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GC-MS ANALYSIS OF BIOACTIVE COMPONENTS OF *ODINA WODIER.L* (ANACARDIACEAE)

P.Saravanan[*1],
G. Chandramohan[2], J.Maria Jancy Rani[2], D.Deepa[3]

[1]Department of Chemistry, Kings College of Engineering, Punalkulam, Thanjavur, TamilNadu-613303, India.
[2]Department of Chemistry, A.V.V.M Sri Pushpam College, Poondi, Thanjavur, TamilNadu- 613502, India.
[3]Department of Chemistry, A.A.M Engineering College Kovilvenni, TamilNadu- 614403, India.

ABSTRACT

Odina Wodier.L belongs to the family Anacardiaceae is well known in Indian traditional system for its traditional uses. The present investigation was carried out to determine the possible chemical constituents of Odina Wodier.L barks using GC-MS analysis. GC-MS analysis of bark extract were performed using a Perkin-Elmer GC Clarus 500 system and Gas Chromotograph interfaced to a Mass Spectrometer (GC-MS) equipped with a Elite - I, fused Silica Capillary Column(30 mm x 0.25 mm 1 D x 1 µMdf, composed of 100% Dimethyl poly siloxane).The GC-MS analysis provided different peaks determining the presence of six different chemical compounds namely Phthalic acid-4-cynophenyl noyl ester (8.97%), n-Decanic acid (13.90%),n-Hexadecanoic acid (27.35%), 4-Dodecanol (10.76%), 1,14-Tetradecanediol (32.74%) and silane-trimethyl [5-methoxy-2-(1-methylethyl) phenoxy]- (6.28%). The presence of various bioactive compounds justifies the use of odina wodier barks for various ailments by traditional practitioners.

Correspondence Author

P.SARAVANAN

Department of Chemistry, Kings College of Engineering, Punalkulam, Thanjavur, TamilNadu-613303, India.

Email: p.v.saravana@gmail.com

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INTRODUCTION

Natural remedies from medicinal plants are found to be safe and effective. Many plants species have been used in folkloric medicine to treat various ailments. Even today compounds from plants continue to play a major role in primary health care as therapeutic remedies in many developing countries [1].Standardization of plant materials is the need of the day. Several pharmacopoeia containing monographs of the plant materials describe only the physicochemical parameters. Hence the modern methods describing the identification and quantification of active constituents in the plant material may be useful for proper standardization of herbals and its formulations. Also the WHO has emphasized the need to ensure the quality of medicinal plants products using modern controlled technique and applying suitable standards [2].GC-MS is the best technique to identify the bioactive constituents of

long chain hydrocarbons, alcohols, acids, esters, alkaloids, steroids, amino and nitro compounds etc [3]

Odina wodier is a large tall tree found in de-ciduous forest in India, Myanmar, Srilanka, China, Malaysia, Cambodia and Philippine Islands [4]. It is popularly known as Kashmala, Odiamaram and in English it is called Rhus odina . Various parts of this plant have been found to be used as medicines in Ayurveda. The leaves have been reported to use in Elephantiasis of the legs [5]. Juice of green branches is used as an emetic in case of coma or insensibility produced by narcotic. The dried and powdered bark is found to use as tooth powder by poor villagers [4]. The bark extract has been reported to be useful in vaginal trouble, curing ulcer, heart diseases etc [6].

MATERIALS AND METHODS

Collection and preparation of plant materials

The barks of Odina wodier L. were collected from the natural habitat of Thanjavur district, Tamil Nadu, India. The barks were washed thoroughly in running water to remove the soil and dust particles, finally washed with distilled water. The washed barks were dried and cut into very small pieces. These materials were stored in air tight polythene bags until use.

Extraction of sample

Ten grams of sample was extracted with 30 mL of ethanol overnight and filtered through ash less filter paper with sodium sulphate (2g) and the extract was concentrated to 1 mL by bubbling nitrogen into the solution. 2µL of the ethanolic extract of barks of Odina wodier.L was employed for GC-MS analysis [7].

GC-MS Analysis

GC-MS analysis of these extracts were performed using a Perkin-Elmer GC Clarus 500 system and Gas Chromotograph interfaced to a Mass Spectrometer (GC-MS) equipped with a Elite - I, fused Silica Capillary Column(30 mm x 0.25 mm 1 D x 1 µMdf, composed of 100% Dimethyl poly siloxane). The components were separated using Helium as carrier gas at a constant flow of 1 ml/min. The 2 µL sample extract injected into the instrument was detected by the Turbo gold mass detector (Perkin Elmer) with the aid of the Turbo mass 5.1 software. During the 36^{th} minute GC extraction process the oven was maintained at a temperature was set at 250^{o}C.

The different parameters involved in the operation of the Clarus 500 MS, were also standardized (Inlet temperature: 200^{o}C; Source Temperature: 200^{o}C). Mass spectra were taken at 70eV; a scan interval of 0.5s and fragments from 45 to 450 Da. 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.

RESULT

The compounds present in the ethanol extract of barks of Odina wodier.L were identified by GC-MS analysis (Fig.1). The active principles with their retention time (RT), molecular formula, molecular weight (MW) and concentration % in the ethanol extract of barks of Odina wodier.L are presented in Table 1. The prevailing compounds in ethanol extract of barks were Phthalic acid-4-cynophenyl noyl ester (8.97%) (fig.1a), n-Decanic acid (13.90%) (fig.1b), n-Hexadecanoic acid (27.35%) (fig.1c), 4-Dodecanol (10.76%), 1,14-Tetradecanediol (32.74%) (fig.1d) and silane-trimethyl [5-methoxy-2-(1-methylethyl) phenoxy]-(6.28%) (fig.1e) respectively. Table 2 listed the major bioactive components and its biological activities obtained through GC-MS study of barks of Odina wodier.L.

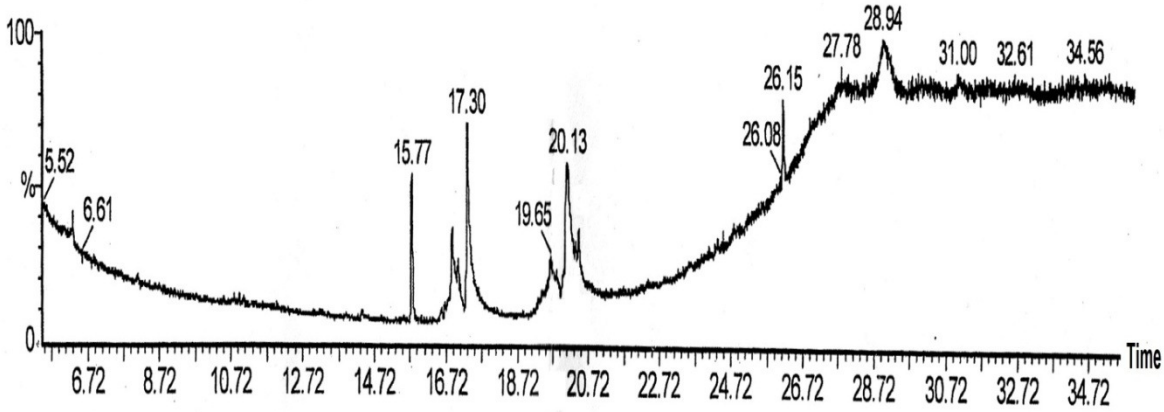

Fig. 1 : GC-MS Chromotogram of the ethanol extract of barks of Odina wodier.L

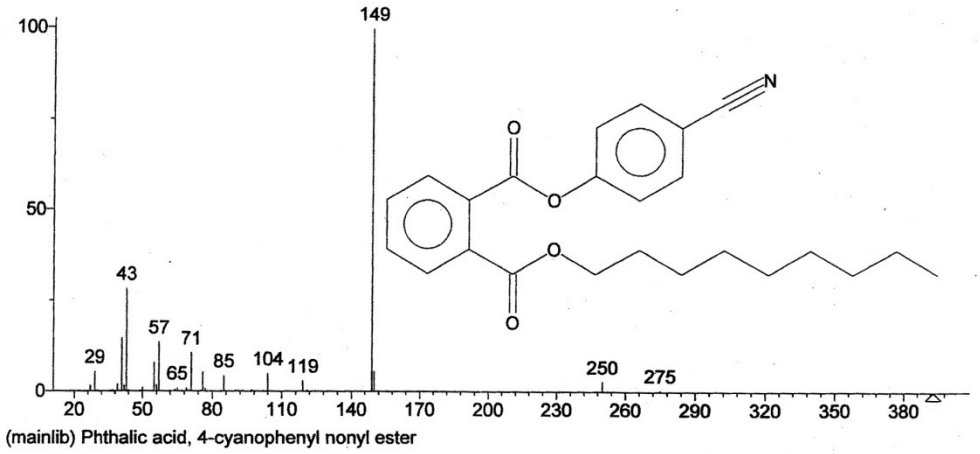

Fig. 1a Mass spectrum of Phthalic acid-4-cynophenyl noyl ester

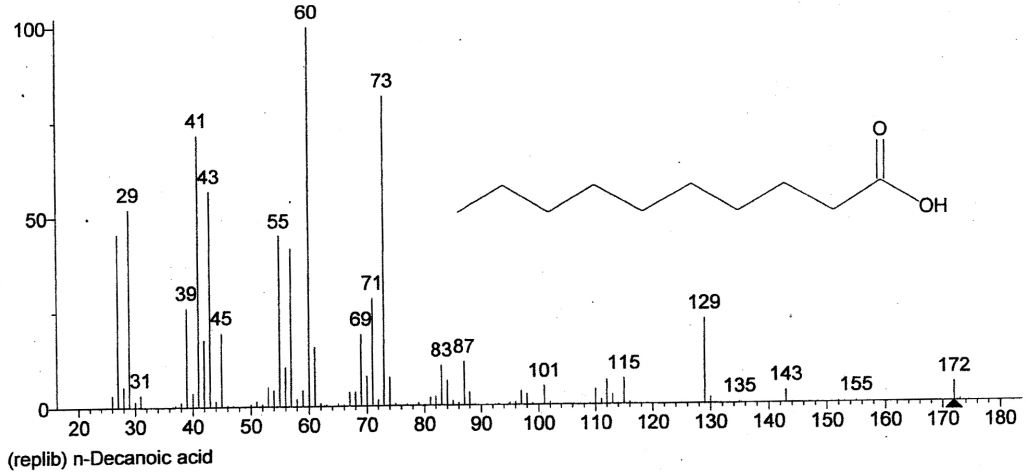

Fig.1b Mass spectrum of n-Decanic acid

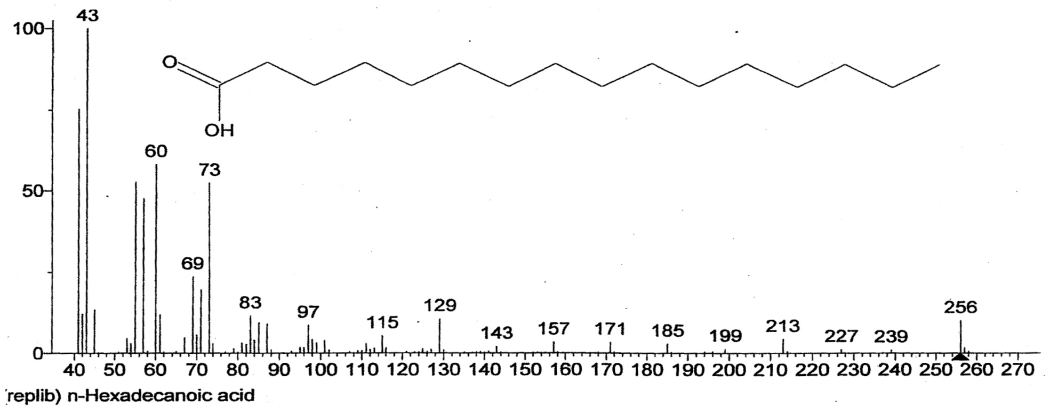

Fig.1c Mass spectrum of n-Hexadecanoic acid

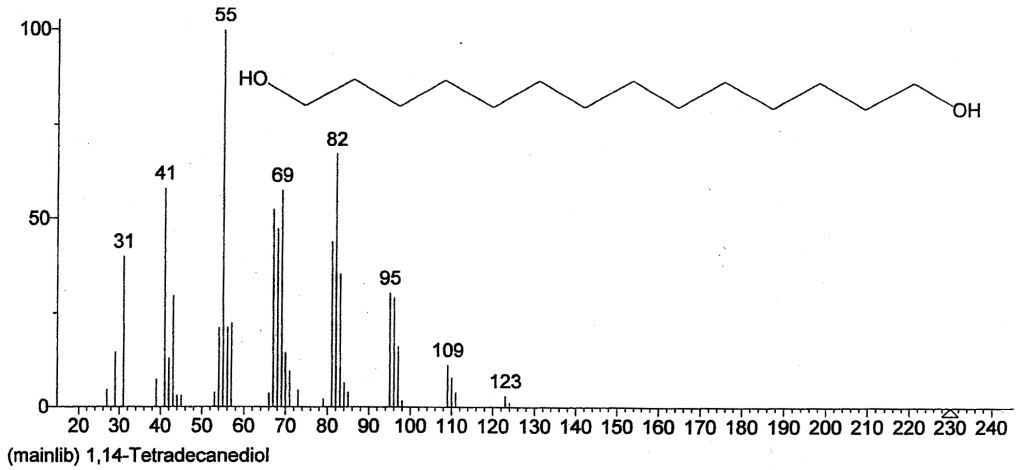

Fig.1d Mass spectrum of 1,14-Tetradecanediol

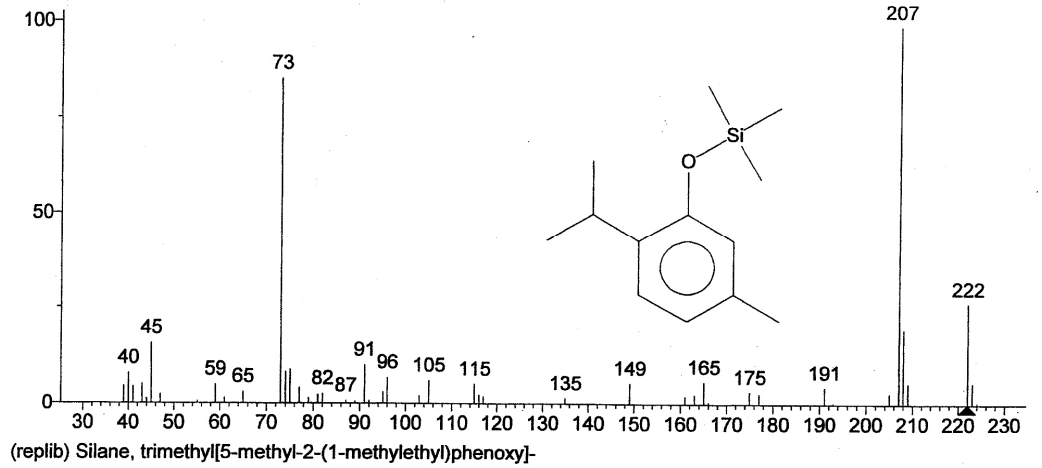

Fig.1e Mass spectrum of silane-trimethyl [5-methoxy-2-(1-methylethyl) phenoxy]-

Table - 1 : Components detected in the ethanol extract of barks of Odina wodier.L

S.No	RT	Name of the compound	Molecular formula	Molecular weight	Peak (%)
1	15.77	Phthalic acid-4-cynophenyl noyl ester	$C_{24}H_{27}NO_4$	393	8.97
2	16.88	n-Decanic acid	$C_{10}H_{20}O_2$	172	13.90
3	17.30	n-Hexadecanoic acid	$C_{16}H_{32}O_2$	256	27.35
4	19.65	4-Dodecanol	$C_{12}H_{26}O$	186	10.76
5	20.13	1,14-Tetradecanediol	$C_{14}H_{30}O_2$	230	32.74
6	26.15	Silane-trimethyl [5-methoxy-2-(1-methylethyl) phenoxy]-	$C_{13}H_{22}OSi$	222	6.28

Table-2 : Activity of bioactive components identified in the ethanol extract of barks of Odina wodier.L

S.No	Name of the compound	Molecular formula	Nature of the compound	Activity
1	Phthalic acid-4-cynophenyl noyl ester	$C_{24}H_{27}NO_4$	Plasticizer compound	Antimicrobial Antifouling
2	n-Decanic acid	$C_{10}H_{20}O_2$	Mono terpene hydrocarbon (fatty acid ester)	Anti oxidant Cancer preventive Nematicide Lubricant
3	n-Hexadecanoic acid	$C_{16}H_{32}O_2$	Fatty acid ester	Hypochloesterolemic
4	4-Dodecanol	$C_{12}H_{26}O$	Alcoholic compound	Antimicrobial
5	1,14-Tetradecanediol	$C_{14}H_{30}O_2$	Alcoholic compound	Antimicrobial
6	Silane-trimethyl [5-methoxy-2-(1-methylethyl) phenoxy]-	$C_{13}H_{22}OSi$	Aromatic hydrocarbon	No activity reported

DISCUSSION

Gas Chromatography-Mass Spectrometry (GC-MS) is a valuable for tool for reliable identification of bioactive compounds [8]. In the present study, 6 compounds have been identified from the ethanol extract of barks of Odina wodier.L by Gas Chromatography-Mass Spectrometry analysis. Among the identified bioactive chemicals, Phthalic acid-4-cynophenyl noyl ester is suggested to be a plasticizer compound and it may acts as an antimicrobial and antifouling agent. n-Decanic acid is recommended to be a mono terpene hydrocarbon and it may as an antioxidant, cancer preventive, nematicide and lubricating agent. n-Hexadecanoic acid is suggested to be a fatty acid ester and it may employed as a Hypochloesterolemic agent. 4-Dodecanol and 1,14-Tetradecanediol are suggested to be a Alcoholic compound and it may used as a antimicrobial agent. Thus this type of GC-MS analyses is the first step towards understanding the nature of active principles in this medicinal plant and this type of study will be helpful for further detailed study.

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