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Asian Journal of Plant Science and Research, 2012, 2 (2):187-192

ISSN : 2249-7412
CODEN (USA): AJPSKY

Chemical compounds investigation of *Cassia auriculata* seeds: A potential folklore medicinal plant

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ABSTRACT

Medicinal plants, herbs, spices and herbal remedies are integral components of alternative system of medicine since times immemorial Cassia auriculata Linn. is a potential folklore medicinal plant (Caesalpiniaceae) used for Aurveda and Siddha systems of medicine. In this study, fatty acid esters, fatty acid, triterpene, diterpene alcohols and phytol were identified as the major chemical groups in the methanol fractions of Cassia auriculata seeds extract. Their structures were elucidated, on the basis of GC-MS data .Grape seed oil 31.02%, n-Hexadecanoic acid 21.31%,9-Octadecenoic acid, (E)- 12.60%, E,Z-1,3,12-Nonadecatriene 12.27%, Stearic acid 9.39% these different active phytochemicals have been found to possess a wide range of activities. In conclusion Cassia auriculata contains biologically active compounds that may serve as candidate for the discovery of new drugs in the treatment of antihyperlipidaemic and antidiabetic.

Key words: GC-MS, Phytochemicals, *Cassia auriculata Linn.*

INTRODUCTION

Plants have great potential uses, especially as traditional medicine and pharmacopoeial drugs. A large proportion of the world population depends on traditional medicine because of the scarcity and high costs of orthodox medicine[1]. Medicinal plants have provided the modern medicine with numerous plant-derived therapeutic agents[2]. Many plants contain a variety of phytopharmaceuticals, which have found very important applications in the fields of agriculture, human and veterinary medicine. Natural products play a dominant role in the development of novel drug leads for the treatment and prevention of diseases[3].

Cassia auriculata Linn (Family: *Caesalpiniaceae*) commonly known as *Tanners senna*, is distributed throughout hot deciduous forests of India and holds a very prestigious position in Ayurveda and Siddha systems of medicine. The plant has been reported to possess antipyretic [4], hepatoprotective [5], antidiabetic, antiperoxidative and antihyperglyceamic [6] and microbicidal activity [7]. The flowers are used to treat urinary discharges, nocturnal emissions, diabetes and throat irritation [8]. They are one of the constituent of polyherbal formulation 'Diasulin' in the concentration range of 40 mg/dl which is proven to have antidiabetic activity [9].The present investigation deals with extraction of essential biological active compounds. This study will help to design the new drugs for the antihyperlipidaemic and antidiabetic**.**

MATERIALS AND METHODS

Collection of plant material

The seeds of *Cassia auriculata Linn* were collected from the various districts (Tiruchirappalli, Perambalur, Vilupuram, Theni) of Tamil Nadu, India. They were identified and authenticated by the Raphient herbarium of St. Joseph's College (Autonomous), Tiruchirappalli, Tamil Nadu, India.

Preparation of powder and extract

Seeds of *Cassia auriculata* (500g) was shade dried, powdered and extracted with ethanol for 6-8 hours using soxhlet apparatus.The extract was then filtered through Whatmann filter paper No.41 along with 2g sodium sulfate to remove the sediments and traces of water in the filtrate. Before filtering, the filter paper along with sodium sulphate is wetted with absolute alcohol. The filtrate is then concentrated by bubbling nitrogen gas into the solution and reduce the volume to 1ml.The extract contains both polar and non-polar phytocomponents.

GC-MS Analysis

The GC-MS analysis of *Cassia auriculata* powder seed extract with in absolute alcohol, was performed using a Clarus 500 Perkin Elmer gas chromatography equipped with a Elite-5 capillary column (5% phenyl 95% dimethyl polysiloxane) (30nm X 0.25mm ID X 0.25μmdf) and mass detector turbomass gold of the company which was operated in EI mode. Helium was the carriers gas at a flow rate of 1ml/min. and the injector was operated at 290ºC and the oven temperature was programmed as follows; 50ºC at 8ºC/min to 200ºC (5min) at 7ºC/min to 290ºC(10min).

Identification of components

Interpretation on mass spectrum of GC-MS was done using the database of National Institute Standard and Technology (NIST), WILEY8, FAME having more than 62,000 patterns. The mass spectrum of the unknown component was compared with the spectrum of the known components stored in the (NIST) , WILEY8, FAME library. The name, molecular weight and structure of the components of the test materials were ascertained.

Fig 1: Plant of *Cassia auriculata*

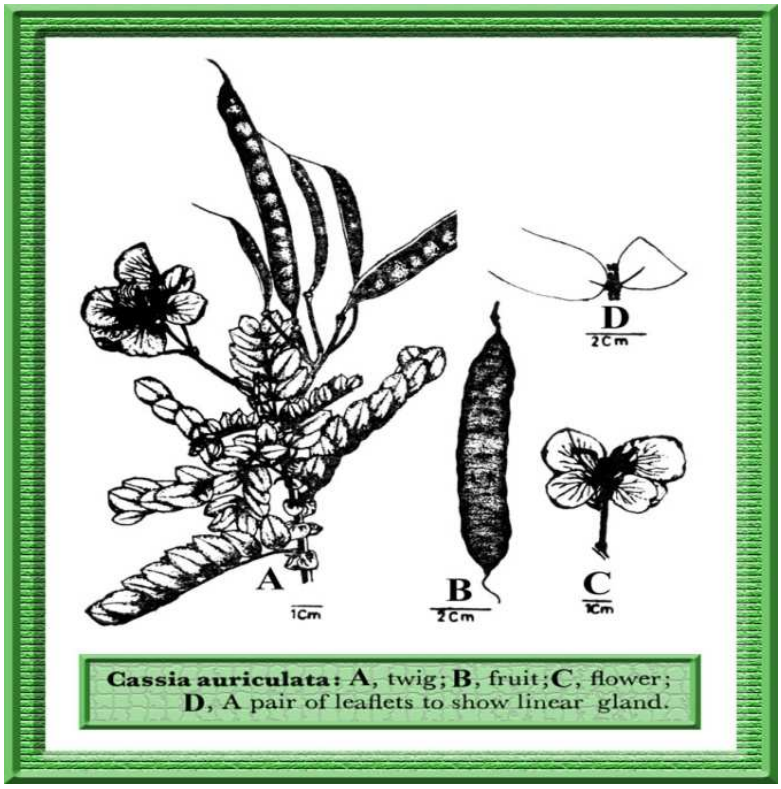
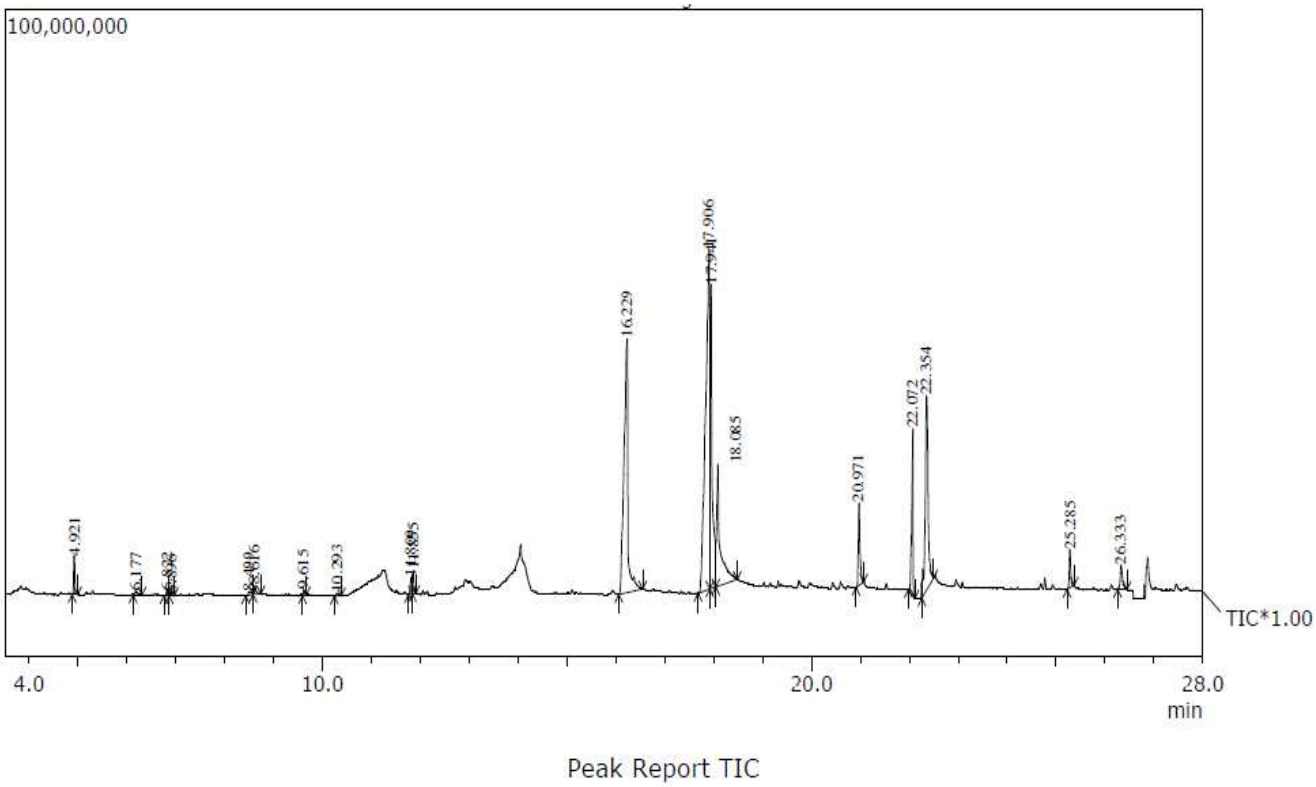


Fig 2.GC-MS Profile of seed extract of *Cassia auriculata*



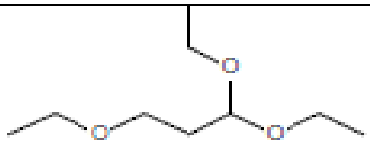
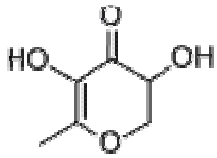
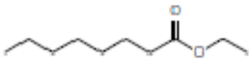
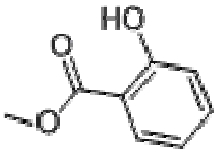
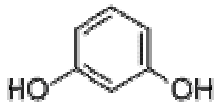
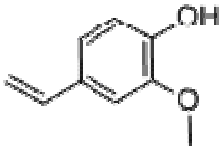
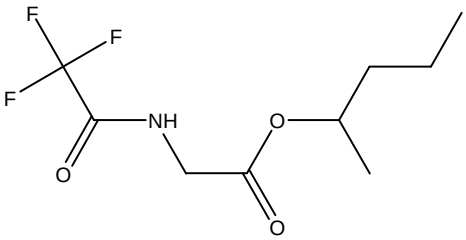
RESULTS AND DISCUSSION

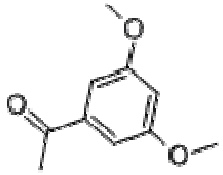
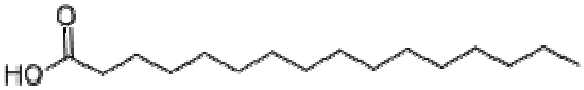
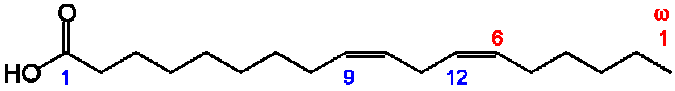
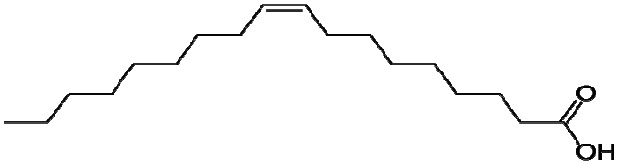
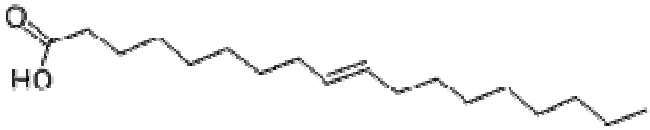
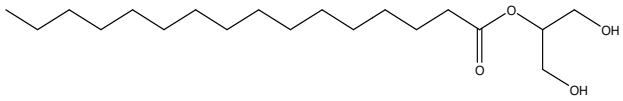
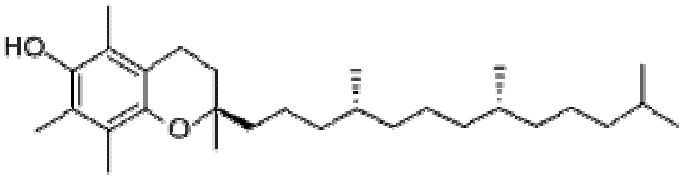
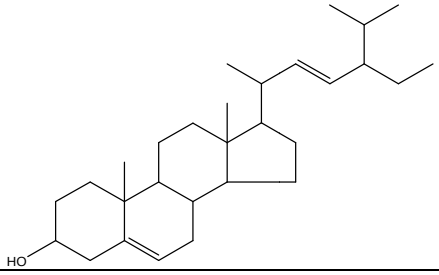
GC-MS chromatogram of the ethanolic seed extract of *Cassia auriculata* (Fig.2) showed 18 peaks indicating the presence of eighteen compounds. The chemical compounds identified in the ethanolic extract of the seed of *Cassia auriculata* are presented in Table 1. GC-MS analysis revealed that the presence of benzoic acid, 2-hydroxy-, methyl ester(0.07%), Glycine, N-(trifluoroacetyl)-, 1-methylbutyl ester(0.10%), 2,3-dihydro-3,5-dihydroxy-6-methyl-4H-pyran-4-one(0.12%), Capric acid ethyl ester(0.16%), Resorcinol(0.21%) are showed as minimum percent. The fatty acid and fatty acid ester derivatives are recorded predominantly. Grape seed oil(Linoleic acid-21% , Oleic acid-7% , Palmitic acid-2.95%,) n-Hexadecanoic acid(21.31%), 9-Octadecenoic acid, (E)-(12.60%), Stearic acid(9.39%) and also the contribution of long chained unsaturated hydrocarbon presents E,Z-1,3,12-Nonadecatriene(12.27%), dl-.α.-Tocopherol(1.22%), stigmasta-5,23-dien-3-ol, (3.β.)-(1.21%).

In the last decades, α-tocopherol has been consecrated as being one of the most efficient antioxidant and radical scavenger. This remarkable biochemical and physiological function is due, at least partially, to the shielding of its phenolic group by hydrophobic methyl groups and its lateral chain. The antioxidant and radical scavenger function of α-tocopherol is essentially dependent on the free state of its hydroxyl group. However, the use of α-tocopheryl glycosides makes sense and constant efforts have been made for their chemical and biochemical syntheses. This phenomenon is due to the large widespread of hydrolytic enzymes cleaving their glycosides, produced either by mammalian host or the comensal microorganisms populating their digestive tract. Moreover, spectacular antiallergic and antiinflamatory activities have been attributed to DL-α- tocopheryl-α-D-mannopyranoside and DL-α-tocopheryl-β-D-galactopyranoside [10]. Hexadecanoic acid methyl ester, also known as Methyl palmitate, in the methanol fraction is an aliphatic acid ester reported to cause growth inhibition and apoptosis induction in human gastric cancer cells [11] (Daniet *et al*., 2011). The n-hexadecanoic, methyl/ethyl ester of hexadecanoic acids are considered as fatty acids and these play important role in biological process [12]. Like other plants, *Litsea glutinosa* [13], *Suaeda maritime* [14], *Alpinia hainanesis* and *Alpinia katsumadai* [15], *Macrotyloma uniflorum* was also found to contain n – hexadecanoic acid*C.auriculata* is a potential folklore medicinal plant used for many diseases

and infections. Phytochemical analysis by GC-MS revealed presence of fatty acid esters, fatty acid amide, terpenoids, diterpene alcohols and phytol as major compound groups in the methanol fractions. Compositional variation in quantities, qualities and structural features may influence compounds behavior on GC-MS, as well as bioactivities of their precursor fractions.

Table1.Compounds present in the seed extract of *Cassia auriculata* using GC-MS analysis

Serial No	Phytochemical compound	Retention time	% Peak area	Structure
1	β.-Ethoxypropionaldehyde diethyl acetal Formula: $C_9H_{20}O_3$ MW:176	4.921	0.86	
2	2,3-dihydro-3,5-dihydroxy-6-methyl-4h-pyran-4-one Formula: $C_6H_8O_4$ MW:144	6.177	0.17	
3	Ethyl caprylate Formula: $C_{10}H_{20}O_2$ MW:172	6.822	0.14	
4	Benzoic acid, 2-hydroxy-, methyl ester Formula :$C_8H_8O_3$ MW:152	6.896	0.07	
5	Resorcinol Formula $C_6H_6O_2$ MW:110	8.499	0.21	
6	2-methoxy-4-vinylphenol Formula: $C_9H_{10}O_2$ MW:150	8.616	0.36	
7	Capric acid ethyl ester Formula: $C_{12}H_{24}O_2$ MW:200	9.615	0.16	
8	Glycine, N-(trifluoroacetyl)-, 1-methylbutyl ester Formula: $C_9H_{14}F_3NO_3$ MW:241	10.293	0.10	
9	Dodecanoic acid Formula: $C_{12}H_{24}O_2$ MW:200	11.809	0.48	

10	3',5'-Dimethoxyacetophenone Formula: $C_{10}H_{12}O_3$ MW:200	11.855	0.58	
11	n-Hexadecanoic acid Formula:$C_{16}H_{32}O_2$ MW :256.42	16.229	21.31	
12	Grape seed oil	17.906	31.02	
12 a	Linoleic acid Formula: $C_{18}H_{32}O_2$ MW:280.44			
12 b	Oleic acid Formula: $C_{18}H34O_2$ MW:282.4			
13	9-Octadecenoic acid, (E)- Formula:$C_{18}H_{34}O_2$ MW:282.46	17.941	12.60	
14	Stearic acid Formula:$C_{18}H_{36}O_2$ MW:284.48	18.085	9.39	
15	Palmitic acid .beta.-monoglyceride Formula: $C_{19}H_{38}O_4$ MW:330	20.971	2.95	
16	E,Z-1,3,12-Nonadecatriene Formula:$C_{19}H_{34}$ MW:262	22.354	12.27	
17	dl-.α.-Tocopherol Formula: $C_{29}H_{50}O_2$ MW:430	25.285	1.22	
18	Stigmasta-5,23-dien-3-ol, (3.β.)- Formula: $C_{29}H_{48}O$ MW:412	26.333	1.21	

Acknowledgement
We warmly thank Mr. Arockiam for his valuable advice and friendly help. His extensive discussions around my work and interesting explorations in operations have been very helpful for this study.

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