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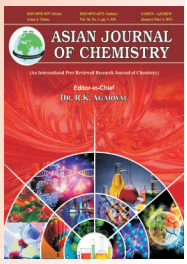

Composition of the Essential Oil of Some *Centaurea* L.

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Composition of the water-distilled oil of *Centaurea kurdica*, *C. antochia* var. *antochia* and *Centaurea albonitens* in Turkey, were analyzed by GC and GC-MS. In essential oil of *Centaurea kurdica,* caryophyllene 14.4 %, α-humulene 4.62 %; germacrene 11.95 %; β-farnesene 9.78 %; spathulenol 7.73 %; glubulol 5.58 %; β-eudesmol 4.04 %; in essential oil of *C. antiochia* var. *antiochia* caryophyllene 18.23 %; germacrene 27.37 %; spathulenol 29.86 %; hexadecanoic acid 7.21 % and in essential oil of *C. albonitens* γ-elemene 4.45 %; caryophyllene 7.75 %; germacrene 9.23 %; spathulenol 7.97 %; caryophyllene oxide 16.45 %; cembrene 6.25 %; phytol 4.75 %; β-selinenol 4.57 % were the main constituents.

Keywords: *Centaurea kurdica*, *C. antochia* var *antochia*, *C. albonitens* essential oil, GC/MS, Compositae.

INTRODUCTION

Centaurea L. is the largest genus of Compositae family in Turkey and this genus is represented with 179 native species, 109 of which are endemic in Turkey[1,2]. The endemism ratio is quite high (65 %)[3]. *Centaurea kurdica* and *Centaurea antiochia* var *antiochia* are endemic taxa and *Centaurea albonitens* shows a wide distribution for Turkey and distributed mainly in eastern and southern Anatolia. *Centaurea* species such as *Centaurea cyanus* L., *Centaurea behen* L., *Centaurea calcitrapa* L., are known for their antidiabetic, antidiarrhetic, antirheumatic, antiinflammatory, colagog, choleretic, digestive, stomachic, diuretic, menstrual, astringent, hypotensive, antipyretic, sitotoxic, antibacterial effects by public medicals and are used single or mixed[4-11]. Essential oils are aromatic oily liquids obtained from plant material (flowers, buds, seeds, leaves, twigs, bark, herbs, wood, fruits and roots) and have been shown to exhibit antimicrobial, antiviral, antimycotic, antitoxigenic, antiparasitic and insecticidal properties[12]. Essential oil conponents studies are available in the literature on *Centaurea* species: *C. thessala* subsp. *drakiensis*, *C. zuccariniana*, *C. spruneri*, *C. raphanina* subsp. *mixta* and *C. pelia*, *C. calcitrapa* and *C. solstitialis*, *C. calcitrapa*, *C. gloriosa* and *C. moschata*, *C. pseudoscabiosa* subsp. *pseudoscabiosa, C. hadimensis* and *Centaurea kotschyi* var. *kotschyi* and *C. Kotschyi* var. *Decumbens*[11].

The aim of this study is to determine essential oil compounds of *Centaurea kurdica, Centaurea alboniten* and *Centaurea antiochia* var *antiochia.*

EXPERIMENTAL

Centaurea kurdica was collected from Mus-Hasköy, 30 km, in July 2011, *Centaurea antochia* var. *Antochia* was collected from Hatay, Near Amonos Mountain, in July 2011 and *Centaurea albonitens* was collected from Van-Ozalp, 40 km, in July 2011 in Turkey.

Isolation of the essential oils and gas chromatography-mass spectrometry: The air-dried whole plants (200 g, each) of *Centaurea kurdica, Centaurea alboniten* and *Centaurea antiochia* var *antiochia* were powdered by a blender and hydrodistilled in a Clevenger-type apparatus using ice bath for cooling system (3 h). The oils were taken by dissolving in HPLC grade *n*-hexane (1 µL) and kept at 4 °C in a sealed brown vial. 1 µL of the sample was directly injected into the GC-MS instrument.

GC-MS analyses were performed by using a Shimadzu 2010 System. A mass spectrometer with an ion trap detector in full scan mode under electron impact ionization (70 eV) was used. The chromatographic column used for the analysis was HP-5 capillary column. The carrier gas used was helium, at a flow rate of 1 mL/min. The injections were performed in splitless mode at 230 °C. One microliter essential oil solution in hexane (HPLC grade) was injected and analyzed with the column held initially at 60 °C for 2 min and then increased to 260 °C with a 5 °C /min heating ramp and subsequently kept at 260 °C for 13 min. The relative percentage amounts of the separated compounds were calculated from total ion

chromatograms by a computerized integrator[11]. Library search was carried out using Wiley/NIST Library of Essential Oil Constituents.

RESULTS AND DISCUSSION

The compositions of the essential oils of *Centaurea kurdica, C.antochia* var. *antochia* and *C. albonitens* in Table-1. In total 47 compounds were identified, amounting to 90.18, 91.42 and 83.93 % of the oils, respectively.

In essential oil of *Centaurea kurdica,* caryophyllene 14.4 %, α-humulene 4.62 %; germacrene 11.95 %; β-farnesene 9.78 %; spathulenol 7.73 %; glubulol 5.58 %; β-eudesmol 4.04 %; in essential oil of *C. antiochia* var. *antiochia* caryophyllene 18.23 %; germacrene 27.37 %; spathulenol 29.86 %; hexadecanoic acid 7.21 % and in essential oil of *C. albonitens* γ-elemene 4.45 %; caryophyllene 7.75 %; germacrene 9.23 %; spathulenol 7.97 %; caryophyllene oxide 16.45 %; cembrene 6.25 %; phytol 4.75 %; β-selinenol 4.57 % were the main constituents.

TABLE-1
COMPOSITION OF THE ESSENTIAL OIL OF *Centaurea kurdica, C. antochia* var. *antochia* AND *C. albonitens*

LRI[a] (HP-5 MS column)	Constituents	[b]*C. kurdica* (%)	*C. antiochia* var. *antiochia* (%)	*C. albonitens* (%)
1004	3-Carene	–[c]	1.4	–
1098	Linalool	0.15	–	–
1104	*n*-Nonylaldehit	0.18	–	–
1142	Allocimene	–	1.01	–
1217	Carveol	–	0.75	–
1221	β-Cyclocitral	0.28	–	–
1229	Carveol	–	3.25	–
1378	α-Copaene	2.65	–	2.84
1411	α-Cedrene	0.15	–	–
1420	*trans* β-caryophyllene	3.75	–	1.25
1421	Caryophyllene	14.24	18.23	7.75
1436	γ-Elemene	2.86	–	4.45
1440	Aromadendrene	0.28	–	0.15
1455	α-Humulene	4.62	–	3.78
1477	Germacrene	11.95	27.37	9.23
1484	β-Ionene	1.89	–	–
1489	β-Selinene	–	–	1.12
1500	β-Farnesene	9.78	–	3.15
1532	Epiglobulol	0.55	–	–
1550	α-Cedrol	0.13	–	0.34
1564	*d*-Nerolidol	1.15	–	1.17
1579	Spathulenol	7.73	29.86	7.97
1583	Caryophyllene oxide	–	–	16.45
1604	Glubulol	5.58	–	–
1611	Cubenol	2.25	–	1.85
1612	α-Cadinol	2.19	–	1.23
1638	Thujyl alkol	–	0.5	–
1648	β-Eudesmol	4.04	–	–
1685	Valerenol	0.42	–	0.98
1713	α-Santalol	1.21	1.48	–
1919	Farnesylacetone	–	–	0.65
1947	Cembrene	2.39	–	4.75
1950	Phytol	3.93	–	6.25
1958	Hexadecanoic acid	1.45	7.21	1.35
2100	Heneicosane	–	–	0.42
2358	Diethylphthalate	0.44	–	1.25
2570	Farnesol	0.34	–	0.28
3000	Triacontane	–	–	0.23
MS	D-Fencyl alkol	0.24	–	0.12
MS	6-Methyl-1-heptanol	0.19	–	–
MS	Decyl aldehit	0.19	–	–
MS	(E,E)-2,4-Heptadienal	0.18	–	–
MS	Palmitik aldehit	2.48	–	–
MS	1,2-Lungidione	0.32	–	–
MS	Amylcarbinol	–	0.36	–
MS	β-Selinenol	–	–	4.57
MS	Neryl-linalool	–	–	0.35
	Total (%)	90.18	91.42	83.93

[a]Linear retention indices (HP-5 column); [b]Percentages obtained by FID peak-area normalization, all relative response factors being taken as one (HP-5 column); [c]Trace < 0.1 %.

REFERENCES

1. P.H. Davis, Flora of Turkey and the East Aegean Islands, Edinburgh University Press, Edinburgh (1988).
2. A. Güner, N. Özhatay, T. Ekim and K.H.C. Baser, Flora of Turkey and the East Aegean Islands, Edinburgh University Press, Edinburgh, Vol. 11 (2000).
3. S. Aslan, M. Vural, B. Sahin, S. Çelik and F.A. Karaveliogullari, *Biol. Div. Conserv.*, **3**, 185 (2010).
4. A.F. Barrero, M.M. Herrador, P. Arteaga, E. Cabrera, I. Rodriguez-Garcia, M. Garcia-Moreno and D.G. Gravalos, *Fitoterapia*, **68**, 281 (1997).
5. N.M. Farrag, E.M. Abd El Aziz, M.M. El-Domiaty and A.M. El Shafea, *Zagazig J. Pharm. Sci.*, **2**, 29 (1993).
6. E. Gürkan, I. Sarioglu and S. Öksüz, *Fitoterapia*, **69**, 81 (1998).
7. M. Kaij-A-Kamb, M. Amoros and L. Girre, *Pharm. Acta Helv.*, **67**, 178 (1992).
8. F. Orallo, M. Lamela, M. Camiña, E. Uriate and J. Calleja, *Planta Med.*, **64**, 116 (1998).
9. T. Baytop, Türkiye'de Bitkilerle Tedavi, Nobel Tip Kitabevi, Istanbul (1995).
10. E. Yesilada, E. Sezik, G. Honda, Y. Takaishi, Y. Takeda and T. Tanaka, *J. Ethnopharmacol.*, **64**, 195 (1999).
11. N. Yayli, A. Yasar, C. Güleç, A. Usta, S. Kolayli, K. Coskunçelebi and S. Karaoglu, *Phytochemistry*, **66**, 1741 (2005).
12. S. Burt, *Int. J. Food Microbiol.*, **94**, 223 (2004).