COMPOSITION OF THE ESSENTIAL OIL OF *FERULA OVINA* (BOISS.) BOISS. FROM IRAN

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ABSTRACT

Water-distilled essential oil from aerial parts of *Ferula ovina* (Boiss.) Boiss. growing wild at the vegetative stage in Isfahan province Iran was analyzed by GC/MS. Forty-three compounds consisting 86.7% of the total components were identified in the oil which was obtained in 1.0% (v/w) yield. Among them, carvacrol (9.0%), alpha-pinene (8.2%), geranyl isovalerate (7.2%) and geranyl propionate (7.0%) were the major components.

Key Words: *Ferula ovina*, Umbelliferae, Essential oil, Carvacrol

INTRODUCTION

Genus of *Ferula* which belongs to tribe Peucedanae, subfamily of Apioidaeae, Umbelliferae family has 133 species distributed throughout Mediterranean area and central Asia (1-3). The chemistry of this genus has been studied by many investigators. More than 70 species of *Ferula* have already been investigated chemically (4). Several species of this genus have been used in folk medicine (5). The Iranian flora comprises 30 species of *Ferula*, of which some are endemic (2,6). The popular Persian name of the most of these species is “Komá” (6). *Ferula ovina* (Boiss.) Boiss. is one of these species which is distributed in different regions of Iran (2). Anti-spasmodic, anticholinergic and smooth muscle relaxant activities of the aqueous extracts of *F. ovina* have previously been reported (7,8). This investigation describes the constituents of the oil of *F. ovina* which has not been studied previously.

MATERIAL AND METHODS

Plant Material: The aerial parts of wild-growing *F. ovina* at the vegetative (non-flowering) stage were collected from Meimeh area (Isfahan Province, Iran) at an altitude of ca. 2550 m in May 1999. The plant was identified as *F. ovina* by the Herbarium Department of Iranian Research Institute of Forests and Rangelands, Isfahan, Iran. A voucher specimen of the plant was deposited in the Herbarium of the Department of Pharmacognosy, School of Pharmacy and Pharmaceutical Sciences, Isfahan University of Medical Sciences, Isfahan, Iran (HN 1112).

Analysis: The oil was analyzed by GC/MS using a Hewlett Packard 6890 mass selective detector coupled with a Hewlett Packard 6890 gas chromatograph, equipped with a cross-linked 5% PH ME siloxane HP-5MS capillary column (30 m x 0.25 mm, film thickness 0.25 μm). Operating conditions were as follows: carrier gas, helium with a flow rate of 2mL/min; column temperature, 60-275ºC at 4ºC/min; injector and detector temperatures, 280ºC; volume injected, 0.1 μL of the oil; split ratio, 1:50. The MS operating parameters were as follows: ionization potential, 70 eV; ionization current, 2 A; ion source temperature, 200ºC; resolution, 1000.

Identification of the components in the oil was based on retention indices relative to n-alkanes and computer matching with the WILEY 275L library, as well as by comparison of the fragmentation patterns of the mass spectra with those reported in the literature (10-13).

RESULTS AND DISCUSSION

The aerial parts of *F. ovina* yielded 1.0% (v/w) of a pale yellowish oil with a strong acrid odor.
Table 1. Composition of the aerial parts essential oil of *Ferula ovina* (Boiss.) Boiss. from Iran

<table>
<thead>
<tr>
<th>No</th>
<th>Compound</th>
<th>Ret Index</th>
<th>%</th>
<th>No</th>
<th>Compound</th>
<th>Ret Index</th>
<th>%</th>
</tr>
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<tbody>
<tr>
<td>1</td>
<td>2-hexenal</td>
<td>865</td>
<td>0.2</td>
<td>23</td>
<td>myrtenol</td>
<td>1193</td>
<td>0.5</td>
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<tr>
<td>2</td>
<td>tricyclene</td>
<td>920</td>
<td>0.2</td>
<td>24</td>
<td>trans-piperitol</td>
<td>1204</td>
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<tr>
<td>3</td>
<td>alpha-pinene</td>
<td>933</td>
<td>8.2</td>
<td>25</td>
<td>endo-fenchyl acetate</td>
<td>1217</td>
<td>2.6</td>
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<tr>
<td>4</td>
<td>camphene</td>
<td>946</td>
<td>3.9</td>
<td>26</td>
<td>citronellol</td>
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<td>950</td>
<td>0.1</td>
<td>27</td>
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<td>6</td>
<td>beta-pinene</td>
<td>974</td>
<td>1.6</td>
<td>28</td>
<td>carvone</td>
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<td>7</td>
<td>myrcene</td>
<td>988</td>
<td>2.4</td>
<td>29</td>
<td>geraniol</td>
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<tr>
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<td>1003</td>
<td>trace</td>
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<td>31</td>
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<td>11</td>
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<td>0.8</td>
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<tr>
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<tr>
<td>13</td>
<td>fenchone</td>
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<td>4.5</td>
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<tr>
<td>14</td>
<td>linalool</td>
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<td>beta-caryophyllene</td>
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<tr>
<td>15</td>
<td>fenchol</td>
<td>1111</td>
<td>1.1</td>
<td>37</td>
<td>2-methylmethylene cyclohexane</td>
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<td>cis-para-menth-2-en-1-ol</td>
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<td>alpha-farnesene</td>
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<td>0.2</td>
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<td>gamma-cadinene</td>
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<tr>
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<td>geranyl propionate</td>
<td>1600</td>
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<td>1177</td>
<td>0.8</td>
<td>43</td>
<td>geranyl isovalerate</td>
<td>1606</td>
<td>7.2</td>
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<tr>
<td>22</td>
<td>2-hexenal</td>
<td>1187</td>
<td>0.5</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

| % identification                  | 86.7   |
| Monoterpene hydrocarbons          | 24.0   |
| Oxygen-containing monoterpenes    | 52.2   |
| Sesquiterpene hydrocarbons        | 2.1    |
| Oxygen-containing sesquiterpenes  | 7.0    |
| Hydrocarbons                       | 1.4    |
| Phenylpropanoids                  | trace  |

Forty-three components were characterized, representing 86.7% of the total oil components (Table 1). The major constituents of the oil were carvacrol (9.0%), alpha-pinene (8.2%), geranyl isovalerate (7.2%), geranyl propionate (7.0%), limonene (6.7%) and carotol (6.5%). Many of the identified compounds in the essential oil of the aerial parts of *F. ovina* like alpha and beta-pinene, camphene, myrcene, alpha-phellandrene, limonene and alpha-terpineol were those which were reported to be present in the essential oil of the aerial parts of Iranian *Ferula* species (14-15).

However, in contrast to the results of one of these reports, gamma-cadinene and alpha-cadinol which were reported to be present as predominant components of the oil (15) were not identified in the present study.

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REFERENCES


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