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Short communication

COMPARISON OF CHEMICAL COMPITION OF ESSENTIAL OIL OF *MENTHA LONGIFOLIA* L. FROM TWO REGIONS OF IRAN

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ABSTRACT

Mentha longifolia L. is native to Europe, Central Asia and Australia. It is used as carminative, stomachic and stimulant and also in aromatherapy. In the present study, Essential oil extracted from *Mentha longifolia* L. has been evaluated. Gas chromatography (GC) and gas chromatography mass spectrometry (GC-MS) were employed to determine the chemical composition of essential oil obtained from dry shoot of *Mentha longifolia* L. Pulegone, 1,8-cineole, Menthone, α-Pinene and Isomenthone werefound to be the major constituents of the oil. Results of this study showed that the presentation of chemical compounds of *Mentha longifolia* L. essential oil is different in Borujerd and Khoram Abad.

Keywords: Composition, different regions**,** essential oil, *Mentha longifolia* L.

INTRODUCTION

Mentha species is commercially grown for its essential oil content and herbage yields. It has a variety of applications in the pharmaceutical, perfumery, food, confectionery and cosmetics industries (Zeinali*et al*., 2004). *Mentha longifolia* L. belongs to the genus Mentha, Lamiaceae family. *Mentha longifolia* L. is perennial herb 40-120 cm high with musty scent. Stem white or grey-villous, sometimes sparsely hairy. Leaves are sessile or shortly petiolate usually oblong elliptical, hairs simple. Extremely variable in height, leaf size and shape, indumentum and inflorescence and complicated by the occurrence of hybrids (Dzamic *et al*., 2010; Stanisavljevic *et al*., 2010). Chemical composition of the essential oil of wild mint herb is very variable depending on the habitat and climate where the species grow. Forty-five constituents were identified in the essential oil of *M. longifolia* from Turkey, with the cis-epoxy piperitone, pulegone and piperitenone oxide as main components, and studied oil exhibits strong antimicrobial activity (Gulluce *et al*., 2007). In the essential oil of wild mint from South Africa, 31 components were identified. Menthone (50.9%), pulegone (19.3%) and 1,8-cineole (11.9%) were the main ingredients of the oil (Oyedeji and Afolayan, 2006). The objectives of this study were to analyze essential oil composition of *Mentha longifolia* L. in two regions of Iran.

MATERIALS AND METHODS

In order to study the Chemical Compounds of essential oil of *Mentha longifolia* L. from two regions of Iran, an experiment was conducted in a completely accidental plan with 2 treatments and 3 replications in the laboratory of the Department of Agriculture and Resources of I.A.U. of Broujerd. The experimented treatments are two regions include Borujerd city and KhoramAbad city. First of all, different geographical features of the regions of study were measured before sampling. The geographical longitude and latitude and the height of the sea level were measured by GPS system. Growing place of Broujerd contains 286387 geographical longitude and 3754760 attitude. The average height of the sea level of this growing place is 1520 meters. The growing place of Khoram Abad has also 250190geographical longitude and 3716549 geographical attitude. The average height of the sea level of this growing place is 1260 meters.Then, to analyze the soil of the two regions, they were excavated done to a depth of 30 cm. The soil samples were transferred to soil-science laboratory to analyze and they were also analyzed for the purpose of some quantitative and qualitative features including pH, EC, N, Na, organic carbon percentage, P, absorbable K, and the texture of the soil.

Harvested aerial part (leaves, stems and flowers) were in summerand dried at room temperature for 1 week (Hafedh

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Table 1. Percentage composition of essential oil of *Mentha longifolia* L.

No.	Components	Retention indices	Khoram Abad(%)	Broujerd(%)
1	α-Pinene	1020	4.21	3.4
2	Camphene	1071	.32	.56
3	β-Pinene	1113	.58	.82
4	Sabinene	1124	.31	.43
5	Myrcene	1161	.52	.47
6	Limonene	1196	.73	.9
7	**1,8-cineole**	**1213**	**9.12**	**13.32**
8	3-octanone	1236	-	.06
9	γ-Terpinene	1245	-	.09
10	**Menthone**	**1473**	**10.24**	**12.67**
11	Isomenthone	1494	2.8	3.2
12	B-bourbonene	1544	.07	.11
13	Linalool	1548	-	.08
14	Methyl acetate	1565	.7	.88
15	Isopulegone	1590	.64	.72
16	Menthol	1613	1.43	1.02
17	**Pulegone**	**1654**	**44.11**	**42.19**
18	α-Humulene	1668	1.33	.53
19	trans -piperitol	1669	3.22	2.14
20	α-Terpineol	1693	2.11	2.42
21	Carvone	1731	.43	.38
22	Piperitone	1732	1.64	1.04
23	d-Cadinene	1755	2.17	2.96
24	Myrtenol	1791	.45	.23
25	Carveol	1804	.21	.62
26	Caryophyllene oxide	1976	1.32	.95
27	Thymol	2166	1.63	1.77
Total identification			90.29	93.96

Table 2. Features of soil science of growing placs.

No.	Regions	EC	pH	N	Na ppm	K ppm	P ppm	Organic carbon	Soil Texture
1	Borujerd	1.3	7.3	. 17	21	450	16	1.5	Loam Clay
2	Khoram Abad	.415	8.13	.11	19	330	7.6	1.32	Clay Loam

et al., 2010) according to nest method. For extract of essential oil, 80 g of the air-dried aerial parts of *Mentha longifolia* was subjected to hydrodistillation for 3h with 500ml distilled water using a Clevenger-type apparatus (Hafedh*et al.,* 2009).

Chromatographic determinations were run on a Perkin Elmer8500 instrument using a BP1 capillary column (30m×0.25mm; film thickness: 0.25µm). The carrier gas was nitrogen with a flow rate of 2ml/min. The oven temperature was programmed from 60-275°C at 4°C/min. Injector and detector temperatures were 275°C and 280°C, respectively.Analysis of the oil was performed on a Hewlett-Packard 6890 GC/MS instrument under the following conditions: Injection of 0.1µl samples, HP-5 MS capillary column (30m×0.25mm; film thickness 0.25µm); carrier He gas, flow rate 2ml/min., injector temperature 250°C, temperature program: 60-275°C at 4°C/min.; mass spectra: electronic impact, ionization potential 70 eV, ion source temperature 250°C, ionization current 1000µA, resolution 1000, and mass range 30-300. Identification of the constituents was based on computer

matching against the library spectra (Library Database Wiley 275), their retention indices with reference to an n-alkane series in a temperature programmed run, interpreting their fragmentation pattern and comparison of the mass spectra with the literature data (Adams, 2007).

RESULTS

The results of extraction and the quality and quantity of the percentage composition of essential oil of*Mentha longifolia* L. in two different regions are in table 1and the results of the soil experiment of each growing place can be seen in table 2.

The results showed that the percentage of the formation components of the essential oil is different in the excavated regions. In Broujerd essential oil 27 components were modified which forms 93.96 percent of the essential oil whose main components are Pulegone (42.19),1,8-cineole (13.32) and Menthone (12.67).
Analysis of oil of *M. longifolia* L. from Italy and Israel revealedpiperitenone oxide as the main component, whilethe essential oil from Sinai contained 1,8-cineole, piperitone oxide and piperitone(Maffei, 1988; Fleisher and Fleisher, 1998).

In the essential oil of Khoram Abad region 24 components were found which form 90.29 percent of the essential oil. In this essential oil Pulegone (44.11),1,8-cineole (9.12) and Menthone (10.24) were also the main components. The main components in *Mentha longifolia* L. essential oil of this research corresponded to Hafedh *et al*. (2009), though some modified components in this study were not in the present study. The results of this research corresponded to Mimica-Dukic*et al*. (2010) about *Myrtus communis* L. and Dehghan*et al*. (2010) about *Ziziphora clinopodioides* for the purpose of the effect of the growing place kind on the essential oil components. The difference between the components and the essential oil percentage in two regions can be stated as a result of the environmental condition (water, weather and soil). In this study Pulegone,1,8-cineole and Menthone were modified in both regions as main components of the essential oil which can be important potential for growing this plant. Further research is needed to get more information in this field.

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