CHEMICAL COMPOSITION OF THE ESSENTIAL OIL OF *Helichrysum oligocephalum*

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Helichrysum genus belongs to the subfamily Lactucoideae of Inuleae tribe in Compositae family [1]. Nineteen species of the genus *Helichrysum* are found in Iran, of which eight of them are endemic. The rate of endemism in the genus *Helichrysum* in Iran is ca. 42% [2].

Helichrysum arenarium is the most famous *Helichrysum* species, and its flowers have long been used in Europe as a herbal medicine for its choleretic, diuretic and spasmolytic effects [3]. There are also reports on anibacterial [4], antiviral [5], antioxidant [6], antidiabetic [7], and antiinflammatory [8] activity of some *Helichrysum* species.

The chemical constituents of the essential oils of different species of *Helichrysum* have been intensively investigated by many researchers [9–15]. β-Caryophyllene is the major constituent in the essential oils of many *Helichrysum* species such as *H. chasmolycicum* [9], *H. cymosum*, *H. fulgidum* [10], and *H. melaleucum* [11]. α-Fenchene, selina-5,11-diene, spathulenol, and germacrene D-4-ol are other constituents reported as the main component of the volatile oils of *H. faradifani* [12], *H. forsskahlii* [13], *H. amorginum* [14], and *H. splendidum* [15] respectively.

H. oligocephalum DC. is an endemic plant growing wild in Iran [16]. The plant is spread over the entire country, but is most common in the west of Iran. According to the literature, *H. oligocephalum* has not been the subject of phytochemical research up to now. As part of a program of chemical investigation on the essential oil of aromatic plants growing wild in Iran, the essential oil constituents of the aerial parts of *H. oligocephalum* are reported for first time.

The aerial parts of *H. oligocephalum* yielded 0.2% (v/w) of a yellowish oil with an aromatic odor. Eighty-two components were detected in the essential oil of *H. oligocephalum.* The identified components and their percentages are given in Table 1, where the components are listed in order of their elution on the HP-5 column. As can be seen, thymol (14.4%), β-caryophyllene (4.9%), β-thujone (4.8%), spathulenol (4.3%), *n*-ethyl dodecanoate (3.4%), hexadecanoic acid (3.4%), viridiflorol (3.0%), and humulene epoxide II (2.6%) were found to be the major constituents of the oil. The results of the present study indicate that thymol is the first major component in the essential oil of *H. oligocephalum*, and β-caryophyllene, the common component in the essential oil of *Helichrysum* species, is found as the second main component of the essential oil.

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TABLE 1. Composition of the Essential Oil of *Helichrysum oligocephalum* DC.

Compound	RI	%	Compound	RI	%
n-Hexanol	873	0.2	*β*-Elemene	1387	0.8
n-Heptanal	899	Tr.	*cis*-Jasmone	1395	1.0
α-Thujene	932	Tr.	*β*-Longipinene	1399	0.4
6-Methyl-5-hepten-2-one	986	0.2	Methyl eugenol	1404	0.3
Dehydro-1,8-cineole	990	0.2	*β*-Caryophyllene	1416	4.9
n-Octanal	1000	0.2	*β*-Cedrene	1418	0.2
α-Terpinene	1016	Tr.	*β*-Ylangene	1421	0.3
p-Cymene	1024	0.4	*cis*-Thujopsene	1429	0.3
1,8-Cineole	1032	2.2	*α*-Guaiene	1435	0.4
cis-*β*-Ocimene	1036	0.1	*α*-Humulene	1450	1.1
trans-*β*-Ocimene	1046	Tr.	*trans*-*β*-Farnesene	1453	1.3
γ-Terpinene	1058	0.7	*γ*-Gurjunene	1471	0.5
Artemisia ketone	1060	0.1	*γ*-Curcumene	1476	0.3
Acetophenone	1067	0.4	*ar*-Curcumene	1479	1.0
α-Terpinolene	1086	Tr.	*trans*-*β*-Ionone	1485	1.8
Linalool	1098	2.1	Valencene	1491	1.6
β-Thujone	1116	4.8	*α*-Muurolene	1495	0.9
cis-*p*-Menth-2-en-1-ol	1122	0.3	Ethyl *n*-undecaonate	1496	0.6
cis-*β*-Terpineol	1142	0.2	*cis*-*α*-Bisabolene	1504	1.2
Camphor	1144	1.9	*δ*-Amorphene	1508	2.1
Isomenthone	1164	0.7	*δ*-Cadinene	1521	1.7
Borneol	1167	1.1	*trans*-Nerolidol	1563	0.5
4-Terpineol	1176	0.7	Spathulenol	1576	4.3
p-Methyl acetophenone	1185	0.2	Caryophyllene oxide	1581	0.7
α-Terpineol	1189	1.1	Viridiflorol	1589	3.0
Decanal	1201	0.1	*n*-Butyl decanoate	1591	2.1
trans-Piperitol	1205	0.2	*n*-Ethyl dodecanoate	1598	3.4
trans-Chrysanthenyl acetate	1233	0.9	Humulene epoxide II	1610	2.6
Pulegone	1238	1.9	Dill apiole	1621	1.7
Piperitone	1253	0.3	*T*-Cadinol	1637	0.1
trans-Geraniol	1255	0.4	*β*-Eudesmol	1646	0.4
cis-Chrysanthenyl acetate	1260	2.5	*α*-Cadinol	1649	0.9
Bornyl acetate	1285	1.6	Tridecanoic acid	1673	1.7
Thymol	1292	14.4	Tetradecanoic acid	1781	1.6
Carvacrol	1301	1.7	6,10,14-Trimethyl-2-pentadecanone	1841	1.0
Nonanoic acid	1304	0.9	Pentadecanoic acid	1867	1.1
Piperitenone	1343	0.3	Pimaradiene	1946	0.4
2,3,6-Trimethylbenzaldehyde	1353	0.3	Hexadecanoic acid	1976	3.4
Eugenol	1356	Tr.	*trans*-Phytol	2111	1.3
α-Ylangene	1372	0.5	(*Z*,*Z*)-9,12-Octadecadienoic acid	2142	0.8
β-Bourbonene	1380	0.3	Ethyl linoleolate	2151	1.1

RI: retention indices on HP-5 capillary column.

%: calculated from TIC data.

Tr.: trace (<0.05%).

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