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The Composition of Fatty Acids in *Hypericum scabrum*, *H. scabroides* and *H. amblysepalum*

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The chemical composition of the fatty acid methyl esters (FAMEs) of flowering tops of *Hypericum scabrum*, *H. scabroides* and *H. amblysepalum* were identified by gas chromatography. In this work 5 FAMEs for *H. scabrum*, 9 FAMEs for *H. scabroides* and 8 FAMEs for *H. amblysepalum* were identified.

The major components were alpha-linolenic (48.60%), linoleic (32.53%) and oleic (11.45%) acids in *H. scabrum*. Alpha-linolenic (29.84%), palmitic (27.90%) and oleic (16.49%) acids were present in *H. scabroides* and alpha linolenic (41.79%) and palmitic acids (32.28%) were found in *H. amblysepalum*.

Key Words: *Hypericum scabrum, H. scabroides, H. amblysepalum,* fatty acids, gas chromatography.

Introduction

The genus *Hypericum (Guttiferae)* is composed of shrubs or herbs usually with translucent glands containing essential oils and sometimes red or black glands containing hypericine[1]. *Hypericum* species are medicinal plants known as healing herbs. The whole plant extract has antidepressive effects on neurotransmitter levels in the brain[2]. The antidepressive[3], anticarcinogenic[4] and antimicrobial[5] activities of these plants are currently under investigation.

Hypericum species have been used in Turkish traditional medicine for their sedative, antihelminthic and antiseptic effects for many years[6]. Furthermore, the infused oil of these plants has also been used to treat depression, burns, wounds, bruises and various forms of pain[7].

The recent surge of interest in the chemistry of the genus has led to the isolation of more than 100 components with different biological activities[8–10].

In spite of many works on its chemical constituents, very little is known about the fatty acid composition of this genus. In previous works, palmitic, linoleic and linolenic acids were found to be major components of the fatty acid composition of some *Hypericum* species[11,12].

Chemical investigations showed that some benzoylphloroglucinol derivatives were present in *Hypericum scabrum*[13]. Alpha-pinene, spathulenol, para-cymene, acetophenone and carvacrol were the main essential oil constituents isolated from *H. scabrum*[14].

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The purpose of this work was to evaluate the fatty acids of *H. scabrum*, *H. scabroides* and *H. amblysepalum* by means of gas chromatography (GC).

Experimental

Materials: The flowering tops of *Hypericum scabrum* L., *H. scabroides* (Robson & Poulter) and *H. amblysepalum* Hochst. were collected from south-eastern Anatolia (Turkey) in June 2001, and were identified by Dr.A. Selçuk Ertekin (Dicle University). Voucher specimens (No: DUF-256, DUF-154 and DUF-211 respectively) are deposited in the Herbarium of the Department of Biology, Faculty of Sciences, Dicle University, Diyarbakır (Turkey).

Isolation and Transmethylation of Fatty Acids: The isolation and transmethylation of fatty acids were performed according to a method described by Graces and Mancha[15]. The flowering tops of fresh plant parts (10 g) were heated with the following reagent: methanol:heptane:tetrahydrofuran:2,2-dimethoxypropane:H_2SO_4 (37:36:20:5:2, by vol.). At 80 °C, the simultaneous digestion and lipid transmethylation parts took place in the same phase. After cooling the mixture at room temperature, the upper phase was collected for GC analysis.

The fatty acid methyl esters (FAMEs) were analysed by GC using an Ati Unicam 610 gas chromatograph equipped with a SP-2330 Supelco capillary column (0.25 mm x 30 M, 0.2 μm film thickness), a flame ionisation detector and a Unicam 4815 recording integrator. The separations were conducted with temperature programming from 180 °C to 200 °C at 5 °C/min, after an initial 2 min hold. FAMEs were identified by comparing the retention times of the signals with those of authentic pure standards (Sigma Chemical Co., St. Louis, Missouri).

Results and Discussion

In this paper, we described the fatty acid compositions of *H. scabrum*, *H. scabroides* and *H. amblysepalum*. The overall fatty acid profiles of these plants are consistent with those generally observed in other *Hypericum* species[11,12]. The major saturated and monounsaturated components including palmitic, stearic and oleic acids are shown in the Table. The major polyunsaturated fatty acids (PUFAs) were linoleic and alpha-linolenic acids. There were some differences in the fatty acid profiles of the studied *Hypericum* species. Lauric, myristic, palmitoleic and eicosanoic acids were detected only in *H. scabrum* and in *H. amblysepalum*, while *H. scabroides* contained more palmitic acid (28 vs. 5%), stearic acid (9 vs. 2%) and oleic acid (16 vs. 11%) and less linoleic (12 vs. 33%) and alpha-linolenic acid (30 vs. 49%) than *H. scabrum*. The overall profile of *H. scabrum* is similar to that of *H. amblysepalum*, with high ratios of alpha-linolenic acid. *H. scabrum* has the highest level of PUFA (81%), due to their high level of linoleic (32.5%) and alpha-linolenic acids (48.6%). Alpha-linolenic acid is a omega-3 fatty acid, ranging from 8 to 29% in previous studies on some *Hypericum* species[11,12].

The ratios of SFA (saturated fatty acid)/UFA (unsaturated fatty acid) were 0.08, 0.67 and 0.76 in *H. scabrum, H. scabroides* and *H. amblysepalum,* respectively. *H. scabrum* had a higher proportion of UFA compared to *H. scabroides* and *H. amblysepalum.*

Table. The ratios of fatty acid to total fatty acid and fatty acid percentages of *H. scabrum, H. scabroides* and *H. amblysepalum**.

Fatty Acid	*H. scabrum*	*H. scabroides*	*H. amblysephalum*
Lauric acid	-	1.12 (0.08)	1.09 (0.06)
Myristic acid	-	1.46 (0.09)	1.96(0.07)
Palmitic acid	5.06 (0.20)	27.90 (0.68)	32.28 (0.82)
Palmitoleic acid	-	1.65 (0.12)	2.08(0.05)
Stearic acid	2.36 (0.06)	9.44 (0.63)	7.78 (0.74)
Oleic acid	11.45 (0.42)	16.49 (0.72)	5.09 (0.32)
Linoleic acid	32.53 (0.73)	11.75 (0.47)	7.93 (0.82)
Linolenic acid	48.60 (1.07)	29.84 (0.69)	41.79 (1.12)
Arachidic acid	-	0.35(0.04)	-
SFA/UFA	0.08 (0.02)	0.67 (0.3)	0.76 (0.4)

SFA: saturated fatty acid; UFA: unsaturated fatty acid.
*for the average data of 5 analyses,
- not detected.

References

1. N.K.B. Robson, *Hypericum* in: P.H. Davis (editor), "**Flora of Turkey and the East Aegean Islands**" Vol. 2, pp 355-401, University Press, Edinburgh, 1967.
2. H.H. Bloomfield, M.D. Nordfors and P. McWilliams, ***Hypericum* and Depression**, 110-112, Prelude Press, California (1996).
3. C. Stevenson and E. Edzard, **Drugs**, **11**, 125-132 (1999).
4. A.R. Kamuhabwa, P. Agostinis, M. D'Hallewin, A. Karsan and P. De Witte, **Anticancer Res.**, **20**, 2579-2584, (2000).
5. A. Sokmen, B.M. Jones and M. Erturk, **Phytoter. Res.**, **13**, 355-357, (1999).
6. T. Baytop, **Therapy with Medicinal Plants in Turkey**, İstanbul University Press, İstanbul. 185-186, 1984.
7. T.R. Payk, **J. Geriatry Neurol.**, Suppl **1**, 3-5 (1994).
8. W. Quing-Li, W. Sheng-Ping, D. Li-Jun, Y. Jun-Shan and X. Pei-Gen, **Phytochem.**, **49**, 1395-1402 (1998).
9. H. Li-Hong and S. Keng-Yeow, **Tetrahedron**, **56**, 1379-1386 (2000).
10. O. Ploss, F. Petereit and A. Nahrstedt, **Pharmazie**, **56**, 509-511 (2001).
11. F.D. Gunstone and G.M. Taylor, **Phytochem.**, **6**, 1297-1298, (1967).
12. M. Girzu, A.P. Carnat and J.L. Chabard, **Ol. Corps Gras Li.**, **2**, 317-318, (1995).
13. M. Matsuhisa, Y. Shikishima, Y. Takaishi, G. Honda, M. Ito, Y. Takeda, H. Shibata, T. Higuti, O.K. Kodzhimatov and O. Ashurmetov, **J. Natur. Prod.**, **65**, 290-294, (2002).
14. A. Çakir, M.E. Duru, M. Harmandar, R. Criminna, S. Passannanti and F. Piozzi, **Flavour Fragr. J.**, **12**, 285-287, (1997).
15. R. Garces and M. Mancha, **Anal. Biochem.**, **211**, 139-143, (1993).