

GC-MS ANALYSIS OF *LAWSONIA INERMIS* SEED OIL

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Received: 05 Mar 2013, Revised and Accepted: 02 Apr 2013

## ABSTRACT

**Objective:** To analyze the yellow aromatic oil obtained from the seeds of *Lawsonia inermis* by using GC/MS.

**Methods:** GC/MS analysis of henna seed oil was performed using JEOL GCMS-Mate-II model gas chromatograph-mass spectrometer. Data handling was made through JEOL software and matched with NIST library.

**Results:** The GC/MS of the oil sample showed five major peaks corresponding to five compounds, prominent of which were 8-Octadecenoic acid, methyl ester (45.6%) and Pentadecanoic acid, 6-oxo, methyl ester (28.6%).

**Conclusion:** GC/MS of the seed oil resulted in the identification of five compounds which were not reported in literature previously.

**Keywords:** *Lawsonia inermis*, Seeds, Oil, GC/MS, Henna.

## INTRODUCTION

*Lawsonia inermis* is an important medicinal plant in the Indian system of Medicine. It is commonly called henna, which grows in warm and arid regions. The dye derived from green leaves of henna is used to decorate the body with intricate designs and the principle coloring matter is lawsone, 2-hydroxy-1, 4-naphthoquinone [1]. Literature shows henna possessing nootropic [2], analgesic, antipyretic, anti-inflammatory [3] antibacterial [4] and anti-immunomodulatory activities [5] along with other properties. In our previous study, the fresh seeds were found to have CNS depressant and anticonvulsant property acting via glycine receptors [6]; free radical scavenging and reducing power [7]. Petroleum ether, dichloromethane, ethanol and aqueous extracts were used to carry out the above said studies. In order to study the phytochemical constituents in petroleum ether extract, column chromatography was performed for the same. In the process of performing the column chromatography, yellow colored aromatic oil was obtained from the combined fractions (6<sup>th</sup> to 20<sup>th</sup> fractions) of 8:2 ratio of hexane: ethyl acetate. This oil was subjected to GC-MS by which five compounds were identified. These five compounds were different from the compounds reported in literature.

## MATERIALS AND METHODS

Dry seeds of *Lawsonia inermis* (local name: marudani) were obtained from Naturaa Farms, Odugathur, Vellore district, Tamil Nadu and authenticated by Prof. Jayaraman, PARC, Chennai. The seeds were shade dried and crushed to fine powder using mortar and pestle. About 100 grams of the powder was extracted with petroleum ether in

a soxhlet apparatus to obtain petroleum ether extract (PE). PE was chromatographed over silica gel using hexane: ethyl acetate as eluent. Fractions (6<sup>th</sup> to 20<sup>th</sup>) from 8:2 showed similar pattern in TLC. They were grouped as one fraction and on one day standing yielded yellow aromatic oil. The oil was then subjected to GC-MS.

GC/MS analyses were performed with a JEOL GCMS-Mate-II model gas chromatograph-mass spectrometer equipped with an AOC-20i autoinjector. Column: HP-5, 30 m x 0.25 mm ID x 0.25 µm film thickness. Temperature program: from 80°C (2 min) to 250°C (10 min.) at 10°C/min. Injection temperature: 250°C. Injection volume: 1.0 µL. Inlet pressure: 37.1 kPa. Carrier gas: He, linear velocity (u): 32.4 cm/sec. Injection mode: split (10:1). MS interface temp.: 250°C; MS mode: EI; 70 eV, detector voltage: 2 kV; mass range: 50-400 u; scan speed: 769 u/s; interval: 0.50 s (2 Hz). Data handling was made through JEOL software and matched with NIST library.

## RESULTS AND DISCUSSION

There is not much information about the phytochemical constituents of henna seeds. Phytochemicals isolated from seed oil are behenic acid, arachidic acid, palmitic acid, stearic acid and linoleic acid [8]. Other phytochemicals isolated are lawnermis acid and its methyl ester [9]. In the present study the GC/MS of the oil sample showed five major peaks at RT 6.57, 7.29, 8.36, 9.52, 10.45 min and the corresponding compounds were found to be Nonanoic acid, 9-oxo, methyl ester, Cyclohexane propanoic acid, 2-oxo, methyl ester, Pentadecanoic acid, 6-oxo, methyl ester, 8-Octadecenoic acid, methyl ester whose percentage compositions are 18.324, 6.898, 0.505, 28.640, 45.633 respectively (Table 1).

Table 1: GC-MS analysis of *Lawsonia inermis* seed oil

Compound	RT	% Composition	Fragmentation
Nonanoic Acid, 9-oxo, methyl ester	6.57	18.324	186[M] <sup>+</sup> (4), 171(10), 155(83), 144(18), 136(10), 129(25), 119(3), 109(40), 102(13), 98(20), 87(11), 83(35).
Cyclohexane propanoic acid, 2-oxo, methyl ester	7.29	6.898	184[M] <sup>+</sup> (30), 152(92), 141(7), 135(5), 128(2), 124(47), 118(4), 111(34), 98(82), 87(17)
Pentadecanoic acid	8.36	0.505	242[M] <sup>+</sup> (30), 213(3), 199(13), 185(6), 171(4), 157(3), 143(7), 129(25), 115(10), 97(15), 83(18), 73(92), 80(92).
Pentadecanoic acid, 6-oxo, methyl ester	9.52	28.640	270[M] <sup>+</sup> (8), 239(3), 221(3), 210(3), 193(2), 183(2), 170(15), 158(85), 143(35), 126(100), 111(52), 101(30), 185(25).
8-Octadecenoic acid, methyl ester	10.45	45.633	296[M] <sup>+</sup> (20), 264(60), 222(21), 180(17), 137(11)

Fatty acids are essential for human nutrition and are of interest in biotechnology, food chain studies and cosmetics [10]. Moreover trans-fatty acids like 8-Octadecenoic acid, methyl ester which is found in high concentration is said to have anti-carcinogenic activity

[11] despite its adverse effects such as cardiovascular disease. GC/MS study of henna seed oil further aided in identifying five compounds which can be of great importance in human nutrition and pharmaceutical applications.

**ACKNOWLEDGEMENT**

The authors are grateful to Department of Science and Technology for the INSPIRE Fellowship (Received by the first author) and also to Dr. R. Murugesan, Sophisticated Analytical Instrument Facility, Chennai, for the GC/MS facility.

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