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RESEARCH ARTICLE

Composition of the Essential Oil of Endemic *Centaurea dursunbeyensis* Uysal & Kose from Turkey

Yavuz Bülent Köse[1], Betül Demirci[2]

[1] Department of Pharmaceutical Botany, Anadolu University, 26470, Eskişehir, TURKEY
[2] Department of Pharmacognosy, Faculty of Pharmacy, Anadolu University, 26470, Eskişehir, TURKEY

*Corresponding author. Email: ybkose@anadolu.edu.tr

Abstract

Centaurea L. which is an important genus of Asteraceae (Compositae) family, is distributed with about its 700 species in Asia, North Africa, America and Europe. *C. dursunbeyensis* is a new endemic species from Turkey.

In this study aerial parts of *C. dursunbeyensis* were hydrodistilled for 3 h using a Clevenger-type apparatus to produce a small amount of essential oil which was trapped in n-hexane. Identification of the essential oil components was carried out by comparison of their relative retention times with those of authentic samples or by comparison of their relative retention index (RRI) to the series of n-alkanes. Computer matching against commercial libraries and in-house "Baser Library of Essential Oil Constituents" built up by genuine compounds and components of known oils, as well as MS literature data, were used for the identification.

Main constituents of the oil were found as hexadecanoic acid (32.4%), tetradecanoic acid (8.7%), nonacosane (5.5%), spathulenol (5.4%) and heneicosane (5.2%).

Keywords: Essential oil, *Centaurea*, Asteraceae

Introduction

Almost 700 species belonging to genus *Centaurea* L. naturally distributes in Asia, North Africa and America (Brumitt, 2004). In flora of Turkey, *Centaurea* is one of the richest genera. Turkey is the main centre of diversity for *Centaurea* (Wagenitz, 1986). In the Flora of Turkey, 172 plus six imperfectly known species of *Centaurea* were accepted (Wagenitz, 1975). Since that many new taxa have been described: there are now 222 species and the level of endemism is 66.8 % (Arif et al., 2004).

In Turkish traditional medicine, uses of *Centaurea* species were reported. *Centaurea* species are common uses as wound healing, choleretic, colagog, cytotoxic, digestive, diuretic, stomachic, menstrual, hypotensive, antipyretic, antibacterial, antidiabetic, antidiarrhetic, antirheumatic, antiinflammatory, astringent purposes (Yeşilada et al., 2006; , Baytop, 1999).

C. dursunbeyensis was described as a new species from Southern Marmara region, Balıkesir. *C. dursunbeyensis* belongs to Section *Phalolepis* (Cass.) DC. Species of this section inhabit in dry and often rocky places in the Mediterranean and Near East mainly in the mountains. Their appendages are orbicular, hyaline with the firmer centre, entire or irregularly lacerate.

Materials and Methods

Plant Sample

Specimens was collected from Turkey. B2 Balıkesir; Dursunbey, Alaçam village, Eğriceöz slopes, 10.07.05, 39°21′296″N, 28°37′400″E, YBK 1535.

Isolation of the Essential Oils

Aerial parts of *C. dursunbeyensis* were hydrodistilled for 3 h using a Clevenger-type apparatus to produce a small amount of essential oil which was trapped in *n*-hexane.

GC-MS Analysis

The GC-MS analysis was carried out with an Agilent 5975 GC-MSD system. Innowax FSC column (60 m x 0.25 mm, 0.25 µm film thickness) was used with helium as carrier gas (0.8 ml/min). GC oven temperature was kept at 60 °C for 10 min and programmed to 220 °C at a rate of 4oC/min, and kept constant at 220 °C for 10 min and then programmed to 240°C at a rate of 1°C/min. Split ratio was adjusted at 40:1. The injector temperature was set at 250 °C. Mass spectra were recorded at 70 eV. Mass range was from m/z 35 to 450.

GC Analysis

The GC analysis was carried out using an Agilent 6890N GC system. FID detector temperature was 300 °C. To obtain the same elution order with GC-MS, simultaneous auto-injection was done on a duplicate of the same column applying the same operational conditions. Relative percentage amounts of the separated compounds were calculated from FID chromatograms. The analysis results are given in Table 1.

Identification of the essential oil components were carried out by comparison of their relative retention times with those of authentic samples or by comparison of their relative retention index (RRI) to series of n-alkanes.

Computer matching against commercial libraries (Wiley GC/MS Library, MassFinder 3 Library) and in-house "Başer Library of Essential Oil Constituents" built up by genuine compounds and components of known oils, as well as MS literature data (ESO 2000, 1999; Jennings and Shibamoto, 1980; Joulain and Koenig, 1998; Koenig, Joulain and Hochmuth, 2004; McLafferty and Stauffer, 1989), was used for the identification.

Results and Discussion

To the best of our knowledge this is the first study on essential oil compositon of *C. dursunbeyensis*. Main constituents of the oil were found as hexadecanoic acid (32.4%), tetradecanoic acid (8.7%), nonacosane (5.5%), spathulenol (5.4%) and heneicosane (5.2%). Previous studies on essential oils of *Centaurea* species report main constituents of the oils as sesquiterpenes, diterpenes, fatty acid esters and hydrocarbon derivatives (Polatoglu et al., 2014).

Table 1. The Composition of the Essential Oil of *C. dursunbeyensis*

RRI	Compound	%
1838	(*E*)-β-Damascenone	2.8
1945	1,5-Epoxy-salvial(4)14-ene	0.4
1958	(*E*)-β-Ionone	0.6
2008	Caryophyllene oxide	2.9
2041	Pentadecanal	1.5
2131	Hexahydrofarnesyl acetone	3.2
2144	Spathulenol	5.4
2135	Hexadecanal	1.2
2257	β-Eudesmol	4.6
2298	Decanoic acid	2.4
2289	Oxo-α-Ylangene	1.1
2300	Tricosane	1.4
2316	Caryophylla-2(12),6(13)-dien-5β-ol (=*Caryophylladienol I*)	0.5
2369	Eudesma-4(15),7-dien-4β-ol	0.6
2369	(2*E*,6*E*)-Farnesol	2.3
2500	Pentacosane	1.0
2503	Dodecanoic acid	4.7

2617	Tridecanoic acid	2.1
2622	Phytol	0.5
2670	Tetradecanoic acid	8.7
2700	Heptacosane	5.2
2822	Pentadecanoic acid	3.7
2857	Palmito-γ-lactone	0.5
2900	Nonacosane	5.5
2931	Hexadecanoic acid	32.4
	Total	**95.2**

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