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Seasonal Variability of Essential Oil Content of *Pituranthos scoparius*

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Pituranthos scoparius, a native plant in North Africa was reinvestigated for its oil content using the ordinary GC-MS analysis. More than 39 compounds were identified. Analysis revealed that its oil content is time dependent. In fact, essential oil concentrations, yields, percentage of the principle components of the aerial parts were determined using two samples collected on early February and late April, respectively. The results showed important fluctuations both quantitatively and qualitatively.

Key Words: Essential oils, *Pituranthos scoparius*, GC-MS Analysis.

INTRODUCTION

Aromatherapy makes use of essential oils extracted from aromatic plants. These oils can enhance health and beauty and can also influence the mind and emotions. Essential oils may be used against acetyl- and butyrylcholinesterase[1], antibacterial[1], antifungal[3], antimicrobial[4-6]. They have also been reported to have antioxidative properties[7], fungitoxic activity[8], cytotoxic and apoptotic effects[9], *etc*.

The genius *Pituranthos* (family umbelliferae) involves more than 20 different species[10]. It is a widespread plant characterized by much ramified stems almost without leaves and with small fruits. *Pituranthos scoparius* is a native plant in North Africa especially in Algeria. It is a medicinal plant used for many purposes especially to treat asthma by inhaling its vapour. Its essential oils have been reported to have many healing effects such as antispasmodic. Phytochemical studies have been conducted on some species namely *P. triradiatus* and *P. tortuostus* as far as the coumarins, flavonoids and sterols are concerned[11,12]. *P. scoparius* has been studied for is essential oil[13]. In the present study we intend to find out the effect of harvesting time on the essential oil content of *P. scoparius* by carrying out the analyses of two samples collected in early February and late April, respectively.

EXPERIMENTAL

Aerial parts were collected on February and April in 2007 in the outskirts of Ghardaia (500 km south of Algiers). Voucher specimens were deposited in the herbarium in the VPRS laboratory at Ouargla University. 1 kg of each sample was dried under shade and subjected to hydrodistillation procedure as described in many references to give 2.5 g (0.25 %) and 3.0 g (0.3 %) of essential oil, respectively.

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Gas chromatography/mass spectrometry (GC/MS): The oil was analyzed by GC/MS using a Agilent 5973EI mass selective detector coupled with a Agilent GC6890A gas chromatograph, equipped with a cross-linked 5 % PH ME siloxane HP-5MS capillary column (30 m × 0.25 mm, film thickness 0.25 μm). Operating conditions were as follows: carrier gas, helium with a flow rate of 1 mL/min; column temperature 50 °C for 1 min, 50-150 °C (3 °C/min), 150-250 °C (5 °C/min) then isothermal for 5 min. Injector and detector temperatures, 280 ºC; split ratio, 1:50. The MS operating parameters were as follows: ionization potential, 70 eV; ionization current, 2 A; ion source temperature, 200 ºC; resolution, 1000.

Identification of oil components was achieved based on their retention indices RI, determined with reference to a homologous series of normal alkanes) and by comparison of their mass spectral fragmentation patterns with those reported in the literature[14] and stored on the MS library (NIST database). The concentration of the identified compounds was computed from the GC peak area without any correction factor.

RESULTS AND DISCUSSION

Hydrodistillation of the dried aerial parts of *Pituranthos scoparius* collected in early February (sample 1) and late April (sample 2) gave light yellowish oils. The two oils were analyzed separately to highlight their oil content. The two samples GC/MS analyses are illustrated in Table-1.

The chemical profiles showed notable quantitative and qualitative differences. The relative percentages of monoterpenes, sesquiterpenes and their oxygenated forms are illustrated above. Regarding the composition of the oils, significant differences were found in the amount of monoterpenes (42.5-53.1 %), oxygenated mono-

TABLE-1
COMPOSITION OF THE AERIAL PARTS ESSENTIAL OILS

Compound	Sample 1	Sample 2
α-Thujene	–	0.5
Cyclofenchene	3.6	1.5
Camphene	–	1.6
Verbenine	–	tr
Tricyclene	0.6	–
α-Pinene	2.9	7.6
β-Pinene	3.7	4.2
α-Phellanadrene	2.2	9.3
γ-Terpinene	2.4	0.4
β-Myrcene	–	1.2
δ-Carene	0.7	0.5
p-Cymene	5.2	7.1
Limonene	8.5	10.3
1-Cyclohexyliden-2-methylpropene	9.9	8.6

α-Terpinolene	2.7	0.8
α-Pyronene	0.1	–
Pinocarveol	–	0.6
Terpinen-4-ol	0.1	0.8
Bornyl acetate	0.1	0.6
γ-Elemene	0.2	0.2
Germacrene D	0.1	–
α-Copaene	1.3	1.4
t-Muurolene	1.1	2.8
Thymol	4.8	6.1
4-Acetyl-2-nitroazidobenzene	2.2	1.6
3,7-Guaiadiene	0.6	–
β-Cubebene	4.6	0.9
Bicyclogermacene	1.4	–
δ-Cadinene	2.6	–
Myristicin	12.1	9.8
Spathulenol	0.3	1.5
Propenal	3.7	2.2
Muurolol	2.1	1.2
β-Eudesmol	3.2	5.1
Butylidene phtalide	0.8	–
7-Methoxy-3-methyl-1*H*-isochromen-1-one	10.6	6.2
Butylidene dihydro-phtalide	0.4	–
α-Phellanadrene epoxide	–	2.1

	Sample 1	Sample 2
% Identification	94.8	96.7
Monoterpene hydrocarbons	42.5	53.6
Oxygen-containing monoterpenes	05.0	10.2
Sesquiterpene hydrocarbons	12.7	06.3
Oxygen-containing sesquiterpenes	03.8	06.8
Other derivatives	30.8	19.7

terpenes (5.0 -10.2 %), sesquiterpenes (12.7-6.3 %). Sample 1 contains a high content of sesquiterpenes in contrast to sample 2 which involves more monoterpenes. The major constituents of sample 1 were myristicin (12.1 %), 7-methoxy-3-methyl-1*H*-isochromen-1-one (10.6 %) and 1-cyclohexyliden-2-methylpropene (6.6 %). On the other side sample 2 contains more limonene (10.3 %), α-phellanadrene (9.3 %) and α-pinene (7.6 %). Some compounds were shown to be present only in one or the other sample such as: α-phellanadrene epoxide, δ-cadinene, pinocarveol, β-myrcene and camphene.

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