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Research Article

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Essential oil Composition of the Fruit of *Prangos uloptera* (Apiaceae) DC. from Turkey

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Abstract In this study, the essential oil composition of the fruit of *Prangos uloptera* DC. collected from Turkey was analyzed. The oils obtained by hydrodistillation using Clevenger Aparatus and chemical composition were determined by gas chromatography / mass spectrometry. The oil yield was determined as 0.4% (v/w) in the essential oils. Totally 30 components were contained the 83.7% of thevolatile oil obtained from the *Prangos uloptera*. The major components of the volatile oil were determined as Germacrene D (17.6%), Acorenone (16.9%), α-Pinene (14.9%) and α-Humulene (8.2%).

Keyword: *Prangos uloptera*, Apiaceae, Essential Oil, Turkey

Introduction

Umbelliferae is a cosmopolitan family that is easily distinguished by its characteristic features. It is distributed in a wide area around the world and it spreads from very cold to tropical regions. Particularly located in temperate regions in the north. The distribution is not homogeneus in Turkey, is more abundant than in Southwestern and Eastern Anatolia regions. About 455 genera and 3600-3750 species of Umbelliferae family are grown in the world. There are also 109 genera and 450 species of Umbelliferae in Turkey. In addition, 140 species of 42 genus and 4 genera are endemic [1,2].

42 of 43 species of the genus Prangos in the world are grown in Asia and among them *P. ferulacea* and *P. pabularia* species wide geographic spread shows [3]. This genus is represented by 17 species of Turkey; nine of them are endemic [4]. *Prangos uloptera* DC. (family: Umbelliferae) is a perennial herb native to mountain slopes of the central and western Asian countries including Turkey, Iran, Iraq, Afghanistan and Uzbekistan [5-7]. *Prangos* species grow on soils composed of chalky rocks, rarely clayey, basaltic and saline soils in Central Asia. Endemic species of this genus generally are mostly grow in high mountainous regions of Iran-Turan phytogeographic region [8].

Some species of the genus *Prangos* have been widely used as emollient, tonic, antifungal, antihelmentic for treatment in folk medicine [9]. The dried and powdered root has been consumed as aphrodisiac in some regions [10]. It is stated that the extracts of the genus *Prangos* in Central Asia are used to therapeutic externally bleeding and scars [11]. Members of this genus are used for the treatment of many diseases like as burns, hemorrhoids, and wounds. In addition, this species have features as carminative, laxative, stomachic, stimulant, emmenagogue, antienflammatuar and antimicrobial [12-15]. Many coumarin, alkaloid, flavonoid, and terpenoid derivatives were isolated from the roots, aerial parts, and fruits of *Prangos* species [11,16-18]. In Turkey, members of the genus *Prangos* are used in traditional medicine as tonic and to stop external bleeding, and to heal the scars (externally application) [15].

In the context of essential oil composition of fruit of *Prangos uloptera* gathered from Bitlis– Turkey were identified by (GC-GC/MS), to dispose the qualitative and quantitative volatile oil composition of the medicinal plant. The analysis results were disputed with the *Prangos* genus pattern in means of chemotaxonomy, chemical components and renewable resources.

Material Methods

Plant material

P. uloptera (Hayta 4004) specimens were collected from Nemrut (Bitlis-Turkey) an altitude of 2000-2250 m., in July, 2017. The identification of the plant material was performed by Assoc. Prof. Dr. Sukru HAYTA (Figure 1). Voucher specimens are kept at the Bitlis University Herbarium (BUH).

Figure 1: P. uloptera DC.

Isolation of the essential oil

In order to obtain essential oil, the plant samples were dried at room temperature (25ºC) and in areas with adequate air circulation. After drying the dried plants, the essential oils were obtained by distillation of 100 g plant sample in 2 lt of water for three hours in the Clevenger apparatus using the hydrodistillation method [19].

GC Mass analysis

The essential oils of plant were analyzed by GC-MS. 1 min / mL He gas flow, 1 μL injection volume and Agilent HP-5 MS column with capillary column 0-2 min 50 ° C, 2-10 min 120 ° C, 15-34. min. 280 ° C temperature program used. The results of the chemical compounds were interpreted using the Wiley and NIST libraries. The chemical structure of essential oils in terms of main components was determined by using gas chromatography.

Results and Discussion

The essential oil yields of fruit of *Prangos uloptera* was found as 0.2 % (w/w).The feature of this yield is pale yellow colour and characteristic odour. Thirty constituents, representing 83.7 % of the total compounds in the fruit were detected. The chemical components of the volatile oil of plant is shown in Table 1**.** Germacrene D (17.6%), acorenone (16.9%), α-pinene (14.9%) and α-humulene (8.2%) were the main compounds of fruit of *Prangos uloptera.* In many studies have done research on essential oils of *Prangos* species [6,10,16,18, 20-25]. A comparison of the essential oils of *Prangos uloptera* with previous studies on essential oils of other species showed variation of the main compounds. The chemical composition of various *Prangos uloptera* essential oils has been investigated from diverse locations and different extraction techniques that influenced their essential oil profile. α-Pinene is major component of oils of fruits of *P. uloptera* (41.9%), *P. latiloba* (25.1%) and *P. ferulacea* (16.7%) [21, 22]. δ-3-

carene (16.1%), ð-Cymene (10.9%) and germacrene-D-4-ol (42.8%) have been reported as main compounds of fruit oils of *P. asperula* Boiss. subsp. *haussknechtii*, *P. uechtritzii* and *P. bornmuelleri* respectively [20,26]. On the other hand, according to analysis results of our study, germacrene D (17.6%), acorenone (16.9%) and α-pinene (14.9%) were found to be the main compounds of the fruit oil of *P. uloptera*. α-Pinene which is an important monoterpene is the major component for the oils of fruits of *P. uloptera, P. ferulacea* (41.9%, 16.7%) respectively [6,18,22]. This difference findings can be expected due to difference in locations where samples were gathered. *Prangos uloptera* fruit oil grown in Iran contained mainly α-pinene, β-bourbonene, α-humulene, germacrene B and n-tetracosane, respectively (14.98%, 7.81%, 7.74%, 7.23%, 6.65%) [27], although n-tetracosane was not detected in our sample, β-bourbonene and germacrene B were found in less amounts. From the aerial parts and seeds of *P. uloptera* grown in 2001 in Iran was obtained essential oil with water distillation and analyzed by GC / MS method. In the essential oil obtained from the aerial parts, there were 22 compounds and only 12 compounds were detected in the essential oil of the seeds. In the analysis of the volatile oil from aerial parts of *P. uloptera;* β-caryophyllene (% 18,2), germacrene D (% 17,2) and limonene (% 8,7) were found as the major components. In addition, α-pinene (% 41,9) and β-cedrene (% 4,0) were the main compounds of essential oil of seeds [21]. However, *P. uloptera* is the very important medicinal plant and its very rich species in terms of chemical compounds. *P. bucharica, P. pabularia, P. uloptera* and *P. latiloba* which grown in Turkmenistan umbelliferon and scopolatin and furanocumarin, which were coumarin in 1981 psoralen, pergabten, isoimperatorin, oxipeusedanin hydrate, xanthotoxin, imperatorin and angelisin were derived [28].

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Acording to this study, one of the achievement that the volatile oil of *P. uloptera* fruit has Germacrene D / acorenone kind of volatile oil. All of the qualitative and quantitative differences were reported in whole of the *Prangos* species essential oils investigated and these achievements have also ecological and economic importance for application of the species in the renewable resources, chemotaxonomy and perfume industries.In addition, the positioning of the sampled *Prangos* in this study within the existing taxonomic treatment is not clear based on the chemical profile.

Table 1: The components of *Prangos uloptera* fruit essential oil

No	Components	RRI	Ratio (%)
1	α-pinene	1021	**14.9**
2	sabinene	1051	0.1
3	β-pinene	1055	0.8
4	β-mryycene	1063	0.1
5	Delta-3-carene	1078	2.9
6	p-cymene	1091	0.5
7	D-L-limonene	1094	1.5
8	cis-ocimene	1099	0.6
9	trans-β-ocimene	1107	0.5
10	ısoterpinolene	1133	0.1
11	α-terpinolene	1136	0.2
12	α-cubebene	1359	0.7
13	β-bourbonene	1365	4.7
14	β-cubebene	1368	0.8
15	β-elemene	1369	0.5
16	trans-caryophyllene	1392	0.6
17	γ-muurolone	1399	1
18	α-humulene	1417	**8.2**

19	α-amorphene	1429	1.5
20	gemacrene-D	1434	**17.6**
21	gemacrene-B	1443	0.7
22	β-bisabolene	1451	0.2
23	delta--cadinene	1457	0.8
24	γ-elemene	1483	2
25	spathulenol	1494	1.7
26	α-cadinol	1538	1.3
27	levomenol	1555	1
28	acorenone	1556	**16.9**
28	ascabin	1595	0.9
30	n-hexadecanoic acid	1690	0.4
	Total		**83.7**

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