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# Chemical Composition of Volatile Oil from *Ferula gummosa* using Hydrodistillation Profile

**M.H.MESHKATALSADAT[1,2]*, S. SALHVARZI[1] and REZA AMINIRAD[2]**

[1]Department of chemistry,faculty of basic sceinces, Lorestan university , Khoramabad, Iran.
[2]Department of basic engineering, Qom University of technology Qom, Iran
*Corresponding author E-mail:mhmeshkatalsadat@yahoo.com

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**ABSTRACT**

The essential oil was investigated. GC-MS analysis of the essential oil resulted in the identification of 32 compounds constituting 85.792% of the total oil β-Guriunene(4.356%), p-ment-2en- 9 ol E (15.356%), Beta- pinene(21.790%), Trans propenyl sec butyl disulfide (5.603%), were the principal components .

**Key words:** *Ferula gummosa*, Volatiles, Composition.

## INTRODUCTION

*Ferula gummosa* Boiss. (Apiaceae) is a perennial plant native to central Asia, growing in the northern and western parts of Iran and blooms once in its several years' life span[1]. Nomads of southwest Iran call this plant 'Barijeh' and traditionally use its resin for the treatment of diarrhea. They eat a small piece of the resin and believe it to be a very effective anti-diarrheal herbal medicine[2]. In Iranian ancient medicine, the gum obtained from the aerial parts of this plant has been used for stomach pain, chorea, epilepsy and as a wound-healing remedy[3]. In recent years there are some reports regarding the main effects of this plant. An antinociceptive activity has been shown for the hydroalcoholic extract of aerial parts[4] and acetone extract of *F. gummosa* seed and root has been reported previously[5]. Furthermore, a methanol-chloroform (1:1) extract of *F. gummosa* and its fractions have alleviated the morphine withdrawal syndrome induced by naloxone[6]. The anticonvulsant potential of an essential oil[3] and the antibacterial activity of the seed[7] and anti-inflammatory activity of the seed and root of *F. gummosa*[5] have been reported previously. The composition of the essential oil of the fruit of the plant has been determined and it has been shown that terpenoid compounds such as alpha-pinene, betapinene, 3-carene, alpha-thuujene and sabinene are abundant in this plant[3].

## EXPERIMENTAL

### Plant material

The plants *Ferula gummosa Boiss*. (Apiaceae) was identified and authenticated by Prof. Dr. Nasser Akbari at the Department of

Agronomy, faculty of agriculture, University of Lorestan. The voucher specimens have been deposited at the Herbarium of the Lorestanuniversity. The aerial parts of the plant were collected from Lorestan university campus area in May 2011 and dried at 30 °C for 4 days without applying any heat treatment to minimize the loss of active components. Dried materials were kept in deep freeze until use.

**Isolation of volatile components**

The sample (100 g of dried material was charged with a particle size of about 500 µm) was submitted to hydro-distillation for 2.5 h, using a Clevenger-type apparatus, according to the European Pharmacopoeia (1975). The volatile distillate was collected over anhydrous sodium sulphate and after filtration, immediately injected to GC/MS. The yield of the oil was 2.05% v/w based on dry plant weight

**GC-MS analysis**

GC/MS analysis of the oil was carried out on an Agilent HP-6890 gas Chromatograph (Agilent

**Table 1: Composition of essential oil from *Ferula gummosa* by hydrodistillation method**

| S. No | Compound | KI | RI | Percentage |
|---|---|---|---|---|
| 1 | Camphene | 954 | 5.31 | 0.714% |
| 2 | Beta- pinene | 979 | 5.27 | 21.790% |
| 3 | Myrcene | 991 | 5.54 | 1.482% |
| 4 | D- limonene | 1029 | 6.11 | 3.986% |
| 5 | Delta- 3- careen | 1031 | 6.32 | 8.217% |
| 6 | Allo-Ocimene | 1050 | 7.1 | 0.129% |
| 7 | Gamma- terpinene | 1060 | 7.2 | 0.908% |
| 8 | Trans- pinocarveol | 1139 | 9.3 | 0.547% |
| 9 | Trans propenyl sec butyl disulfide | - | 9.91 | 5.603% |
| 10 | Myrtenal | 1196 | 10.52 | 0.346% |
| 11 | myrtenol | 1196 | 10.60 | 0.377% |
| 12 | p-ment- 2en- 9 ol E | 1199 | 11.08 | 15.356% |
| 13 | Rubean | - | 11.68 | 0.221% |
| 14 | Endobornyl acetate | - | 12.20 | 1.134% |
| 15 | 3- Caren- 4ol | - | 12.55 | 0.339% |
| 16 | Alpha- Cabebene | 1351 | 13.40 | 0.175% |
| 17 | α-copaene | 1377 | 14.03 | 0.521% |
| 18 | Beta- elemene | 1391 | 14.19 | 0.701% |
| 19 | α-Gurjunene | 1410 | 14.30 | 0.829% |
| 20 | Trans- caryophylene | 1419 | 14.90 | 1.441% |
| 21 | α-Guaiene | 1440 | 15.03 | 1.868% |
| 22 | Alloaromadendrene | 1460 | 15.13 | 0.392% |
| 23 | β-selinene | 1490 | 16.35 | 0.535% |
| 24 | α-Farnesene | 1506 | 17.2 | 1.188% |
| 25 | D- cadinene | 1523 | 17.89 | 1.534% |
| 26 | Calarene | - | 18.96 | 0.791% |
| 27 | α-Eudesmol | 1654 | 19.39 | 0.943% |
| 28 | β-moaliene | - | 19.68 | 5.156% |
| 29 | Agarospirol | 1648 | 20.24 | 1.358% |
| 30 | Aromandrene | - | 20.67 | 1.329% |
| 31 | β-Guriunene | - | 21.08 | 4.356% |
| 32 | Aristolene | 1763 | 21.36 | 1.526% |
| | Total | | 85.792 | |

Technologies, Palo Alto, CA, USA) equipped with an Agilent HP-5973 mass selective detector in the electron impact mode (ionization energy: 70eV), operating under the same conditions as described above, using a HP-5MS 5% phenylmethylsiloxane capillary column (30 m × 0.25 mm, 0.25 µm film thickness; Restek, Bellafonte, PA). Retention indices were calculated for all components using a homologous series of n-alkanes injected in conditions equal to the sample 671 one. Identification of components of essential oil was based on retention indices (RI) relative to nalkanes and computer matching with the Wiley7n.L libraries, as well as comparisons of the fragmentation pattern of the mass spectra with data published in the literature[8] Some commercially available components of the essential oil were also co-injected for further confirmation of their identification.

## RESULTS AND DISCUSSION

The volatile oil of barks of Ferula gummosa was extracted by hydrodistillation method and was analyzed by GC and GC-MS. Retention indices for all compounds were determined according to the Kovats method using n-alkanes as standards[8]. Wherever possible, by co injection with an authentic sample and by matching their fragmentation patterns in mass spectra with those stored in NIST library and published mass spectra[8] and Wiley7n.L libraries of GC/MS. The chemical composition of the *Ferula gummosais* presented in Table 1. A total of 32 compounds were identified, which constitute 85.792% of the volatile oil. β-Guriunene(4.356%), p-ment- 2en- 9 ol E (15.356%), Beta- pinene(21.790%), Trans propenyl sec butyl disulfide (5.603%), identified as major components

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