

Original Article

Flower Essential Oil of *Hymenocrater platystegius* Rech. f., a Labiate Herb Indigenous in Iran

Open Access

Hashem Akhlaghi^{1*}

¹Hashem Akhlaghi, Department of Basic Sciences, Islamic Azad University, Sabzevar Branch, Sabzevar, Iran

Abstract

The hydrodistilled essential oil from flowers of *Hymenocrater platystegius* Rech. f., which is endemic to Iran, was analyzed by GC and GC/MS. Twelve compounds representing 80.4% of the flowers oil of *H. platystegius* were identified. This oil was particularly rich in α -pinene (25.8%) and limonene (20.9%); another major component of the oil was β -pinene (12.2%).

Keywords: *Hymenocrater platystegius*, Labiatae, essential oil composition, α -pinene, limonene.

*Corresponding author: Hashem Akhlaghi, Department of Basic Sciences, Islamic Azad University, Sabzevar Branch, Sabzevar, Iran

Email address: sh_akhlaghi@iaus.ac.ir

INTRODUCTION

Nine species of the genus *Hymenocrater* are found in Iran: four are endemic [1,2]. One of these is *H. platystegius*, which occurs in Khorasan Province, northeastern Iran.

Hymenocrater spp. are low shrubs and perennial herbs [3]. There are only a few reports on the essential oils content of members of this genus [4-6]. In one of these studies, the hydrodistilled oil from the aerial parts of *H. elegans* Bunge was found to contain mostly spathulenol (49.5%) and caryophyllene oxide (12.9%) [4]. In another study, the hydrodistilled oils were obtained from the aerial parts of *H. calycinus* Boiss. collected from three different locations in northeastern Iran: Bojnourd village of Yekeh-Shakh (sample A), Nodeh village (sample B) and the Golestan forest (sample C). The major constituents were α -Pinene (10.5%) and sabinene (10.5%) in sample A, spathulenol (35.4%) and abietatriene (13.4%) in sample B and β -caryophyllene (32.8%) and caryophyllene oxide (16.1%) in sample C [5].

This study deals with the analysis of the oil isolated from flowers of *Hymenocrater platystegius* Rech. f. which grows wild in Iran.

EXPERIMENTAL

Plant material:

Hymenocrater platystegius, the Labiatae species, was collected during the flowering stage near Afchang village, north of Sabzevar, Khorasan Province, in May 2012 at an altitude of 1640 m.

Voucher specimens have been deposited at the Herbarium of the Research Center of Natural Resources, Sabzevar, Iran.

Oil isolation:

The air-dried flowers of *H. platystegius* was subjected to hydrodistillation for 3h using a Clevenger-type apparatus. After decantation,

the oils were dried over anhydrous sodium sulfate, and recovered in a yield of 0.03% (w/w).

GC Analysis:

GC analyses were performed on a Shimadzu GC-15A equipped with a split/splitless injector (250 °C). N₂ was used as carrier gas (1 mL/min). The capillary column used was a DB-5 (50 m × 0.2 mm; film thickness, 0.32 μ m). The column temperature was kept at 60 °C for 3 min and then heated to 220 °C at a rate of 5 °C/min, after which it was kept constant at 220 °C for 5 min. Relative amounts were calculated from peak areas using a Shimadzu C-R4A Chromatopac program, without the use of correction factors.

GC/MS Analyses:

GC/MS Analyses were performed using a Hewlett-Packard 5973 with a HP-5MS column (30 m × 0.25 mm; film thickness, 0.25 μ m), with a split ratio of 30:1, a scan time of 1.56 min and a mass acquisition range of 41-300 amu. The column temperature was kept at 60 °C for 3min and programmed to 220 °C at a rate of 5 °C/min, after which it was kept constant at 220 °C for 5 min. The flow rate of helium carrier gas 1mL/min. The ionization voltage was 70 eV. Each oil constituent was identified by comparison of its mass spectra and retention index (RI) with those given in the literature and those of authentic samples [7].

RESULTS AND DISCUSSION

The composition of the oil of the flowers of *H. platystegius* are shown in Table I, which lists the percentage yields of the components found and their retention indices. As can be seen, twelve components representing 80.4% of the flowers oil of *H. platystegius* were identified. The major components of the oil

were α -pinene (25.8%) and limonene (20.9%). The other sizable component was β -pinene (12.2%). These results can be compared to those for the oil of *H. platystegius* (from Iran), namely, spathulenol (17.1%), α -pinene (16.7%) and 1,8-cineole (12.9%) for the leaf oil and α -pinene (18.6%), spathulenol (17.9%) and cis-calamenene (11.2%) for the stem oil (6). As also can be seen from Table I, the monoterpene hydrocarbons fraction in flowers oil of *H. platystegius* contains four compounds

Table 1: Retention indices and percentages of components in the flowers oil of *Hymenocrater platystegius*

Compound	RI	%
α -pinene	939	25.8
β -pinene	980	12.2
limonene	1026	20.9
1,8-cineole	1033	3.1
γ -terpinene	1054	2.6
linalool	1098	1.0
α -copaene	1374	0.1
β -caryophyllene	1418	3.2
β -gurjunene	1440	2.8
germacrene D	1480	3.3
α -muurolene	1500	4.5
γ -cadinene	1513	0.9
Total		80.4

RI: relative retention indices as determined on a DB-5 column using the homologous series of *n*-alkanes.

comprising 61.5%. In addition, two oxygenated monoterpenes account for 4.1% of the oil and six sesquiterpene hydrocarbons account for 14.8%.

ACKNOWLEDGEMENT

We are grateful to Dr. R. Laursen, Boston University for reviewing this article, his comments and dedicated handbook that is mentioned as reference (7).

REFERENCES

Rechinger, K.H. (1982). *Hymenocrater*, in: *Flora Iranica*, Labiatae, No. 150, K.H. Rechinger and I.C. Hedge (eds.), Akademische Druck and Verlagsanstalt, Graz, Austria.

Mozaffarian, V. (1996). *A Dictionary of Iranian Plant Names*. Farhange Moaser, Tehran, Iran.

Davis, P.H. (1982). *Flora of Turkey* Vol. 7, p. 293, Edinburgh, Scotland, UK.

Firouznia, A., Rustaiyan, A., Masoudi, S., Rahimzadeh M., Bigdeli, M., Tabatabaei-anaraki, M. (2009). Volatile constituents of *Salvia limbata* C.A.Mey., *Stachys turcomanica* Trautv., *Scutellaria litwinowii* Bornm. & Sint. ex Bornm. and *Hymenocrater elegans* Bunge, four Lamiaceae herbs growing wild in Iran. *J. Essent. Oil Bear. Plants*, 12(4), 482-489.

Firouznia, A., Rustaiyan, A., Nadimi, M., Masoudi, S., Bigdeli, M. (2005) Composition of the essential oil of *Hymenocrater calycinus* (Boiss.) Benth. From Iran. *J. Essent. Oil Res.*, 17, 527-529.

Masoudi, S. et al. (2009) Volatile Constituents of *Micromeria persica* Boiss., *Hymenocrater platystegius* Rech. f. and *Scutellaria pinnatifida* A. Hamilt. subsp. *pinnatifida*, Three Labiatae Herbs Growing Wild in Iran. *J. Essent. Oil Res.*, 21, 515-518.

R.P. Adams. (2007). *Identification of Essential Oil Compounds by Gas Chromatogra-*

Akhlaghi

phy/ Mass Spectrometry, 4th ed., Allured
Publishing Corp., Carol Stream, IL.