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***Full Length Article***

# GC MS Analysis of Leaves of *Jatropha maheswarii* Subram & Nayar

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**ABSTRACT**

*Jatropha maheswarii* Subram.& Nayar is an endemic plant distributed in the south coastal regions of Thoothukudi and Tirunelveli districts. It belongs to the family Euphorbiaceae. The stem and leaf of this plant are used by the rural folk similar to other *Jatropha* species in curing skin diseases, hemorrhage and tooth infections. Gas chromatography and mass spectrometric analysis ofmethanol extract of leaf revealed the presence of twenty two compounds.The major chemical constituents were Vitamin-E (19.96%), Phytol (16.96%), Imidazole2-amino-5-[(2-carboxy), vinyl] and Squalene (6.14%).

**Key Words**: GC-MS analysis, *Jatropha maheswarii*, Phytol, Squalene, Vitamin-E.

## INTRODUCTION

*Jatropha maheswarii* is commonly called "Adalai or Kattamannaku", is a shrub to 1-5m, stem is dark green petiole glabrous. The plant is widely used by the local people to cure rheumatism, eczema and ringworms and also as a insecticide.The fresh viscid juice flowing from stem is used to arrest haemorrhage from eczema.Fresh stem is used as tooth brush. Viswanathan *et al*., (2004) studied 4 compounds from stem extract of *Jatropha maheswarii* and the methanolic stem extract of *Jatropha maheswarii* exhibited maximum activity against *Staphylococcus aureus* provide scientific evidence for use in skin disease and toothaches. Uthayakumarai and Sumathi (2011) studied the preliminary phytochemical analysis of *Jatropha maheswarii*. The phytochemical presents were flavonoids, alkaloids phenol, glycosids, tannins, steroids and saponins. Hence the objective of the present study is to identify the phytochemical constituents present in the leaves of *Jatropha maheswarii* with the aid of GC-MS technique.

## MATERIALS AND METHODS

### Collection and identification of plant material

The plant was collected from areas of Thoothukudi and Tirunelveli districts, Tamilnadu. The plant was identified and authenticated by Botanical Survey of India, Southern Circle, Coimbatore as *Jatropha maheswari* (Euphorbiaceae). Voucher specimen (SMCH-3098) was preserved in Department of Botany, St.Mary's College (Autonomous) Herbarium, Thoothukudi, Tamilnadu, India.

### PREPARATION OF POWDER AND EXTRACT

Fresh leaves were shade dried and pulverized to powder in a mechanical grinder (Anonymous, 1998). 25 gm of leaf powder was packed in soxhlet apparatus and extracted with methanol. The filtrate was evaporated to dryness using a rotary evaporator. The final residue obtained was then subjected to GC-MS analysis.The dried extract was stored at $20^0$C in vials for further studies.

**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.

**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 were 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: Fig.1, 2, 3&4).

**RESULTS AND DISCUSSION**

The present study identified the presence of twenty two phytocomponents in the methanol leaf extract of *Jatropha maheswarii* with the retention time ranging from 10.46 to 35.64.Vitamin E (19.96%) and Phytol (16.96%) were the phytocomponents with high peak areas.The compounds identified were Imidazole2-amino-5-[(2-carboxy), vinyl]-, Trans-2- undecen-1-ol, 9-Tetra decen-1-ol,acetate,(E), 9,9-Dimethoxybicyclo[3.3.1]nona-2,4-dione, Phytol, 9-Oxabicyclo[6.1.0]nonan-4-ol, 1,4-Dioxaspiro[4.5]decane, 8-(methylthio)-, 1,6-Anhydro-3,4-dideoxy-á-D-manno-hexapyranose, 1,2-Benzenedicarboxylic acid, diisooctyl ester, 3,3'-Iminobispropylamine, Squalene, 3-Trifluoroacetoxypentadecane, ç-Tocopherol, Vitamin E, 9-Octadecenoic acid (Z)-, phenylmethyl ester, Pterin-6-carboxylic acid, 1b,5,5,6a-Tetramethyl-octahydro-1-oxa-cyclopropa[a]inden-6-one, 2H-Pyran, 2-(7-heptadecynyloxy)tetrahydro-, Z,Z,Z-4,6,9-Nonadecatriene,1,6,10,14-Hexadecatetraen-3-ol,3,7,11,15-tetramethyl-,(E,E)-, 1Naphtha lenepropanol,à-ethyldecahydro-5-(hydroxymethyl)-à,5,8a-trimethyl-2-methylene-, [1S-[1à(S*), 4aá,5à,8aà]]- ,8,9,9,10,10,11-Hexafluoro-4,4-dimethyl-3,5 dioxatetracyclo [5.4.1.0(2,6).0(8,11)] dodecane. Themajor phytocontituents present in the leaf extract were Vitamin-E (19.96%). and Phytol (16.96%). Squalene (6.14%). Vitamin E (α-tocopherol) is the most important lipid-soluble antioxidants, and that it protects cell membranes from oxidation, thus stabilizing them and maintaining their permeability (Herrera and Barbas, 2001; Traber and Atkinson, 2007). Vitamin E supplement elevates the activities of antioxidant enzymes (Ammouche *et al.,* 2002; Kiron *et al.,* 2004). In humans, the high supplementation of vitamin E has been shown to induce a pro-oxidant activity making them react directly with other free radicals or induce lipid oxidation under mild oxidative stress but not under severe situations (Kontush *et al.,* 1996). Phytol is a diterpene with antimicrobial properties, significantly against many bacterial strains (Bharathy *et al.,* 2012). It can be used as a precursor for the manufacture of synthetic forms of vitamin E (Netscher, 2007) and vitamin K1 (Daines). Squalene is one of the major components of skin surface lipids.It protecting human skin surface from lipid peroxidation due to exposure to UV and other sources of ionizing radiation. In animals, supplementation of the diet with squalene can reduce cholesterol and triglyceride levels. In humans, squalene might be a useful addition to potentiate the effects of some cholesterol-lowering drugs. The primary therapeutic use of squalene currently is as an adjunctive therapy in a variety of cancers (Kelly, 1999) Kala *et al.* (2011) identified squalene have the property of antioxidant.

**CONCLUSION**

*Jatropha maheswarii*, an endemic taxon to South India is an unexploited and underutilizedspecies. The phytocomponents identified might serve as source for drug formulations in future.

**ACKNOWLEDGEMENT**

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**Table 1: Phytocomponents identified in the methanol leaf extracts of *Jatropha maheswarii* (GC-MS Study)**

| No. | RT | Name of the compound | Molecular Formula | MW | Peak Area % | Compound Nature | **Activity |
|---|---|---|---|---|---|---|---|
| 1 | 10.46 | Imidazole2-amino-5-[(2-carboxy), vinyl] | $C_6H_7N_3O_2$ | 153 | 13.38 | Amino compound | Antimicrobial Anti-inflammatory |
| 2 | 10.89 | Trans-2- undecen-1-ol | $C_{11}H_{22}O$ | 170 | 6.24 | Unsaturated Alcoholic compound | No activity reported |
| 3 | 11.33 | 9-Tetra decen-1-ol,acetate,(E) | $C_{16}H_{30}O_2$ | 254 | 1.95 | Acetate compound | No activity reported |
| 4 | 12.55 | 9,9 Dimethoxybicyclo[3.3.1]nona-2,4-dione | $C_{11}H_{16}O_4$ | 212 | 3.70 | Ketone compound | No activity reported |
| 5 | 14.00 | Phytol | $C_{20}H_{40}O$ | 296 | 16.96 | Diterpene | Antimicrobial Anti-inflammatory Anticancer Diuretic |
| 6 | 15.25 | 9-Oxabicyclo[6.1.0]nonan-4-ol | $C_8H_{14}O_2$ | 142 | 2.37 | Alcoholic compound | **No activity reported** |
| 7 | 17.2 | 1,4-Dioxaspiro[4.5]decane, 8-(methylthio)- | $C_9H_{16}O_2S$ | 188 | 1.03 | Sulfur compound | Antimicrobial |
| 8 | 17.64 | 1,6-Anhydro-3,4-dideoxy-á-D-manno-hexapyranose | $C_6H_{10}O_3$ | 130 | 0.30 | Sugar moiety | Preservative |
| 9 | 19.67 | 1,2-Benzenedicarboxylic acid, diisooctyl ester | $C_{24}H_{38}O_4$ | 390 | 3.46 | Plasticizer compound | Antimicrobial Antifouling |
| 10. | 21.75 | 3,3'-Iminobispropylamine | $C_6H_{17}N_3$ | 131 | 0.73 | Amino compound | Antimicrobial Anti-inflammatory |
| 11. | 23.27 | Squalene | $C_{30}H_{50}$ | 410 | 6.14 | Triterpene | **Antibacterial, Antioxidant, Antitumor, Cancer preventive, Immunostimulant, Chemo preventive, Lipoxygenase-inhibitor, Pesticide** |
| 12. | 23.68 | 3-Trifluoroacetoxypentadecane | $C_{17}H_{31}F_3O_2$ | 324 | 1.75 | Fluro compound | Antimicrobial |
| 13. | 26.50 | ç-Tocopherol | $C_{28}H_{48}O_2$ | 416 | 7.07 | Vitamin E compound | Antiageing, Analgesic, Antidiabetic Antiinflammatory, Antioxidant, Antidermatitic, Antileukemic, Antitumor, Anticancer, Hepatoprotective, Hypocholesterolemic, |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | | | | | | | Antiulcerogenic, Vasodilator, Antispasmodic, .Antibronchitic, Anticoronary |
| 14. | 27.46 | Vitamin E | $C_{29}H_{50}O_2$ | 430 | 19.96 | Vitamin-E | Antiageing, Analgesic, Antidiabatic Antiinflammatory, Antioxidant, Antidermatitic, Antileukemic, Antitumor,Anticancer, Hepatoprotective, Hypocholesterolemic, Antiulcerogenic, Vasodilator, Antispasmodic, .Antibronchitic, Anticoronary |
| 15. | 28.79 | 9-Octadecenoic acid (Z)-, phenylmethyl ester | $C_{25}H_{40}O_2$ | 372 | 0.61 | Oleic acid ester | Antiinflammatory, Antiandrogenic Cancer preventive, DermatitigenicHypocholesterolemic 5-Alpha reductase inhibitor,Anemiagenic Insectifuge, Flavor |
| 16. | 29.23 | Pterin-6-carboxylic acid | $C_7H_5N_5O_3$ | 207 | 0.66 | Nitrogen compound | No activity reported |
| 17. | 30.00 | 1b,5,5,6a-Tetramethyl-octahydro-1-oxa-cyclopropa[a]inden-6-one | $C_{13}H_{20}O_2$ | 208 | 0.45 | Ketone compound | No activity reported |
| 18. | 30.23 | 2H-Pyran, 2-(7-heptadecynyloxy)tetrahydro- | $C_{22}H_{40}O_2$ | 336 | 6.61 | Pyran compound | No activity reported |
| 19. | 30.77 | Z,Z,Z-4,6,9-Nonadecatriene | $C_{19}H_{34}$ | 262 | 2.32 | Alkene compound | No activity reported |
| 20. | 30.93 | 1,6,10,14-Hexadecatetraen-3-ol, 3,7,11,15-tetramethyl-, (E,E)- | $C_{20}H_{34}O$ | 290 | 0.77 | Unsaturated alcoholic compound | No activity reported |
| 21. | 31.71 | 1-Naphthalenepropanol, à-ethyldecahydro-5-(hydroxymethyl)-à,5,8a-trimethyl-2-methylene-, [1S-[1à(S*),4aá,5à,8aà]] | $C_{20}H_{36}O_2$ | 308 | 1.79 | Naphthalene compound | No activity reported |
| 22. | 35.64 | 8,9,9,10,10,11-Hexafluoro-4,4-dimethyl-3,5-dioxatetracyclo[5.4.1.0(2,6).0(8,11)]dodecane | $C_{12}H_{12}F_6O_2$ | 302 | 1.75 | Fluro compound | Antimicrobial |

**Source: Dr.Duke's Phytochemical and Ethnobotanical Databases

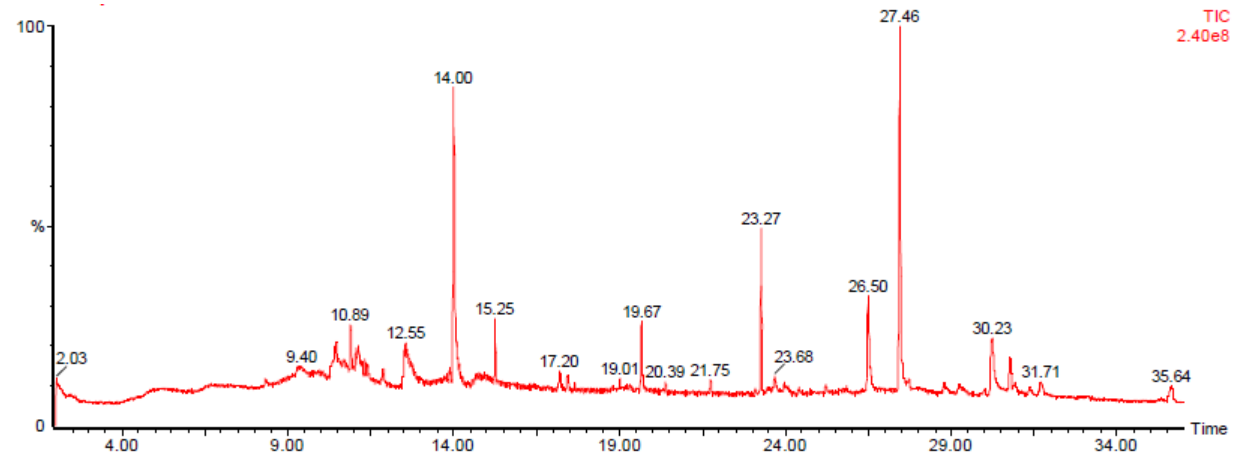


**Fig.1. GC-MS Chromatogram of ethanol leaf extract of *Jatropha maheswarii***

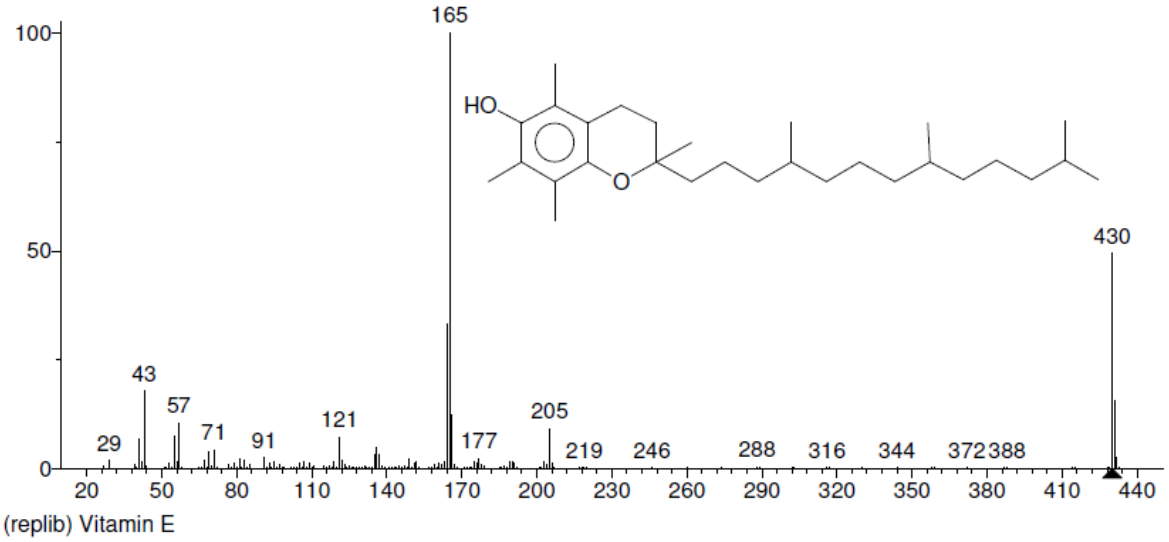


**Fig 2: Mass spectrum of Vitamin E**

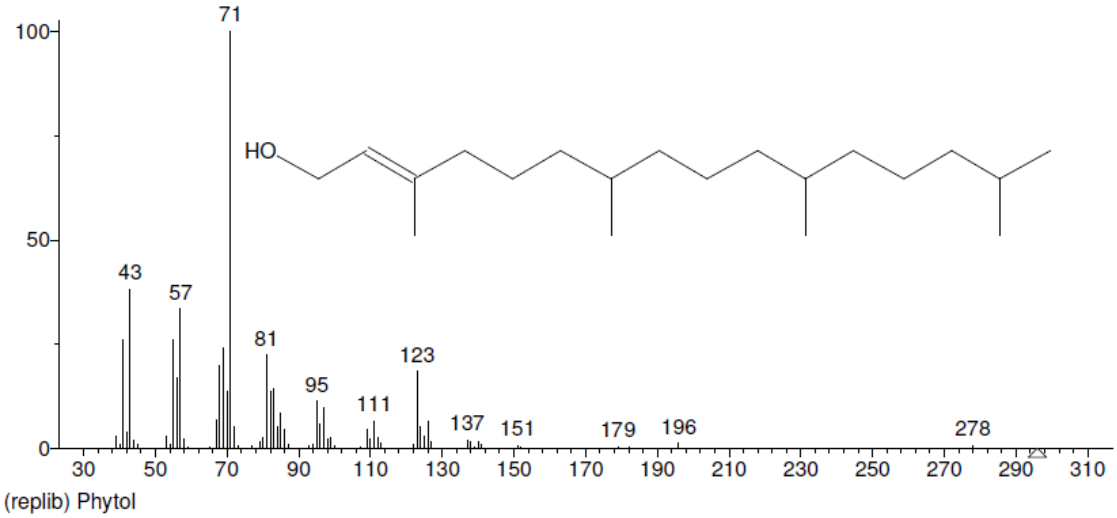


**Fig 3:Mass spectrum of Phytol**

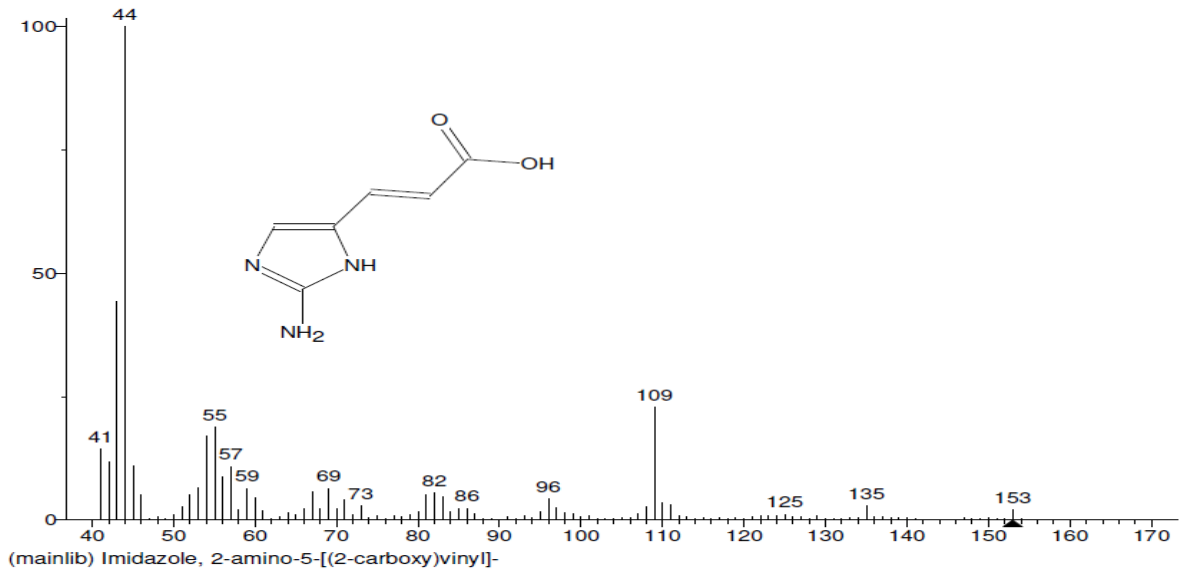


**Fig 3: Mass spectrum of Imidazole, 2-amino-5-[(2-carboxy)vinyl]-**

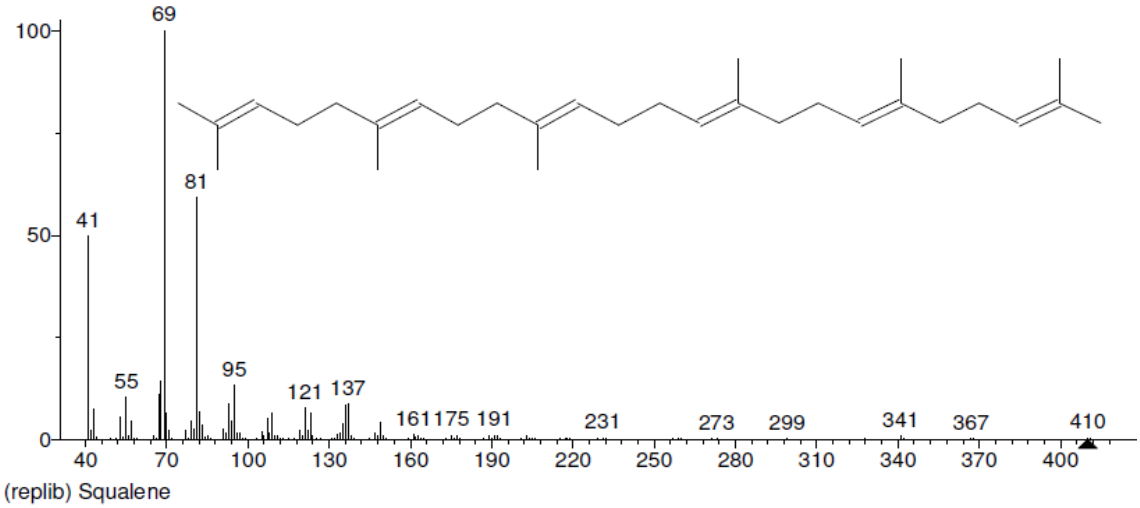


**Fig 4: Mass spectrum of Squalene**

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