

## Essential Oil Constituents of *Echinophora platyloba* DC.

Gholam Reza Asghari<sup>a\*</sup>, S. Ebrahim Sajjadi<sup>b</sup>, Hasan Sadraei<sup>b</sup>, Kh Yaghobi<sup>b</sup>

<sup>a</sup>Department of Pharmacognosy, Faculty of Pharmacy and Pharmaceutical Sciences Isfahan University of Medical Sciences, Isfahan, Iran. <sup>b</sup>Department of Pharmacology, Faculty of Pharmacy and Pharmaceutical Sciences, Isfahan University of Medical Sciences, Isfahan, Iran.

---

### Abstract

The hydrodistilled oil of the aerial parts of *Echinophora platyloba* DC. was analyzed by GC and GC/MS. Ten components have been identified, of which the major constituents were found to be trans- $\beta$ -ocimene (67.9%), 2-furanone (6.2%), myrcene (6.0%), linalool (3.1%), and cis- $\beta$ -ocimene (2.3%).

**Keyword:** *Echinophora platyloba*; Umbelliferae; Essential oil composition; Trans- $\beta$ -ocimene.

---

### Introduction

The genus *Echinophora* is (Umbelliferae, subfamily Apioideae, tribe Echinophoreae) represented in the flora of Iran by four species including two endemics (1-3). These are: *E. sibthorpiana* Guss., *E. orientalis* Hedge et Lamond and two endemic species, which are *E. platyloba* DC. and *E. cinerea* (Boiss.) Hedge et Lamond (2). In Iran, fresh and dried aerial parts of some of these species are added to cheese and yoghurt for flavoring. The genus *Echinophora* has been the subject of scant phytochemical and biological investigations. *E. platyloba* is locally known as "Khosharizeh" (2). A view of literature has not revealed any previous work on the oil of *E. platyloba*. However, oils from other *Echinophora* species have been the subject of several studies (4-11). The plant is one of the Iranian endemic species, which could be found in some central and western provinces of the country (12).

### Experimental

#### Collection of plant materials

Aerial parts of the plant were collected from Alvand Mountain, Golpaygan-Khomein Road,

at an altitude of 1750 m on June 1999. Voucher specimens of the plant (E25) are available at the Herbarium of the Faculty of Pharmacy and Pharmaceutical Sciences, Isfahan University of Medical Sciences, Isfahan, I.R. Iran.

Air-dried aerial parts of *E. platyloba* were ground and subjected to hydrodistillation for 4 h, using Clevenger-type apparatus.

#### Analysis

Gas chromatography analysis was carried out on a Perkin-Elmer 8500 gas chromatograph with FID detector and a BP-1 capillary column (39 m x 0.25 mm; film thickness 0.25  $\mu$ m). The carrier gas was helium with a flow rate of 2 ml/min. The oven temperature for the first 4 min was kept at 60°C and then increased at a rate of 4°C/min until reached a temperature of 280°C. Injector and detector temperatures were also set at 280°C.

The mass spectra were recorded on a Hewlett Packard 6890 MS detector coupled with Hewlett Packard 6890 gas chromatograph equipped with a HP-5MS capillary column (30 m x 0.25 mm; film thickness 0.25  $\mu$ m). The gas chromatography condition was as mentioned above. The mass spectrometer condition was as follows: ionized potential 70eV and source temperature 200°C.

---

\* Corresponding author:

E-mail: asghari@pharm.mui.ac.ir

Identification of constituents present was based on computer matching against the library spectra (Wiley275L), built up using pure substances and components of known constituents, MS literature data and evaluation of fragmentation patterns of compounds and their confirmation by gas chromatography retention times (13). The percentage of essential oil composition was computed from gas chromatography peak areas, without using correction factors. A series of hydrocarbon standards (C<sub>9</sub>-C<sub>18</sub>) were also used to calculate Kovats indices from the gas chromatography analysis. Kovats indices were calculated by the Kovats equation. Identification was based on retention indices and comparison of mass spectra with the literature (13, 14).

### Results and Discussion

Results of chromatographic analysis of *E. platyloba* oil are presented in Table 1.

The identified constituents were 2-butenal, myrcene,  $\rho$ -cymene, limonene, cis- $\beta$ -ocimene, trans- $\beta$ -ocimene, linalool,  $\rho$ -mentha-1, 5, 8-triene, cis-3-hexenyl 2-methyl butanoate, and 2-furanone. Trans- $\beta$ -ocimene (67.9%) was the main constituent of the oil and the major components were 2-furanone (6.2%), myrcene (6.0%), linalool (3.1%), and cis- $\beta$ -ocimene (2.3%). Earlier reports indicated that *E. sibthorpiana* contains methyl eugenol and *E. lamondiana* contains  $\delta$ -3-carene as the major constituents of their oils (10, 11). In the *E. chrysantha* oil,  $\alpha$ -phellandrene was identified as the major compound (15).

The composition of *E. platyloba* oil was found to be rich in monoterpenes (83.5%), with a predominance of hydrocarbons (80.4%). The essential oil of *E. platyloba* could be considered

No.	Compound	Percentage	Retention Index
1	2-butenal	1.8	870
2	myrcene	6.0	989
3	$\rho$ -cymene	1.2	1021
4	limonene	1.5	1025
5	cis- $\beta$ -ocimene	2.3	1034
6	trans- $\beta$ -ocimene	67.9	1047
7	unknown	1.4	1095
8	linalool	3.1	1098
9	$\rho$ -mentha-1,5,8-triene	1.5	1127
10	unknown	2.2	1207
11	cis-3-hexenyl 2-methyl butanoate	2.0	1229
12	unknown	2.9	1271
13	2-furanone	6.2	1466

as a source of hydrocarbon monoterpenes, especially the trans- $\beta$ -ocimene

### Acknowledgment

This work was financially supported by the research council of the Isfahan University of Medical Sciences.

### References

- (1) Heywood VH. *Flowering Plants of the World*, Croom Helm, London (1985) 219-221
- (2) Mozaffarian V. *A Dictionary of Iranian Plant Names*, Farhang Moaser, Tehran (1996) 194-195
- (3) Mozaffarian V. *Plant Systematics*, Vol 2. Nashr Danesh Emrouz, Tehran (1994) 372
- (4) Tsukervanik I and Martynova K. Ethereal Oil of *Echinophora sibthorpiana*. *Acta Univ. Asiae Mediae Ser.* (1937) 6: 38
- (5) Tanker N, Sener B and Baerheim-Svendson A. Gas-liquid chromatographic research on the volatile oil of *Echinophora tenuifolia* subsp. *sibthorpiana* (Umbelliferae). *Ankara Ecz. Fak. Mec.* (1976) 6: 161-180
- (6) Kivanc M. Antimicrobial activity of "Cortuk" (*Echinophora sibthorpiana* Guss.) spice, its essential oil and methyleugenol. *Nahrung.* (1988) 32: 635-637
- (7) Akgul A and Chialva F. Constituents of the essential oil of *Echinophora tenuifolia* L. subsp. *sibthorpiana* (Guss.) Tutin from Turkey. *Flav. Fragr. J.* (1989) 4: 67-68
- (8) Baser KHC, Erdemgil FZ and Ozek T. Essential oil of *Echinophora tenuifolia* L. subsp. *sibthorpiana* (Guss.) Tutin. *J. Essent. Oil Res.* (1994) 6: 399-400
- (9) Baser KHC, Kurkcuoglu M, Malyer H and Bicakci A. Essential oil of six *Echinophora* species from Turkey. *J. Essent. Oil Res.* (1998) 10: 345-351
- (10) Ahmad VU, Jassbi AR and Sanei Chariat Pannahi M. Analysis of the essential oil of *Echinophora sibthorpiana* Guss. by means of GC, GC/MS and <sup>13</sup>C-NMR techniques. *J. Essent. Oil Res.* (1999) 11: 107-108
- (11) Baser KHC, Bicakci A and Malyer H. Composition of the essential oil of *Echinophora lamondiana* B. Yildiz et Z. Bahcecioglu. *J. Essent. Oil Res.* (2000) 12: 147-148
- (12) Rechinger K H. *Flora Iranica*, No. 162, Akademische Druke-u., Verlagsanstalt, Graz (1987) 72
- (13) Adams RP. *Identification of Essential oils by Ion Trop Mass Spectroscopy*, Academic Press, San Diego (1989)
- (14) Davies NW. Gas chromatographic retention indices of monoterpenes and sesquiterpenes on methyl silicon and Carbowax 20M phases. *J. Chromatogr.* (1990) 503: 1-24
- (15) Baser KHC. Essential oil of *Echinophora chrysantha* Freyn et Sint. *J. Essent. Oil Res.* (1996) 8: 433-43