

ESSENTIAL OILS OF *HERACLEUM PERSICUM* DESF. EX FISCHER LEAVES

FARAZ MOJAB*, ABDOLHOSSEIN RUSTAIYAN**, AMIR REZA JASBI**

*Department of Pharmacognosy, Faculty of Pharmacy, Shaheed-Beheshti University of Medical Sciences,

**Department of Chemistry, Sciences and Researches Campus, Islamic Azad University, Tehran, Iran

ABSTRACT

The leaves of *Heracleum persicum* Desf. ex Fischer (Syn. *H. glabrascens* Boiss. & Hohen, *H. pubescens* Rech.) (Fam. Apiaceae) were collected in July-August 1993 from Kandavan area in north of Tehran. The oil was extracted by hydrodistillation (0.13%) from leaves and was analyzed by GC, GC/MS and ¹H-NMR. The major component was trans-anethole (82.8%). Other components were β-pinene, p-cymene and terpinolene (monoterpenes), α-caryophyllene, α-bergamotene, α-farnesene, zingiberene, spathulenol (sesquiterpenes), cis-anethole, stragole, 2,5-dimethyl styrene (aromatic compounds), and β-springene (an aliphatic and hydrocarbonic diterpene). It is concluded that this oil is a source of trans-anethole.

Keywords: *Heracleum persicum*, Apiaceae, essential oil, trans-anethole, β-springene

INTRODUCTION

Heracleum genus has 10 species in Iran (1). *H. persicum* Desf. ex Fischer (Apiaceae) is an annual herb, indigenous to the Alborz region, the northern part of Iran, where it grows at an altitude ranging from 2000 to 3000 m (2). Its fruits are used commonly in Iran as spices, in the preparation of pickles and in folk medicine as carminative. Also the young shoots of this plant is used for the preparation of pickles. A search through the literature revealed that roots of *H. persicum* have been investigated for their content of furanocoumarins and five such compounds are isolated and identified (3). Another paper (4) deals with the presence of such compounds in leaves and seeds of this species and from the seeds six furanocoumarins were isolated, two of which were also found in the leaves. From the ether extracts of the fruits of *H. persicum* an aglycone was identified which revealed to be quercetin (5). The essential oil from fruits of *H. persicum* has been investigated by means of GLC and GC/MS. The oil contained about 95% of aliphatic esters, 4% of aliphatic alcohols and 1% of monoterpenes. Thirty seven esters and 17 monoterpenes were identified (6). The main aim of this article was identification and determination of the essential oil components of the *H. persicum* leaves.

MATERIAL AND METHODS

Leaves of *Heracleum persicum* Desf. ex Fischer were collected in Kandavan (80 km north of

Tehran) in July-August 1993. Voucher specimens were authenticated and then deposited in the Herbarium of the Department of Pharmacognosy, Shaheed-Beheshti University of Medical Sciences (Voucher No. 15).

The air-dried leaves of the plant were subjected to hydrodistillation for 4 h using a clevenger-type apparatus. Analysis instruments with following specifications were used: GC: Packard 439 (USA) with a CP Sil 5 CB column, 25m x 0.25 mm, film thickness 0.39 mm, temperature program: 60-220°C at 5° C/ min, carrier gas H₂ GC/MS: Varian 3700 (USA) with a CP Sil 5 CB column, 25m x 0.25 mm (film thickness 0.39 mm) combined with Varian MAT, 44 S, carrier gas He. The operation conditions were as above. The ionization voltage was 70 eV. ¹H-NMR: Varian (USA), spectrum measured in CDCl₃ in 25°C at 400 MHz with TMS as internal standard.

Identification of compounds was based on a comparison of their mass spectra with Standards (7). Confirmation of compound identities was achieved by their retention indices (8).

RESULTS AND DISCUSSION

Hydrodistillation of dried leaves of *H. persicum* in a clevenger-type apparatus yielded 0.13% yellowish color oil with a strong odor. The names of the components corresponding with the peak numbers are given in table 1, which also shows the percentage composition of the oil. As shown, about 95% (13 components) of the oil are identified and

there was a high content in aromatic compounds. The oil was rich of trans-anethole (82.8%), that has been previously reported in the oil of other *Heracleum* sp. leaves, such as *H. trachyloma* (9-10) and *H. lehmannianum* (11-14) as a major component.

Trans-anethol was the major compound of the oil, which was confirmed by the ¹H-NMR spectrum of the total oil. The spectrum was identical to that of literature (15). Three monoterpenes including β-pinene, *p*-cymene and terpinolene were identified. The latter has been reviously reported in the oil of

H. persicum fruits (6). Also, five sesquiterpenes detected in the oil of which β-springene (or geranyl geraniadiene) is previously reported in *Nicotiana tabacum* by GLC (16) and this is the second report of its existence in the plant kingdom.

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Table 1. Essential oil constituents of *Heracleum persicum* Desf. ex Fischer leaves (column: 25m CP Sil 5 CB)

No.	Compound	%	Retention times	Retention indices	Methods of identification
1	β-Pinene	6.86	6.86	969	GC,GC/MS
2	<i>p</i> -Cymene	7.93	7.93	1010	GC,GC/MS
3	2,5-Dimethyl styrene	9.68	9.68	1074	GC,GC/MS
4	Terpinolene	9.86	9.86	1080	GC,GC/MS
5	Stragole	12.73	12.73	1176	GC,GC/MS
6	cis-Anethole	14.36	14.36	1230	GC,GC/MS
7	trans-Anethole	15.62	15.62	1272	GC,GC/MS, ¹ H-NMR
8	α-Caryophyllene	19.91	19.91	1414	GC,GC/MS
9	α-Bergamotene	20.31	20.31	1433	GC,GC/MS
10	zingiberene	21.51	21.51	1477	GC,GC/MS
11	α-Farnesene	22.03	22.03	1495	GC,GC/MS
12	Spathulenol	23.83	23.83	1565	GC,GC/MS
13	β-Springene	37.67	37.67	2111	GC,GC/MS

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