



## Chemical composition of Elamit *Mentha longifolia*(L.)Huds

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**Abstract :** Oregano plant with the scientific name of *Mentha longifolia* L. and genus of *Mentha* is owned by the Lamiaceae family. In traditional medicine it is used to treat nausea, bronchitis, bloating and loss of appetite. It also has carminative, antispasmodic and anti-inflammatory properties. In this study, the chemical composition of *Mentha* native to Ilam Province was examined. Initially, the essential oil was extracted and analyzed with chromatography/ mass spectrometry (GC-MS). Based on the results obtained from the GC-MS method SMPE, it became clear that there were 55 active ingredients in the essential oil. Phytochemical analysis showed that beta-Phellandrene,  $\alpha$ -PINENE, trans-Caryophyllene and  $\beta$ -Myrcene constituted respectively 19.95%, 17.85%, 10.15% and 9.15% of the ingredients of Oregano plant native to Ilam which most known composition of oregano isolated from Ilam Province plant was beta-Phellandrene (19.95%).

**Keywords:** Medicinal herbs, essential oils, oregano Elamite, beta-Phellandrene.

### Introduction

Oregano plant with the scientific name of *Mentha longifolia* L. and genus of *Mentha* is owned by the Lamiaceae family (1). Basically, it is grown in wet places such as rivers and grows across the temperate regions of central and southern Europe, southwest Asia and Australia. Leaves, flowers and stems of grass species are used in herbal tea or as an additive in commercial spice mixtures for flavoring foods. This plant has been traditionally used to treat nausea, bronchitis, emphysema and anorexia (2). Oregano is an aromatic plant that the aerial parts of the plant have medicinal properties (1). The *Mentha* genus has antibacterial, anti-inflammatory, and antioxidant and anti-fungal effect (3, 4). Oregano herb in traditional medicine is used as a carminative, antispasmodic and anti-inflammatory remedy. Traditionally, decoction of the plant is used for the treatment of fibrosis and cervical cancer (5, 6). In this study, the chemical composition of *Mentha* native to Ilam Province was determined.

## Materials and Methods

### Preparation of medicinal plant

In this study, specimens of the plant of pennyroyal were taken from different parts of Ilam province during 22 to 30 November 2014 (Table 1). 10 samples of pennyroyal plant were collected. The plant was submitted to Natural Resources Research Center of Ilam province for authentication and analysis.

Used part	Essential oil or extract	Growth form	Altitude (m a.s.l)	Longitude	Latitude	Province	Region	Plant family	Species
Areal organs	Essential oil	perennial	683-790	13°33 E	58°26 N	Ilam (West of Iran)	Meyme-zarinabad	Lamiaceae	<i>Mentalongifolia</i> (L.) Huds

Carrier gas: He (99.999%); Injection type: Split 1:60, Library: Wiley 7n, Injector temperature: 250°C, Flow rate: 0.9 ml/min, Injection volume: 0.2 µL, Solvent delay: 4 min.

### Gas chromatograph Instrument:

Gas chromatograph: Agilent 6890N coupled to Agilent 5973 mass detector; Column: HP-5, 30m (length) × 0.25 mm (ID) × 0.25 µm (stationary phase thickness); Injector type: split/ splitless; Column temperature program:

Rate(°C/min)	Temperature (°C)	Hold (min)
-	55	-
5	190	-
10	250	0.00

### Isolation of the essential oil

For total phenolic content, antioxidant, antibacterial, antifungal and anti-giardial activity assessment tests, the essential oils were prepared by Clevenger-type apparatus. The fresh aerial parts of *M. longifolia* plant (separately) were dried inside for 6 days at room temperature (25±3°C), and the ground to fine a powder using Moulinex® food processor. The essential oil was extracted from 100 g of ground tissue in 400 ml of water contained in a 2 L flask and heated by heating jacket at 60°C for 4 h in a Clevenger-type apparatus, according to producers outlined British Pharmacopoeia. The essential oil yield was 0.80% (w/w) for *M. longifolia*.

### Gas chromatography/mass spectrometry (GC–MS) analysis

The essential oils were analyzed using an Agilent 6890N coupled to Agilent 5973 mass detector gas chromatograph with a HP-5MS 5% phenylmethylsiloxane capillary column (HP-5, 30m (length) × 0.25 mm (ID) × 0.25 µm (stationary phase thickness)). Oven temperature was kept at 55 °C for 4 min initially, and then raised at the rate of 4 °C/min to 250 °C. Injector temperatures were set at 250 °C, respectively. Helium (99.999%) was used as carrier gas at a flow rate of 0.9 ml/min; 1 samples were injected manually in the split mode. Peaks area percent were used for obtaining quantitative data. The gas chromatograph was coupled to an Agilent 6890N coupled to Agilent 5973 mass detector mass selective detector. Retention indices were calculated for all components using a homologous series of n-alkanes (C5–C24) injected in conditions equal to samples. Identification of oil components was accomplished based on comparison of their retention times with those of authentic standards and by comparison of their mass spectral fragmentation patterns (WILLEY/ChemStation data system).

## Results

Based on the results obtained, there were 55 active ingredient in the essential oil (Table 2). Phytochemical analysis showed that beta-Phellandrene, α-PINENE, trans-Caryophyllene and β-Myrcene respectively contained 19.95%, 17.85%, 10.15% and 9.15% of the ingredients of Oregano plant native to Ilam which most known composition was beta-Phellandrene (19.95%). Details Phytochemical analysis of Oregano is specified in Table 2.

**Table 2. Analysis of phytochemical essential oil of oregano in Ilam**

No.	Compound	KI	%
1	2-Hexenal	920	0.23
2	$\alpha$ -PINENE	931	17.85
3	Sabinene	966	5.01
4	$\beta$ -Myrcene	988	9.15
5	1-Phellandrene	994	0.84
6	$\alpha$ - TERPINENE	1014	0.12
7	beta-Phellandrene	1035	19.95
8	3-Carene	1046	0.33
10	cis-sabinene hydrate	1066	0.28
12	Linalool	1097	0.15
13	beta.-Sesquiphellandrene	1148	0.06
15	Alloocimene	1176	0.59
17	$\alpha$ -Terpineol	1180	0.29
21	1-Pentadecene	1224	6.82
22	Thymol	1289	0.09
25	Bicycloelemene	1325	1.55
26	Copaene	1378	2.71
28	$\beta$ -Cubebene	1386	0.22
29	$\beta$ -elemene	1394	0.40
30	$\alpha$ -Gurjunene	1406	0.34
32	trans-Caryophyllene	1418	10.15
33	$\gamma$ -Cadinene	1424	0.70
34	$\alpha$ -Bergamotene	1439	1.19
35	Zingiberene	1447	0.20
36	$\alpha$ - Muurolene	1456	0.34
37	trans- $\beta$ -Farnesene	1468	4.06
38	Calarene	1472	0.35
40	$\beta$ -Himachalene	1480	0.35
41	GERMACRENE-D	1485	3.98
42	$\gamma$ -Cadinene	1489	0.51
43	bicyclogermacrene	1492	2.18
44	$\beta$ -Bisabolene	1512	0.67
45	$\alpha$ Amorphenone	1524	0.76
46	$\delta$ -Cadinene	1538	3.10
47	$\alpha$ -BISABOLENE	1549	0.70
48	sesquisabinene hydrate	1562	0.13
49	Spathulenol	1571	0.25
50	Caryophyllene oxide	1589	0.27
53	Aromadendrene	1620	0.13
55	Bis(2-ethylhexyl) phthalate	1840	3.03

## Discussion

The results of a phytochemical study showed that, Pulegon with 31.54% is the most active ingredient of plant (7). Unlike the previous study, beta-Phellandrene in *Mentha longifolia* L native to Ilam is the main composition. Mint which one of the most important plants, have been used as a medicinal plant to treat stomach ache as well as chest pains (8) Several other uses have been reported in traditional medicine (9) and preliminary research for possible uses of this plant in treatment of irritable bowel syndrome (8). Menthol from mint essential oil (45–85%) is an important ingredient of many cosmetics. Menthol as well as mint essential oil are also used in aromatherapy to alleviate post-surgery nausea (8,9).

Phenolic compounds which are abundant in this plant have antimicrobial activities (10-13). Phenolic compound mostly have antioxidant activities which are effective in various diseases including diabetes mellitus (14-17), atherosclerosis (18-20), kidney toxicities (21-35), pain (36-39) and neurological diseases (40-45). Pharmaceutical active ingredients such as phenols, flavonoids, tannins, Anthocyanin and... cause having therapeutic effects in herbal plants (46-57). Hence, *Mentha longifolia* which is an important plant might also possess these properties.

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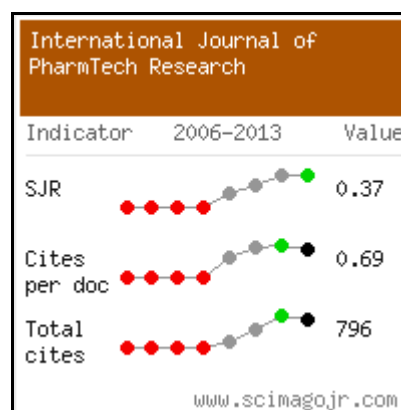
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