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CHEMICAL COMPOSITION OF THE ESSENTIAL OIL OF *Urtica dioica*

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Urtica dioica herbs are a source of valuable biologically active constituents. They are used in folk medicine and nowadays are incorporated into many herbal medicinal preparations. In recent years the scientific literature has reported on the pharmacological effects of aqueous and organic extracts of nettle plant, such as its antioxidant [1–5], hypoglycemic [6, 7], antifungal [8], antiviral [9], and immunomodulatory [10, 11] activities. Nevertheless a detailed investigation of the essential oil of this plant has not been undertaken.

The present study was designed to elucidate the chemical composition of the essential oil from nettle growing wild in Romania.

The aerial parts of the plant were collected during the flowering stage (June, 2009) from the Dambovita region. A voucher specimen was stored in the Herbarium of the Faculty of Pharmacy, University of Medicine and Pharmacy "Carol Davila", Bucharest.

Two hundred grams of the air-dried aerial parts (leaves with 5% inflorescence) of the plant were hydrodistilled in a Clevenger-type apparatus with 300 mL water for 3 h. The separated oil was dried over anhydrous sodium sulfate and stored at 4°C until analysis by GC-MS.

TABLE 1. Percentage Composition of the Essential Oil of Aerial Parts of *Urtica dioica*

Compound	RI	%	Compound	RI	%
Benzaldehyde	964	0.29	α-Ionone	1421	4.04
3-Octanone	988	0.28	Geranyl acetone	1448	2.22
2-Pentylfuran	991	0.84	α-Humulene	1453	0.75
n-Octanal	1004	0.30	β-Ionone	1479	11.86
2,2,6-Trimethylcyclohexanone	1035	0.28	β-Selinene	1485	0.78
2-(1-Pentenyl)furan	1056	0.29	α-Selinene	1493	0.70
Nonanal	1105	0.59	β-Bisabolene	1506	0.39
3,5-Dimethyl-1,2,4-trithiolane	1134	0.30	γ-Cadinene	1510	1.57
Camphor	1145	0.27	δ-Cadinene	1516	2.37
Borneol	1171	0.31	β-Vetivenene	1532	0.49
Menthol	1178	0.29	α-Copaene-8-ol	1579	3.28
Decan-2-one	1192	0.28	5,6-Dihydro-4-pentyl-2,6-dimethyl-4*H*-1,3,5-dithiazine	1588	0.57
Safranal	1196	0.33			
2,4,6-Trimethyl-5*H*-1,3,5-dithiazine	1199	0.30	Isopropyl dodecanoate	1627	5.27
Decanal	1206	0.29	Farnesol	1715	1.88
β-Cyclocitral	1217	0.35	Hexahydrofarnesylacetone	1844	31.20
β-Homocyclocitral	1254	0.28	Farnesylacetone	1908	1.26
Bornyl acetate	1283	2.14	Methyl palmitate	1925	0.28
Thymol	1292	0.60	Apoatropine	2093	0.82
Carvacrol	1299	0.30	Phytol	2110	11.20
α-Longipinene	1347	0.30	Total		91.79
β-Caryophyllene	1416	1.62			

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GC-MS analysis was carried out with a Fisons Instruments GC 8000 gas chromatograph equipped with an electron impact quadrupole MD 800 mass spectrometer detector, and a DB-5MS fused silica column based on a method published earlier [12, 13]. The identity of volatile oil components was established from their GC Kovats retention indices and from mass spectra by computer matching with the mass spectra library (Adams, NIST, and Wiley).

The yield of the essential oil was 0.01% (w/w) relative to the dried material.

Forty-one compounds were identified in the essential oil of nettle, accounting for 91.79% (Table 1).

The essential oil consists mostly of carbonyl compounds, their total content reaching 54.12% (hexahydrofarnesylacetone 31.20%, α-ionone 4.04%, β-ionone 11.86%, and farnesylacetone 1.26%). The acyclic monosatured diterpene alcohol phytol (widely distributed in plants as a constituent of chlorophyll molecules) was found in nettle oil with a content of 11.20%. Monoterpenic hydrocarbons were not detected, while the total content of sesquiterpenic hydrocarbons accounted for 8.97% of the total oil.

REFERENCES

1. A. Pieroni, V. Janiak, C. M. Durr, S. Ludeke, E. Trachsel, and M. Heinrich, *Phytother. Res.*, **16**, 467 (2002).
2. T. C. Matsingou, M. Kapsokefalou, and A. Safiloglou, *Free Radic. Res.*, **35**, 593 (2001).
3. I. F. Abdullin, E. N. Turova, G. K. Gaisina, and G. K. Budnikov, *J. Anal. Chem.*, **57**, 557 (2002).
4. I. Gulcin, I. Kufrevioglu, M. Oktay, and M. E. Buyukokuroglu, *J. Ethnopharmacol.*, **90**, 205 (2004).
5. A. Kamkar, M. Monfared, A. J. Javan, F. Asadi, and A. Aknodzadeh, *Asian. J. Food Agro-Ind.*, **3** (5), 491 (2010).
6. B. Farzami, D. Ahmadvand, S. Vardasbi, F. J. Majin, and S. Khaghani, *J. Ethnopharmacol.*, **89**, 47 (2003).
7. M. Bnouham, F. Z. Merhfour, A. Ziyyat, H. Mekhfi, M. Aziz, and A. Legssyer, *Fitoterapia*, **74**, 677 (2003).
8. I. Hadizadeh, B. Peivastegan, and M. Kolahi, *Pakistan J. Biol. Sci.*, **12** (1), 58 (2009).
9. R. E. Uncini Manganelli, L. Zaccaro, and P. E. Tomei, *J. Ethnopharmacol.*, **98**, 323 (2005).
10. P. Rovira, M. Buckle, J. P. Abastado, W. J. Peumans, and P. Truffa-Bachi, *Eur. J. Immunol*., **29**, 1571 (1999).
11. T. Ozen and H. Korkmaz, *Acta Pol. Pharm. Drug Res.*, **66** (3), 305 (2009).
12. V. Radulescu, S. Chiliment, and E. Oprea, *J. Chromatogr. A*, **1027**, 121 (2004).
13. E. Oprea, V. Radulescu, C. Balotescu, V. Lazar, M. Bucur, P. Mladin, and I. C. Farcasanu, *BioFactors*, **34**, 3 (2008).