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Essential Oil Composition of *Salvia aucheri* Bentham var. *canescens* Boiss. & Heldr. Described Endemic Species from Turkey

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Abstract

This study was carried out at the laboratory of Field Crops Department, Faculty of Agriculture and University of Ankara in 2004. Plant material of *Salvia aucheri* Bentham var. *canescens* Boiss. & Heldr. was collected from the locality: C4 Karaman, between Ermenek and Gülnar, Görmeli Village in Turkey. Aerial parts of plants were dried in shadow than the leaves were separated from the stems. The essential oil was extracted from the leaves by hydro distillation method. The average content of essential oil was obtained as 1.32%. The water-distilled essential oil from dried leaves of this species was analysed by GC-MS. A total of 47 components, representing 98.8 % of the oil, were characterized. The major component of essential oil was camphor as 23.41%. The other important compounds were identified such as 1,8-cineole, camphene, α pinene, borneol and β-pinene.

Key Words: *Salvia aucheri* var. *canescens*, essential oil composition, camphor

INTRODUCTION

The genus *Salvia* L. (*Lamiaceae*) has over 900 species all over the world [1,2]. The two largest centers of the genus are in America and in South-West Asia [2,3]. Anatolia is a major centre for *Salvia* in Asia and 46 (52 %) of 89 totals *Salvia* species are endemic to Turkey [4-7]. The distribution of species in neighboring countries is as follows: 75 in Flora USSR [8], 70 in Flora Iranian [9], 36 in Flora European [10] and 21 in Flora Palestine [11]. Some members of *Salvia* are of economic importance since they have been used as flavoring agents in perfumery and cosmetics. Sage (*S. officinalis*) has been credited with a long list of medicinal uses as spasmodical, antiseptic, astringent [12,13]. 48 taxa of the genus *Salvia* are researched on the chemical contents vascular plants of known wild Turkish origin, or cultivated in Turkey or elsewhere from material of wild Turkish origin [14]. Leaves of some *Salvia* species are used to relieve for the upper respiration channel disease. Its leaves, stalks and essential oil are used for many purposes. Pharmacopoeias of many countries contain sage leaf essential oil [15].

MATERIALS AND METHODS

Collection of plant material

Aerial Parts of *Salvia aucheri* Bentham var. *canescens* Boiss. & Heldr. were collected from the locality: C4 Karaman: between Ermenek and Gülnar, Görmeli village vicinity, 1100 m, 21 June 2003, roadsides, clearings in maquis, A. Duran 6240. Voucher specimens kept at the Herbarium of the Faculty of Science and Literature, of Kırıkkale University in Kırıkkale, Turkey (ADO).

Isolation of the essential oil

The air-dried leaves of plant were divided three equal samples (50 g). These samples were submitted for 3 h to water-distillation using a Clevenger-type apparatus. The average essential oil yield was calculated as 1.32 % v/w. The obtained essential oil samples were mixed and prepared for GC-MS analysis.

Gas chromatography analysis

The analysis of the essential oil was performed using a Hewlett Packard 6890 II GC, equipped with a HP-5 MS capillary column (30 m x 0.25 i.d., 0.25 μm) and a HP 5973 mass selective detector. For GC-MS detection, electron ionization energy of 70 eV was used. Helium was the carrier gas, at flow rate of 1 ml/min. injector and MS transfer line temperature were set at 220 and 290 °C, respectively. Column temperature was initially kept at 50 °C for 3 min, and then gradually increased to 150 °C at a 3 °C/min rate. Finally, the temperature was raised 250 °C at a 10 °C/min in ten minutes. Diluted samples (1/100 in hexane, v/v) of 1.0 μl were injected automatically and in splitless mode. The components were identified based on the comparison of their relative retention time and mass spectra with those of standards, NBS75K and Wiley library data of GC-MS system and literature data [16].

RESULTS AND DISCUSSION

A total of 47 compounds, representing 98.83% of the essential oil, were identified by GC/MS analyses revealed that the major constituents of the oil were camphor (23,41%), 1,8-cineole (21,97%), camphene (11,07%), α-pinene (8,76%), borneol (6,92%) and β-pinene (5,02%) as listed in Table 1.

Table 1. Essential oil composition of *Salvia aucheri* Bentham var. *canescens* Boiss. & Heldr.

	Compound	RT	Compounds ratio (%)
1	Tricyclene	8.12	0,45
2	α-thujene	8.35	0,39
3	α-pinene	8.63	8,76
4	Camphene	9.21	11,07
5	Sabinene	10.23	0,63
6	β-pinene	10.34	5,02
7	β-myrcene	11.02	0,70
8	α-terpinene	12.09	0,10
9	p-cymene	12.47	0,19
10	1,8-cineole	12.85	21,97
11	Ocimine	13.15	1,13
12	γ-terpinene	14.03	0,40
13	Trans-sabinene hydrate	14.38	0,27
14	α-terpinolene	15.39	0,24
15	Cis-sabinene hydrate	**15.82**	0,18
16	Linalool	15.99	0,35
17	α-campholenal	17.16	0,08
18	**Camphor**	**18.15**	**23,41**
19	Pinocarvone	18.83	0,05
20	Borneol	19.07	6,92
21	Terpinen-4-ol	19.54	0,96
22	Benzenemethanol	19.92	0,05
23	α-terpineol	20.16	0,20
24	Myrtenol	20.41	0,11
25	Trans-carveol	21.46	0,05
26	Linalyl acetate	23.25	0,06
27	Bornyl acetate	24.55	2,34
28	Thymol	24.87	0,92
29	Perillol	25.06	0,06
30	Carvacrol	25.26	0,16
31	Elixene	26.78	0,10
32	α-terpinenyl acetate	27.34	0,68
33	β-bourbonene	28.81	0,14
34	Caryophyllene	30.28	2,37
35	Aromadendrene	31.06	0,19
36	α-humulene	31.67	0,36
37	Muurolene	32.64	0,04
38	Germacrene-D	32.81	0,34
39	β-selinene	33.00	0,20
40	Bicyclogermacrene	33.45	1,43
41	α-cedrene	34.10	0,05
42	γ-cadinene	34.54	0,05
43	Spathulenol	36.66	2,99
44	Caryophyllene oxide	36.86	1,87
45	β-eudesmol	39.16	0,52
46	α- eudesmol	39.25	0,25
47	Elaol	43.31	0,03
	Total		98,83

In previous investigations on *Salvia* spp of Turkey, different compounds were identified as major components. The main compound was identified 1,8, cineole (55.5 %) in *S. fruticosa* oil [17]. From *S. cryptantha* oil; borneol (24.8%), camphor (17.5%) and 1,8-cineole (10.4 %) have been the major constituents [17]. Başer et al. (1993)[18] reported that β-

thujone was the main component of *S. pomifera* essential oil as 50-67%. β pinene (34.4%) and α pinene (22.6%) were identified as major compound of the essential oil of *S. tomentosa.* In the oil of *S. officinalis* the main components were camphor (22.9 %) and α-thujone (20.6 %) [17]. *Salvia aucheri* Bentham var. *canescens* Boiss. & Heldr. growing endemic, were collected from two different locations in Turkey and analysed by GC-MS. According to result, 1,8-cineol (32.3 %, 28.6 %), camphor (18.9 %, 22.8 %) borneol (8.2 %, 8.9 %), α pinene (6.3 %, 9.0 %) and β pinene (5.3 %, 6.2 %) were identified as main constituents of the essential oil [19]. These previous results when compared with our results there was some differences between these researches. In this study the volatile compounds of *S. aucheri* Benham var. *canescens* differ from the previous study by Özcan et al [19]. These differences can be attributed to different locations and geographical factors.

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