ESSENTIAL OIL COMPONENTS OF *Hypericum hircinum* subsp. *majus* (Aiton) N. Robson GROWING IN HATAY (TURKEY) FLORA

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Essential oils obtained by hydrodistillation of *Hypericum hircinum* subsp. *majus* (Hypericaceae) from Hatay (Turkey), were analyzed by GC/MS. Forty volatile components were identified in the oils, representing 93.95 % of the total oils. The major components were α -guaiene (43.23 %), 1-Gurjunene (8.77 %), β -Farnesene (4.59 %), Limonene (4.38 %), nonane (4.38 %) and Valencene (4.07 %).

Keywords: *Hypericum hircinum* subsp. *majus*, essential oils, GC/MS, Hatay

INTRODUCTION

Hypericum hircinum subsp. *majus* (Aiton) N. Robson, described as “Shrub form, 20-70 (-150) cm. Leaves 2-6.7(-7.5) cm, sessile or subsessile, narrowly lanceolate to broadly ovate, acute to rounded or apiculate, when crushed often smelling of goats. Sepals 3-7 mm, somewhat unequal, ovate-lanceolate to narrowly oblong, deciduous after flowering. Petals 15-25 mm, narrowly oblanceolate to narrowly obovate. Stamens exceeding petals. Styles 3-5 x longer than the ovary. Fruit capsular, 8-13 mm, ellipsoid to subcylindric, subcoriaceous, persistent. Damp, shady places often beside streams, 100-600 m and Mediterranean element” (Davis, 1967).

The Hypericum genus belongs to the Clusiaceae family and the Hypericaceae subfamily and covers about 400 species worldwide (Altan *et al.*, 2015). Turkey is an important center for Hypericum species, having about 96 species from which 46 of them are endemic (Guner *et al.*, 2012).

Hypericum species have been used for centuries as a healing herb in the relief of pain caused by nervous diseases, menstrual cramps, sciatica, joint inflammation and midwife disorders, and in the treatment of certain skin diseases (Cırak and Kevseroglu, 2004). Hypericum is considered a valuable herbal medicine by people.

The aims of this work were to investigate chemical composition of the *Hypericum hircinum* subsp. *majus* (Aiton) N. Robson essential oil growing in Hatay (Turkey).

MATERIALS AND METHODS

Plant Materials

Hypericum hircinum subsp. *majus* (Aiton) N. Robson plants were harvested in Hatay province of Turkey during the full bloom period (June), when the amount of active substance was most intense and then was dried in the shade at room temperature.

Preparation of Essential Oil

Plant material was weighted and placed in a round bottom flask with a volume of distilled water as extraction solvent; the herba-water mixture was refluxed about 2 h, after that the oil being collected in the side arm of the system. The installation was allowed to stand for about half of hour to prevent the oil to reach room temperature. The

oil was dried onto anhydrous sodium sulphate and then stored in dark color glass bottles and kept to refrigerator (about 4 °C) until its using to be analyzed.

GC/MS Analysis

Analysis of essential oil was performed using the Thermo Scientific Focus gas chromatograph equipped with a DSQ II single quadrupole mass spectrometer, Triplus autosampler and fused-silica capillary column TR-5MS (5% phenyl-polysilphenylene-siloxane, 30 m×0.25 mm inner diameter, film thickness 0.25 µm). The injection volume was 2 µL. The samples were injected with a split ratio of 250:1 by using helium (99.99%) as carrier gas, at a flow rate of 1 mL/min; ionization energy was 70 eV. The transfer line temperature of the mass spectrometer was 220°C, while the temperature of orifice injection was of 220°C. The temperature of oven was programmed in the range 50–220°C at a rate of 3°C/min. Data acquisition was made in the scanning mode. Identification was done on full scan mode in the m/z range of 50–650 a.m.u.

RESULTS

In this study we report the chemical composition of the essential oils hydrodistilled from *Hypericum hircinum* subsp. *majus* (Aiton) N. Robson plant that grown in Hatay flora in Turkey and analyzed by GC-MS. Forty volatile components were identified in the essential oils of *Hypericum hircinum* subsp. *majus* (Aiton) N. Robson (Figure 1, Table 1).

The components and component ratios of the essential oil obtained from the *Hypericum majus* plant naturally growing in Hatay are presented in Table 1. As evidenced in Table 1, the main component, α -Guaiene constitutes 43.23 % of the essential oil, and is followed by ι -Gurjunene with 8.77 %, β -Farnesene with % 4.59, Limonene (4,38 %), nonane (4,38 %) and Valencene (4,07 %).

Figure 1. GC/MS chromatogram of *Hypericum hircinum* subsp. *majus* (Aiton) N. Robson

Table 1. Essential oil components of *Hypericum hircinum* subsp. *majus* (Aiton) N. Robson

RT	Compound Name	SI	RSI	Cas #	Area %
2,36	Nonane	981	985	111-84-2	4,38
4,93	Undecane	960	978	1120-21-4	0,55
7,47	Limonene	977	983	5989-54-8	4,38
13,67	3-Hexen-1-ol	865	923	928-96-1	0,22
16,31	2-Decen-1-ol	642	774	22104-80-9	0,26
18,10	Decanal	912	954	112-31-2	0,45
18,55	β -Bourbonene	679	803	5208-59-3	0,21
20,81	2-Pentadecyn-1-ol	777	868	2834-00-6	0,34
21,37	Elemene	911	930	515-13-9	0,38
21,47	trans-Caryophyllene	966	979	87-44-5	2,54
21,82	Aromadendrene	750	824	489-39-4	0,31
22,16	Eremophilene	878	894	10219-75-7	1,05
22,66	α -Ionol	807	864	25312-34-9	1,74
23,13	α -Guaiane	920	922	3691-12-1	43,23
24,00	Sativen	857	872	3650-28-0	0,79
24,41	β -Farnesene	939	958	502-60-3	4,59
24,94	Valencene	896	910	4630-07-3	0,71
25,15	Ledene	607	675	21747-46-6	0,29
25,39	β -Chamigrene	872	894	18431-82-8	1,10
25,58	ι -Gurjunene	977	981	489-40-7	8,77
25,96	Valencene	959	964	4630-07-3	4,07
26,16	α -helmiscapene	917	935	473-13-2	2,00
26,52	bicyclogermacrene	938	948	100762-46-7	2,61
26,62	trans- α -Bergamotene	807	908	17699-05-7	0,35
27,51	germacrene A	940	962	28387-44-2	1,89
34,92	Caryophyllene oxide	727	836	1139-30-6	0,27
35,67	spathulenol	532	657	77171-55-2	0,31
37,44	trans- β -Ionone	692	730	14901-07-6	0,27
38,29	Globulol	671	757	51371-47-2	0,29
38,64	Calarene	578	724	17334-55-3	0,24
39,61	Spathulenol	801	860	77171-55-2	0,40
39,77	3-Hexen-1-ol, benzoate	841	943	25152-85-6	0,36
40,01	Veridiflorol	614	690	552-02-3	0,27
42,74	β -Eudesmol	674	801	473-15-4	0,20
43,44	Ledol	895	901	552-02-3	2,39
44,19	Veridiflorol	728	798	552-02-3	0,48
50,28	Undecanoic acid	636	707	112-37-8	0,24
50,59	Docosane	543	572	629-97-0	0,24
	Hexadecanoic acid,				
53,19	2-hydroxy-1,3-propanediyl ester	546	592	502-52-3	0,26
55,75	Decyltetraglycol	646	765	NA	0,52

In previous research Maggi *et al.* (2010) studied the chemical composition and antimicrobial activity of *Hypericum hircinum* L. subsp. *majus*. In the study, they found that the major compounds of *Hypericum hircinum* L. Subsp. *majus* essential oil were cis- β -guaiane (23.25–41.23%) and - β -selinene (8.48–25.20%). Quassinti *et al.* (2012), when analyzed essential oil of *Hypericum hircinum* L. subsp. *majus* plant found that β -guaiane, δ -selinene and (E)-caryophyllene were the most representative. Our results varying according to the study conducted that previous studies.

DISCUSSION AND CONCLUSIONS

In our study; α -Guaiene constitutes, ι -Gurjunene and β -Farnesene were found to be the most abundant essential oil components. Different researchers have identified different components in the same plant species they collecting at different locations (Maggi *et al.*, 2010; Quassinti *et al.*, 2012). This means that different types of essential oil components can be found in the same species of plants in natural flora and that the essential oil components can be change at different locations.

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