Chemistry of Natural Compounds, Vol. 44, No. 6, 2008

ESSENTIAL OIL COMPOSITION OF *Tripleurospermum disciforme* FROM IRAN

K. Javidnia,[1,2*] R. Miri,[1,2] M. Soltani,[1] and A. R. Khosravi[3]

UDC 547.913

The genus *Tripleurospermum* Sch. Bip. belongs to the Compositae family, tribe Anthemideae, and is represented by about 30 species which are distributed in temperate regions of the northern hemisphere of the world [1]. In Iran, six species of *Tripleurospermum* can be found [2]. In the Anthemideae tribe, this genus is characterized by the presence of luteolin 7-glucoside [3], and in a recent chemotaxonomic survey of Anthemideae flavonoids, distinctive constituents of *Tripleurospermum* confirmed its treatment as a separate genus [4].

Tripleurospermum disciforme, the subject of this article, is a widespread biennial species which can be found almost everywhere in farmlands and gardens as a weed. It is called "Babuneh" in Persian and is used as a tranquilizer, gastrotonic, antihemorrhage, and hair tonic [5]. Extracts of this plant show excellent antioxidant activity, and a new dioxaspiran derivative was isolated from it [6]. Its crude extract also shows considerable *in vitro* antifungal activity against several fungal strains [7].

Data on the constituents of *Tripleurospermum disciforme* essential oil are shown in Table 1. Thirty-nine components representing 81.6% of the total oil were identified. According to Table 1, sesquiterpenes are the dominant compounds (57.5%), and among these, sesquiterpene hydrocarbons are the major compounds (45.5%). Monoterpenoids are present in trace quantities in this oil. The first three major compounds of this oil are *p*-methoxy-β-cyclopropylstyrene (18.8%), (*E*)-β-farnesene (15.6%), and β-sesquiphellandrene (15.4%). The two first compounds were also detected in the chloroform extracts of flowers, stems, and roots of *T. callosum* (Boiss. & Helder) E. Hossain, but in amounts less than 1% [8].

The aerial parts of *Tripleurospermum disciforme* were collected in 31 May 2006 at the full flowering stage from Dehbid in Fars province of Iran. The voucher specimen has been deposited at the Herbarium of Shiraz University, Department of Botany. The aerial parts of the specie were air-dried. The oil was obtained by hydrodistillation using a Clevenger-type apparatus for 4 h. The yield of oil was 0.16% (w/w) and the color of the oil was yellow. It was dissolved in *n*-hexane (Merck), dried over anhydrous sodium sulfate, and stored at 4 – 6°C.

GC analysis was carried out using a Varian GC 3600 chromatograph with a DB-5 column (30m × 0.25 mm; 0.25 μm film thickness). The oven temperature increased from 60 – 240°C at 3°C/min, and the injector and detector temperatures were 240°C and 250°C, respectively. Quantitative data were obtained from electronic integration of peak areas without the use of correction factors.

GC/MS analysis was carried out using a Hewlett-Packard 6890 machine operating at 70 eV ionization energy, equipped with a HP-5 capillary column (phenyl methyl siloxane, 30m × 0.25 mm; 0.25 μm film thickness) with He as the carrier gas and a split ratio of 1:20. Retention indices were determined by using the retention times of *n*-alkanes that had been injected after the oil under the same chromatographic conditions. The retention indices for all the components were determined according to the Van Den Dool method using *n*-alkanes as standard [9]. The compounds were identified by comparison of their retention indices (RRI, HP-5) with those reported in the literature and by comparison of their mass spectra with the Wiley and Mass finder 3 libraries or with the published mass spectra [10, 11].

1) Medicinal & Natural Product Chemistry Research Centre, Shiraz University of Medical Sciences, Shiraz, Iran, e-mail: javidniak@sums.ac.ir; 2) Department of Medicinal Chemistry, Faculty of Pharmacy, Shiraz University of Medical Sciences, Shiraz, Iran; 3) Department of Biology, Faculty of Sciences, Shiraz University, Shiraz, Iran. Published in Khimiya Prirodnykh Soedinenii, No. 6, pp. 644-645, November-December, 2008. Original article submitted May 4, 2007.

 0009-3130/08/4406-0800

TABLE 1. The Chemical Constituents (%) of the Oil of *Tripleurospermum disciforme*

Compound	RI	%	Compound	RI	%
Hexanal	800	0.2	(*E*)-β-Farnesene	1456	15.6
(*E*)-2-Hexenal	850	Tr.	γ-Muurolene	1481	0.9
α-Pinene	936	Tr.	*trans*-β-Bergamotene	1486	0.5
Benzaldehyde	960	Tr.	(*E*)-β-Ionone	1488	Tr.
Sabinene	974	Tr.	Bicyclogermacrene	1500	0.8
6-Methyl-5-hepten-2-one	985	0.2	(*E,E*)-α-Farnesene	1506	1.7
2-Pentyl furan	991	Tr.	β-Sesquiphellandrene	1521	15.4
(2*E*,4*E*)-Heptadienal	1012	Tr.	*p*-Methoxy-β-cyclopropylstyrene	1540	18.8
Limonene	1029	Tr.	Dendrolasin	1573	1.0
1,8-Cineole	1031	0.1	Spathulenol	1579	9.7
Benzeneacetaldehyde	1042	Tr.	Salvial-4(14)-en-1-one	1593	0.6
Linalool	1101	Tr.	Humulene epoxide II	1608	0.4
Nonanal	1104	Tr.	6,10,14-Trimethyl 2-pentadecanone	1845	0.3
Camphor	1142	Tr.	Hexadecanoic acid	1976	0.8
Terpinen-4-ol	1177	Tr.	Eicosane	2000	4.0
α-Terpineol	1191	Tr.			
Decanal	1203	Tr.	Oxygenated aliphatic hydrocarbons		1.2
Presilphiperfol-7-ene	1339	0.5	Aliphatic hydrocarbons		4.0
β-Maaliene	1379	9.0	Monoterpene hydrocarbons		-
α-Isocomene	1386	0.7	Oxygenated monoterpenes		0.1
β-Isocomene	1405	0.4	Sesquiterpene hydrocarbons		45.5
trans-α-Bergamotene	1432	Tr.	Oxygenated sesquiterpenes		12.0
epi-β-Santalene	1445	Tr.	Others		18.8
α-Humulene	1453	Tr.	Total		81.6

Tr.: trace (<0.05%).

RI: retention indices relative to C_8-C_{28} *n*-alkanes on HP_5. The componenets are listed in order of elution from the HP-5 column.

ACKNOWLEDGMENT

This work was supported by a grant from Iran National Scientific Funding (Grant No. 84085).

REFERENCES

1. D. J. Mabberley, *The Plant Book, A Portable Dictionary of the Higher Plants*, Cambridge University Press, Cambridge, 1990, p. 592.
2. V. Mozaffarian, *A Dictionary of Iranian Plant Names*, Farhang Moaser, Tehran, Iran, 2003, p. 560.
3. J. B. Harborne, V. H. Heywood, and N. A. M. Saleh, *Phytochemistry*, **9**, 2011 (1970).
4. C. A. Williams, J. Greenham, and J. B. Harborne, *Biochem, Syst. Ecol*., **29**, 929 (2001).
5. G. R. Amin, *Popular Medicinal plants of Iran*, Vol. **1**, Iranian Research Institute of Medicinal Plants, Tehran, Iran, 1991, p. 52.
6. E. Souri, P. Sarkhail, P. Kaymanesh, M. Amini, and H. Farsam, *Pharm. Biol*., **43**, 620 (2005).
7. G. Amin, A. Dehmoobed-Sharifabadi, M. S. Salehi Surmaghi, N. Yasa, Y. Aynechi, M. Emami, M. Shidfar, M. Amin, M. Moghadami, P. Kordbacheh, and F. Zeini, *Daru*, **10**, 38 (2002).
8. A. Yasar, O. Ucuncu, C. Gulec, H. Inceer, S. Ayaz, and N. Yayli, *Pharm. Biol*., **43**,108 (2005).
9. H. Van Den Dool, and P.D. Kratz, *J. Chromatogr.*, **11**, 463 (1963).
10. Y. Massada, *In Analysis of Essential oil by Gas Chromatography and Spectrometry*, Wiley, New York, 1976.
11. R. P. Adams, *Identification of Essential oil Components by Gas Chromatography*/ Quadrupole Mass Spectroscopy, Allured, Carol Stream IL, 2001.