GC MS/MS analysis of Bioactive Compounds in Alcoholic Seed Extract of Gauzuma ulmifolia Lam

Sivakami Sundari Ponnusamy*, Shanaz Banu, Mururan Vedigounder, Dhanashree Narayanswamy

ABSTRACT
Introduction: Gauzuma ulmifolia Lam. (GU) belonging to the family Malvaceae, commonly called Bastard Cedar is native to tropical American countries. It was introduced into India more than 100 years ago. Methods: In the present study, alcoholic seed extract of Gauzuma ulmifolia Lam. was subjected to GC MS/MS analysis and chemical compounds were characterized. Results: Totally sixteen compounds were characterized. Chemical analysis of the extract showed that it includes bioactive compounds like D-Asarinin (65.02%), 2,6-Bis(3-methylenedioxynaphthalenyl)-3,7-dioxabicyclo(3.3.0)octane (20.12%), 1-Dodecanone, 2-(imidazol-1-yl)-1-(4-methoxyphenyl) (7.54%) and o-Anisic acid, tridec-2-ynyl ester (3.33%) as major constituents. Minor components such as Vitamin E, γ-Tocopherol, Ergost-5-en-3-ol, (3β), Hexadecanoic acid, methyl ester is also present. Conclusion: Based on the above results, the seeds of this plant could possess oxygen (92.27%), hydrocarbon (0.19%) and nitrogen (75.4%) derivatives of volatile principle. This is the first-time report on the composition of seed of GU. Key words: Gauzuma ulmifolia, Alcoholic extract, GC MS/MS analysis, D-Asarinin, Vitamin E.

INTRODUCTION
Gauzuma ulmifolia Lam. (GU) is wildly distributed in tropical America from Mexico to the northern part of Argentina and the middle part of Brazil. It has been naturalized to the local climatic conditions. This species has high economic importance. GU grows to 30 m in height and 30-40 cm in diameter with a rounded crown and drooping foliage. Bark is grey or grey-brown becoming furrowed and rough with age. Young branches are covered with stellate hairs. Leaves are simple, alternate, with serrate margins, 5-7 cm long. Flowers are yellow-brown, about 1 cm long in 3-5 cm long axillary inflorescences. The fruit is a round or elliptic 5 celled capsule that opens at the apex. When the fruit is ripe, it is black and contains 40-80 seeds, each 3-5 mm in diameter. There is approximately 100 g of clean seed in 1 Kg of fruits and 1,500,000 clean seeds per Kg.¹

The use of the plant is well documented in the traditional literature as a remedy for various ailments, such as bronchitis, burns, diarrhoea, asthma, inflammation, alopecia, diuretic, astringent and veneral diseases.² Previous investigations of the chemical composition of GU have indicated the occurrence of flavon-3-ol procyanidins,³ nitrile and a glucoside, menisdaurin.⁴ This plant was reported to have anti-oxidant,⁴ anti-diabetic,⁵,⁶ hypotensive,⁶ vasorelaxant, antiulcer,⁷ antibacterial⁸,⁹ and antiviral¹⁰ activity. Considering all these facts, the present study was designed to investigate the presence of chemical composition of the seed extract.

MATERIALS AND METHODS
The fruits of Gauzuma ulmifolia Lam. was collected and dried at 60°C for 24 hrs. The dried fruits were pulverized manually to remove the seeds. The seeds were purified and stored in air tight container.

The GU seed was extracted with ethanol and analyzed through Gas Chromatography-Mass Spectrometry (GC-MS). The analyses of the alcoholic extract were run on 436-GC Bruker operating in the EI mode at 70 eV, equipped with a split/splitless injector (280°C). Column BR-5MS (5% Dimethyl polysiloxane), 30 m × 0.25 mm × 0.25 μm df). Oven temperature was programmed as follows, 110°C hold for 3.50 min, then increased upto 280°C at the rate of 280°C per min with no hold, then increased upto 280°C at the rate of 5°C per min for 12 min hold. Carrier gas (1 ml/min), Split 10:1, Sample injected was 2 μl and Injector temperature was 280°C. Total GC running time was 40.50 min. TQ Quadrupole Mass Spectrometer detector and Software MS Work station 8 was used for the analysis.¹¹

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Table 1: List of compounds identified in *Gauzuma ulmifolia* Lam.

<table>
<thead>
<tr>
<th>S.No.</th>
<th>RT</th>
<th>Name of the Compound</th>
<th>Molecular Formulae</th>
<th>Molecular Weight</th>
<th>Peak Area %</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>12.97</td>
<td>4-((1E)-3-Hydroxy-1-propenyl)-2-methoxyphenol</td>
<td>C₁₀H₁₂O₃</td>
<td>180</td>
<td>0.01</td>
</tr>
<tr>
<td>2</td>
<td>15.06</td>
<td>Hexadecanoic acid, methyl ester</td>
<td>C₁₇H₃₄O₂</td>
<td>270</td>
<td>0.01</td>
</tr>
<tr>
<td>3</td>
<td>15.84</td>
<td>α-Guaiene</td>
<td>C₁₅H₂₄O₂</td>
<td>204</td>
<td>0.19</td>
</tr>
<tr>
<td>4</td>
<td>17.37</td>
<td>9, 12- Octadecadienoic acid, methyl ester</td>
<td>C₁₇H₃₄O₂</td>
<td>294</td>
<td>0.18</td>
</tr>
<tr>
<td>5</td>
<td>18.86</td>
<td>1,3-Benzodioxole, 5,5’-(tetrahydro-1H, 3H-furan-1,4-diyl) bis- [1S-(1α, 3aa, 4β, 6aa)]- D-Asarinin</td>
<td>C₂₀H₁₈O₆</td>
<td>354</td>
<td>65.02</td>
</tr>
<tr>
<td>6</td>
<td>22.87</td>
<td>9,12,15-Octadecatrienoic acid, methyl ester, (Z, Z,Z)-</td>
<td>C₁₉H₃₂O₂</td>
<td>292</td>
<td>0.80</td>
</tr>
<tr>
<td>7</td>
<td>24.52</td>
<td>α-Anisic acid, tridec-2-ynyl ester</td>
<td>C₁₃H₂₆O₃</td>
<td>330</td>
<td>3.33</td>
</tr>
<tr>
<td>8</td>
<td>26.07</td>
<td>Butyl 9, 12-octadecadienoate</td>
<td>C₁₉H₃₄O₂</td>
<td>336</td>
<td>0.66</td>
</tr>
<tr>
<td>9</td>
<td>27.55</td>
<td>Ethyl iso-allocolate</td>
<td>C₁₈H₃₂O₂</td>
<td>436</td>
<td>0.15</td>
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<tr>
<td>10</td>
<td>28.81</td>
<td>2,6-Bis(3,4-methylenedioxyphenyl)-3,7-dioxabicyclo (3.3.0) octane</td>
<td>C₂₀H₂₈O₆</td>
<td>354</td>
<td>20.12</td>
</tr>
<tr>
<td>11</td>
<td>30.11</td>
<td>1-Dodecanone, 2-(imidazol-1-yl)-1-(4-methoxyphenyl)-</td>
<td>C₂₂H₃₂N₂O₂</td>
<td>356</td>
<td>7.54</td>
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<tr>
<td>12</td>
<td>31.22</td>
<td>γ-Tocopherol</td>
<td>C₂₀H₃₂O₂</td>
<td>416</td>
<td>0.47</td>
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<tr>
<td>13</td>
<td>32.75</td>
<td>Vitamin E</td>
<td>C₂₀H₃₂O₂</td>
<td>430</td>
<td>0.11</td>
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<tr>
<td>14</td>
<td>34.81</td>
<td>Ergost-5-en-3-ol, (3β)-</td>
<td>C₂₈H₄₈O</td>
<td>400</td>
<td>0.12</td>
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<tr>
<td>15</td>
<td>35.49</td>
<td>Stigmasterol</td>
<td>C₂₉H₄₈O</td>
<td>412</td>
<td>0.07</td>
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<tr>
<td>16</td>
<td>37.18</td>
<td>β-Sitosterol</td>
<td>C₂₉H₄₈O</td>
<td>414</td>
<td>1.22</td>
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</table>
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ABBREVIATION USED

GU: Gauzuma ulmifolia; GC MS/MS: Gas Chromatography - Mass Spectrometry/Mass Spectrometry; m/z: Mass to charge ratio.

CONFLICT OF INTEREST

The authors declare that we do not have any conflict of interest.

REFERENCE

The present study has highlighted on the chemical profile of the seeds of GU for the first time by GC MS/MS method. A total of 16 compounds with their proportions have been identified. Further exploration on isolation of these phytoconstituents may develop many novel compounds with potent medicinal properties.

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