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RESEARCH ARTICLE

GC-MS ANALYSIS OF PHYTOCHEMICALS IN THE METHANOLIC EXTRACT OF *Caesalpinia coriaria* (Jacq) Willd.

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GC-MS analysis, phytocomponents, *Caesalpinia coriaria*, whole plant methanol extract

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Abstract

Background: The presence of diverse secondary metabolites (phytochemicals) has been reported from the genus *Caesalpinia*. However, there has been not much information available on phytochemical components and biological activity in the methanol extract of *Caesalpinia coriaria* (Jacq) Willd.

Objective: This study was designed to determine the phytochemicals in the methanol extract of *Caesalpinia coriaria* (Jacq) Willd.

Materials and Methods: Using GC-MS the molecular mass of a compound and its elemental composition could be easily determined. High resolution Electron Impact Mass Spectroscopy was performed. For GC-MS analysis a 30 X 0.32 mm X 1.8 µm column Shimadzu QP2012 was used. For GC-MS detection an electron system with ionization energy of -70eV was used. Helium gas (99.9995%) was used as the carrier gas at a constant flow rate of 1.491ml/min and an injection volume of 1.0 ml was employed with split ratio 10:1. Injector temperature 140^0 C Ion-source temperature 200^0 C. The oven temperature was programmed from 110^0 with an increase of 10^0C/min to 240^0C ending with 8 min. Mass spectra were taken at 70eV a scan range of 0.5 sec. Total GC running time was 24.35 min. The relative percentage amount of each component was calculated by comparing its average peak area to the total areas. Software adopted to handle mass spectra and chromatograph was GCMS solution version 2.53 and compared with NIST Library 2011 version. The name, molecular weight and the structure of the components of the test material were ascertained.

GC-MS analysis of the ethanol extract of Caesalpinia *coriaria* was performed using a GC-MS-5975C [AGILENT] comprising an HP-5ms Agilent auto-sampler and a gas chromatograph interfaced to a mass spectrometer (GC-MS).

Results: This investigation was carried out to determine the possible chemical components from *Caesalpinia coriaria* by GC-MS. This analysis revealed that the methanol extract of *Caesalpinia coriaria* contained of 12 compounds. Dodecadien-1-ol, n-Hexadecanoic acid Tridecanoic acid Hexadecanoic acid were present abundantly. These compounds have pesticide, nematicide, acidifier, antitumor activity. 3-Cyclopentylpropionamide, 2 Ethyl 9,12,15-octadecatrienoate - Octadecatrienoic acid and Vitamin E have Antidote, antitumor Antiproliferative Hypercholesterolemic, antiarthritic,antiacne, hepatoprotective Antidote, anticancer activity. All identified compounds were, generally, reported as having antimicrobial activity. In addition, the squalene compound also having anti-cancer, anti-oxidant, anti-tumor, chemo-preventive, pesticidal.

Conclusions: From the results, it is evident that *C.coriaria* contains various bioactive compounds and is recommended as a plant of phytopharmaceutical importance.

Introduction:-

The medicinal plants find application in pharmaceutical, cosmetic, agricultural and food industry. The use of the medicinal herbs for curing disease has been documented in history of all civilizations. The plant is a biosynthetic laboratory, not only for chemical compounds, but also a multitude of compounds like glycosides, alkaloids etc. These exert physiological and therapeutic effect. Ancient knowledge coupled with scientific principles can come to the forefront and provide us with powerful remedies to eradicate the diseases (Sarah H. Bates, 2000). Alternation crude plant extracts can be first assay for particular activities and the active fractions then analyzed phytochemically. A variety of bioassays are now available for the phytochemical to use in such work (Aya,2011). Plants have been formed the basis of natural pesticides that make excellent leads for new pesticide development. Fungi cause severe damage to stored food commodities. A scientific and systematic phytochemical investigation of leaves with regard to the various biological activities (Newman, 2000). Medicinal plants might represent an alternative treatment in non-severe cases of infectious diseases (Kone, 2004). Large body of evidence has accumulated to demonstrate the promising potential of medicinal plants used in various traditional, complementary and alternate systems of treatment of human diseases (Sher A, 2009). The uses of plant-derived products as disease control agents have been studied, since they tend to have low mammalian toxicity, less environmental effects and wide public acceptance (Mohana, 2006). Crude extracts of some well known medicinal plants are used to control some of the plants pathogens (Okpekon, 2004). Chemical studies of Indian medicinal plants provide a valuable material base for the discovery and development of new drugs of natural origin (Xu, 1998).

Materials and Methods:-

Collection of Plant Materials:-

Leaves of *Caesalpinia coriaria* free from diseases were collected from Captain Srinivasa Murthy Drug Research Institute, Anna Nagar, Chennai.

Sterilization of Plant Materials:-

The disease free and fresh plants were selected. About 2kg of fresh and health leaves were taken for solvent extraction. They were washed with distilled water for three times.

Extract Preparation:-

2 kg of leaves of *Caesalpinia coriaria* were shade dried separately, coarsely powdered and soaked in ethanol in aspirator bottles and exhaustively extracted at room temperature for 72hours. The methanol extract was completely dried from solvent under reduced pressure using high vaccum conditions. The collected extracts were taken up for further investigations.

Gas Chromatography–Mass Spectrometry (GC-MS):-

Using GC-MS the molecular mass of a compound and its elemental composition could be easily determined. High resolution Electron Impact Mass Spectroscopy was performed. For GC-MS analysis a 30 X 0.32 mm X 1.8 μm column Shimadzu QP2012 was used. For GC-MS detection an electron system with ionization energy of -70eV was used. Helium gas (99.9995%) was used as the carrier gas at a constant flow rate of 1.491ml/min and an injection volume of 1.0 ml was employed with split ratio 10:1. Injector temperature 140^0 C Ion-source temperature 200^0C. The oven temperature was programmed from 110^0 with an increase of 10^0C/min to 240^0C ending with 8 min. Mass spectra were taken at 70eV a scan range of 0.5 sec. Total GC running time was 24.35 min. The relative percentage amount of each component was calculated by comparing its average peak area to the total areas. Software adopted to handle mass spectra and chromatograph was GCMS solution version 2.53 and compared with NIST Library 2011 version. The name, and the structure of the components of the test material were ascertained. 12 compounds were identified in *C.coriaria* leaf extract using GC-MS analysis was shown in Fig & Table .

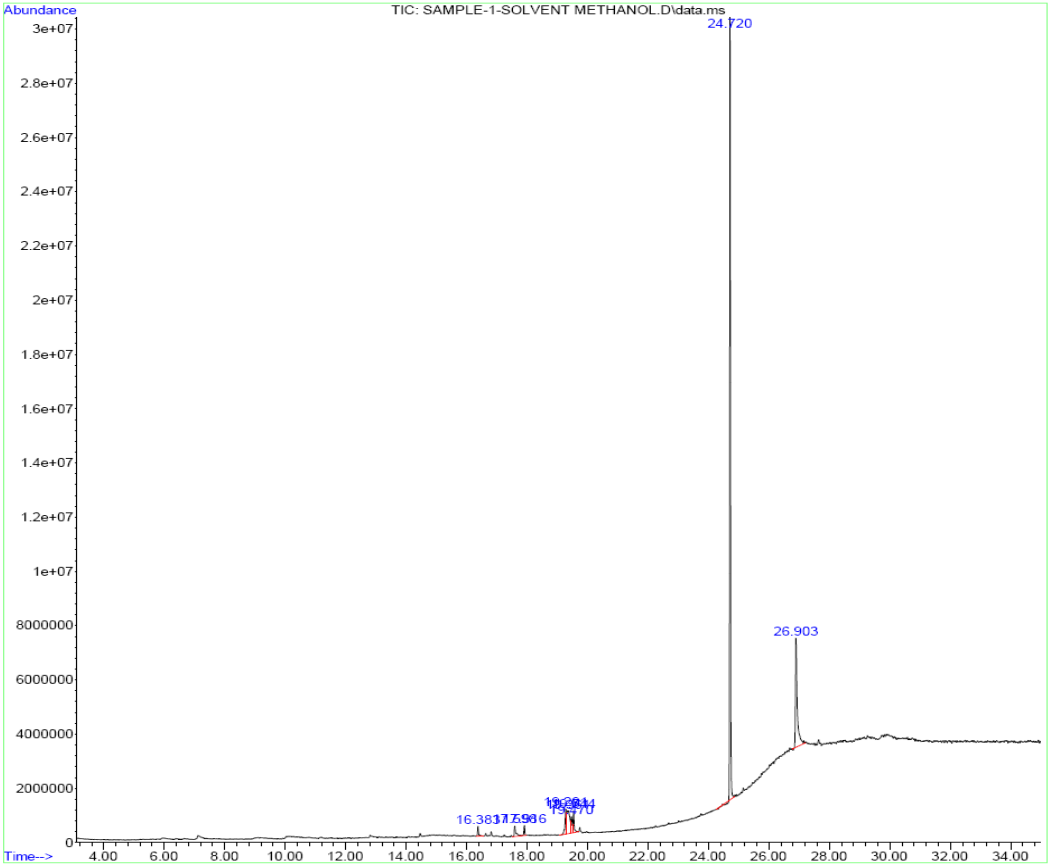


Figure 1:- GC-MS Chromatogram of methanolic extract of *C.coriaria*

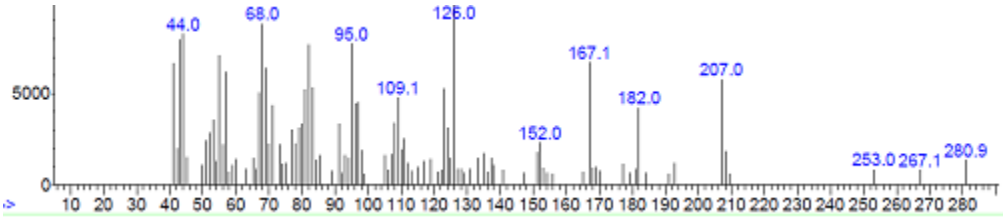


Figure 2 A 3-Dodecen-1-ol

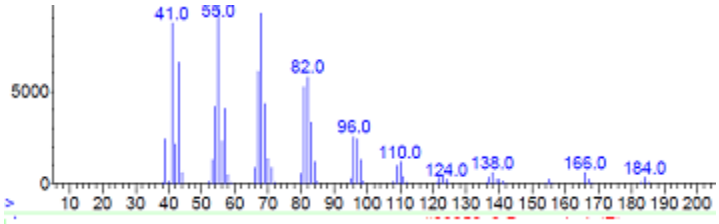


Figure 2 B- Decen-1-ol

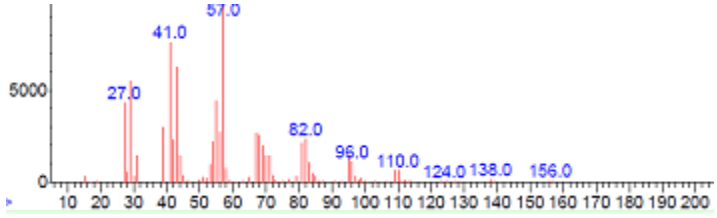


Figure 2 C – Dodecadien – 1-ol

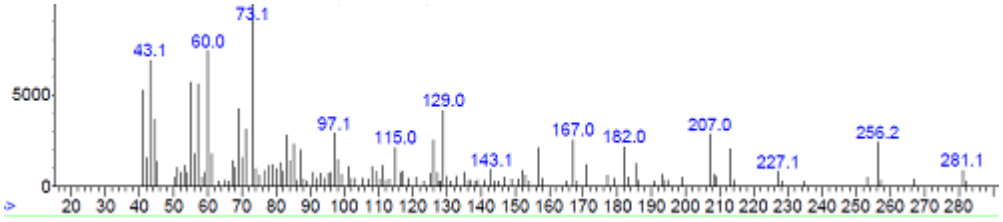


Figure 2 D- n- Hexadecanoic acid

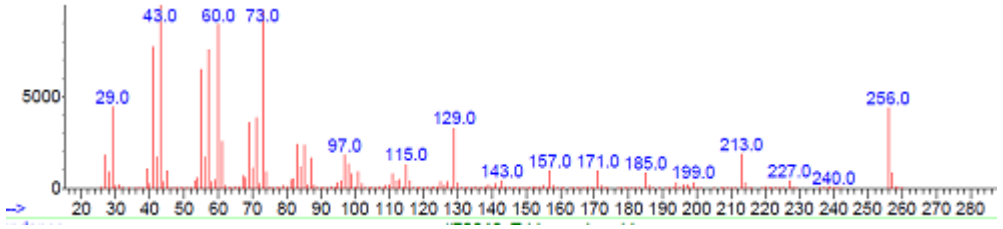


Figure 2 E – Tridecanoic acid

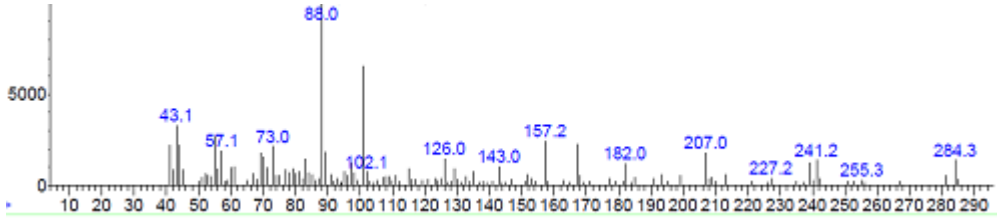


Figure 2 F- Hexadecanoic ethyl ester

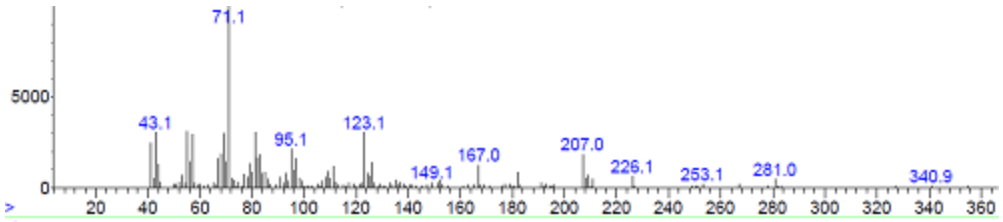


Figure 2 G – Phytol

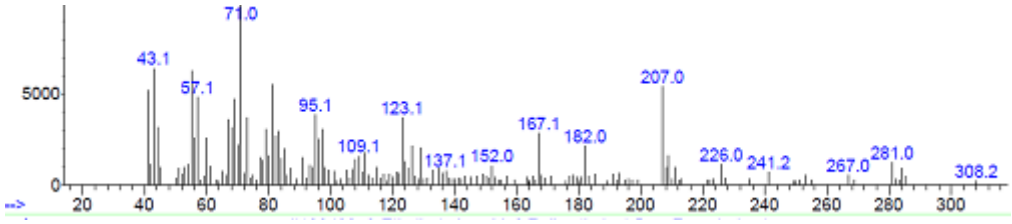


Figure 2 H – 2 7 –demethyloct-5-yn7-en-4-yl ester

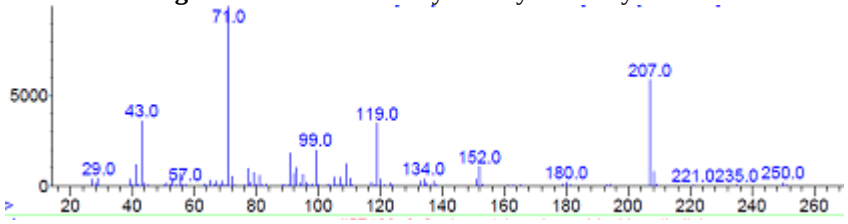


Figure 2 I – 3-Cyclopentylpropionamide,N-methallyl

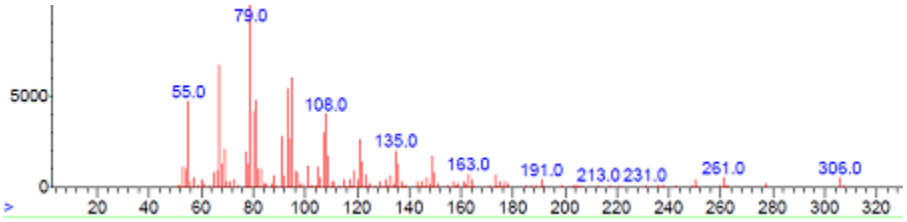


Figure 2 J- Octadecatrienoic acid

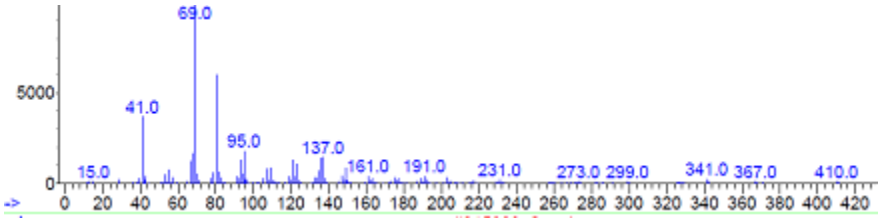


Figure 2 K – Squalene

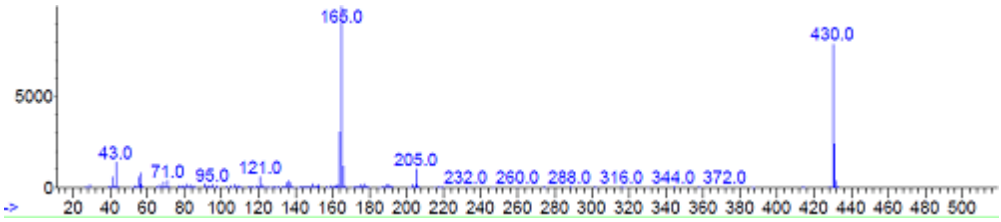
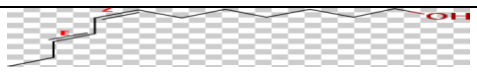
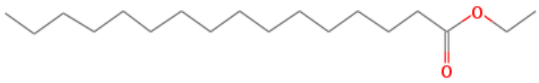
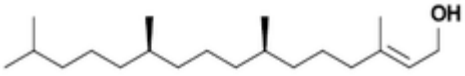
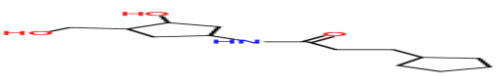
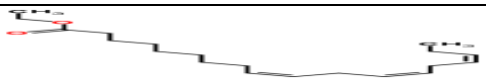
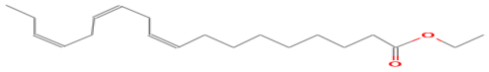
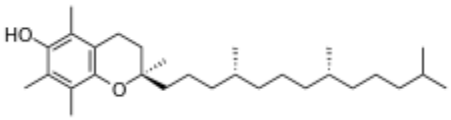


Figure 2 L- Vitamin E

Table 1:- Phytocomponents identified in the methanolic leaf extract of *C.coriaria* by GC-MS

S.No	Name of the compound	Structure	Activity
1	2-Decen-1-ol, $C_{10}H_{20}O$		Acidifier
2	(7E,9E)-Dodecadien-1-ol $C_{12}H_{22}O$		Nematicide , Pesticide
3	n-Hexadecanoic acid $C_{16}H_{32}O_2$		Acidifier, Antitumor
4	Tridecanoic acid $C_{13}H_{26}O_2$		Acidifier
5	Hexadecanoic acid, ethyl ester $C_{18}H_{36}O_2$		Acidifier, anti-inflammatory
6	9,12,15-Octadecatrienoic acid, $C_{18}H_{30}O_2$		Acidifier
7	Phytol $C_{20}H_{40}O$		
8	3 Cyclopentylpropionamide, $C_{14}H_{25}NO_3$		Antidote, antitumor

9	2 Ethyl 9,12,15-octadecatrienoate $C_{20}H_{34}O_2$		Antiproliferative
10	9,12,15-Octadecatrienoic acid $C_{20}H_{34}O_2$		Hypercholesterolemic antiarthritic,antiacne hepatoprotective
11	Squalene $C_{30}H_{50}$		Anticancer, antioxidant activity
12	Vitamin E $C_{29}H_{50}O_2$		Antidote, anticancer activity

Discussion:-

Many of the modern pharmaceuticals used today for various ailments are based on plants and plan-based medicaments (Abraham, 1981). In the present study, the GC-MS analysis of the methanolic extract of *C.coriaria* showed the presence of 12 compounds. Dodecadien-1-ol, n-Hexadecanoic acid Tridecanoic acid, Hexadecanoic acid were present abundantly. These compounds have pesticide, nematicide, acidifier, antitumor activity. 3-Cyclopentylpropionamide, 2 Ethyl 9,12,15-octadecatrienoate -Octadecatrienoic acid and Vitamin E have Antidote, antitumor, antiproliferative, hypercholesterolemic, antiarthritic, antiacne, hepatoprotective, antidote, anticancer activity. This activity gives about the phytochemical components and biolocigical activities from this plant. We report that the presence of the important components resolved by GC-MS analysis and their biological activities. Thus the present study GC-MS analysis revealed the presence of the phytochemicals and their biological activity of *C.coriaria* and will helpful for the further study in detail.

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