

COMPOSITION OF THE ESSENTIAL OIL FROM *Anthriscus nemorosa*

B. Nickavar,^{1,2*} F. Mojab,^{1,2} and A. Mojahedi¹

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The genus *Anthriscus* Pres. (commonly known as beaked chervil, beaked parsley, rough chervil) is one of the aromatic members of the Umbelliferae family [1]. Approximately 80 specific names have been described in *Anthriscus*, but about 14 species are recognized [2]. In the flora of Iran, the genus is represented by three species [*A. cerefolium* (L.) Hoffm., *A. sylvestris* (L.) Hoffm., and *A. nemorosa* (M. B.) Speng.]. The plants are naturally distributed in the northern and western parts of the country [1]. Some of them have been traditionally used by local people as herbal drugs. For example, the tea obtained from the aerial parts of *A. nemorosa* is used to treat gastrointestinal ailments.

TABLE 1. Chemical Composition of the Essential Oil of Aerial Parts of *A. nemorosa*

Compound ^a	RI	Content, %	Compound ^a	RI	Content, %
α -Thujene	926	0.1	(Z)-Chrysanthenyl acetate	1260	0.1
α -Pinene	936	3.7	<i>n</i> -Tridecane	1298	0.1
Camphene	947	0.2	α -Copaene	1377	0.1
Sabinene	971	0.1	β -Elemene	1401	13.0
β -Pinene	975	0.1	(Z)-Caryophyllene	1409	0.1
Myrcene	991	0.9	(E)-Caryophyllene	1423	2.3
<i>n</i> -Octanal	1002	0.1	γ -Elemene	1434	0.9
δ -3-Carene	1022	0.1	α -Humulene	1453	0.4
Limonene	1029	1.0	(E)- β -Farnesene	1459	1.0
(Z)- β -Ocimene	1035	0.1	Germacrene D	1483	5.0
(E)- β -Ocimene	1047	0.8	α -Zingiberene	1503	9.9
γ -Terpinene	1056	0.1	(E,E)- α -Farnesene	1514	3.9
Terpinolene	1088	0.3	δ -Cadinene	1523	0.8
<i>n</i> -Undecane	1099	0.1	Germacrene B	1562	2.4
Linalool	1101	0.1	(E)-Nerolidol	1567	41.7
<i>n</i> -Nonanal	1104	0.1	Spathulenol	1581	2.0
Camphor	1144	0.6	γ -Eudesmol	1641	0.3
Borneol	1165	0.1	β -Eudesmol	1663	1.2
Terpinen-4-ol	1176	0.1	α -Cadinol	1667	1.4
<i>p</i> -Cymen-8-ol	1185	0.1	<i>n</i> -Octadecane	1799	0.1
<i>n</i> -Decanal	1205	0.1			

^aCompounds are listed in order of their elution from a DB-5 column.

1) Department of Pharmacognosy, School of Pharmacy, Shaheed Beheshti Medical University, P. O. Box: 14155-6153, Tehran, Iran, fax: +98 21 88795008, e-mail: bnickavar@yahoo.com; 2) Pharmaceutical Sciences Research Center, Shaheed Beheshti Medical University, P. O. Box: 14155-3817, Tehran, Iran. Published in *Khimiya Prirodnykh Soedinenii*, No. 3, pp. 372–373, May–June, 2009. Original article submitted November 1, 2007.

Many plants belonging to the Umbelliferae family are known as sources for essential oils, and it is believed that a part of the medicinal properties of the plants is due to the volatile constituents [3, 4]. Therefore, attention has been directed towards the chemical composition of the essential oils. A literature review revealed that the essential oils from two *Anthriscus* species have been examined previously. In 2002, Bos et al. reported that the essential oils obtained from fresh leaves and roots of *A. sylvestris* consisted mainly of β -phellandrene. The other major constitutions were β -myrcene, sabinene, and (*Z*)- β -ocimene in the leaf oil and (*Z*)- β -ocimene and α -pinene in the root oil [5]. On the other hand, Simandi and co-workers analyzed the essential oil composition of *A. cerefolium* in 1996. The essential oil was characterized by very high amounts of methyl chavicol and 1-allyl-2,4-dimethoxybenzene [6].

However, to the best of our knowledge, there has been no report on the essential oil composition of *A. nemorosa*. Therefore, in continuation of our scientific work on the analysis of the essential oils obtained from traditional Iranian medicine, this research project was done to identify the essential oil components from the aerial parts of *A. nemorosa* growing in Iran.

The hydrodistillation of *A. nemorosa* aerial parts yielded a light yellow oil whose percentage yield was determined as 0.1% v/w (on a dried-weight basis). The identity of the constituents, their retention indices on a DB-5 column, and their percentage composition are listed in Table 1, where the compounds are arranged in order of their GC elution on the DB-5 capillary column.

In the *A. nemorosa* essential oil investigated here, 41 compounds were identified. However, the essential oil was poor in other classes of terpenoid compounds, especially monoterpenoids (8.6%). The other major components in the oil were germacrene-D (5.0%), (*E,E*)- α -farnesene (3.9%), and α -pinene (3.7%). In generally, the essential oil of *A. nemorosa* was characterized by the presence of high levels of sesquiterpenoids.

According to the literature review [5, 6], components such as β -phellandrene, β -myrcene, sabinene, (*Z*)- β -ocimene, α -pinene (in the essential oil of *A. sylvestris*), or methyl chavicol and 1-allyl-2,4-dimethoxybenzene (in the oil of *A. cerefolium*) have not been detected as the major compounds in the oil of *A. nemorosa*. Therefore, there are significant differences in the oil composition of *A. nemorosa* and other related *Anthriscus* species as to the variety of their components and their relative quantity. These chemical differences can be most probably explained by the variability of the plant species and the existence of different chemotypes [7, 8].

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