti-inflammatory, Cancer preventive
6.	13.07	1,2-Benzenedicarboxylic acid, butyl octyl ester	Plasticizer compound	Antimicrobial Antifouling
7.	14.96	Phytol	Diterpene	Anticancer Anti-inflammatory Antimicrobial, Diuretic
8.	23.05	d-Mannitol, 1-decylsulfonyl-	Sugar alcohol with sulfur	Anti cancer Anti microbial
9.	23.76	9,12,15-Octadecatrienoic acid, 2-(acetyloxy)-1-[(acetyloxy)methyl]ethyl ester, (Z,Z,Z)-	Linolenic acid ester compound	Anti-inflammatory, Cancer preventive, Hepatoprotective,
10.	23.91	(-)-Globulol	Sesquiterpene alcohol	Anti-tumor, Analgesic, Antibacterial, Anti-inflammatory, Sedative Fungicide.
11.	25.84	d-Mannitol, 1-decylsulfonyl-	Sugar alcohol with sulfur	Anti cancer Anti microbial
1.	27.12	1-Monolinoleoylglycerol trimethylsilyl ether	Steroid	Antiarthritic, Anticancer Hepatoprotective, Antimicrobial Antiasthma, Diuretic
16.	28.05	Vitamin A aldehyde	Vitamin compound	Antioxidant Helps in night vision Anticancer, Antimicrobial Cardio protective
17.	31.99	Lanosterol	Sterol compound	Antiarthritic, Anticancer Hepatoprotective, Antimicrobial Antiasthma, Diuretic
18.	32.43	ç-Sitosterol	Steroid	Antiarthritic, Anticancer Hepatoprotective, Antimicrobial Antiasthma, Diuretic

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

CONCLUSION

In this study, the GC-MS analysis has justified the ethnomedical use for which the plant is reputed and this enables very interesting exposure to the plant which is an ancient folklore medicine.

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