

CHEMICAL COMPOSITIONS OF THE ESSENTIAL OILS OF STEMS, LEAVES, AND ROOTS OF *Prangos latiloba*

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Hydrodistilled volatile oils from crushed dry stems, leaves, and roots of Prangos latiloba Korov. (Umbelliferae) growing wild in Sabzevar (Iran) were analyzed by GC and GC/MS. Eight compounds constituting 84.72% of stem oil, twelve compounds constituting 95.39% of leaf oil, and nine compounds constituting 88.73% of root oil have been identified. The main components of stem oil were γ -cadinene (30.39%), α -pinene (25.47%), and sabinene (12.55%). The main components of leaf oil were germacrene D (27.79%), α -pinene (17.81%), β -caryophyllene (12.75%), and β -pinene (11.23%). The main components of root oil were spathulenol (29.5%), 1,8-cineol (19.42%), p-cymene (17.03%), and α -bisabolol (15.33%).

Key words: *Prangos latiloba*, essential oils, GC/MS.

The genus *Prangos* consists of about 30 species [1]. In Iran, fifteen species of this Umbelliferae family plant exist, among which five are endemic [2]. Medicinal applications have been reported for some *Prangos* species as: emollient, carminative [3], antifungal [4], antioxidant [5], antibacterial, cytokine release inhibitor [6], and anti-HIV [7]. Investigation of chemical components of the genus *Prangos* has resulted in isolation and identification of terpenoids [8–15], flavonoids [5], coumarins, and glycosides [6].

In this work, hydrodistilled volatile oils from crushed dry stems, leaves, and roots of *Prangos latiloba* Korov. (Umbelliferae) from Sabzevar (Iran), were studied by GC and GC/MS. The air-dried stems, leaves, and roots of the plant yielded 0.18, 0.25, and 0.38% (w/w) oil, respectively. The oil of leaves and stems is clear yellowish and that of roots is dark yellow. Eight components were identified in the stem oil, which contains 84.72% of the compounds. Twelve components were identified in the leaves, which contain 95.39% of the compounds. Nine components were also identified in the roots, which contain 88.73% of the compounds. Table 1 presents the list of compounds identified in the oils. As can be seen, the main components which were characterized in the stems are γ -cadinene (30.39%), α -pinene (25.47%), and sabinene (12.55%). The main components in the leaves were germacrene D (27.79%), α -pinene (17.81%), β -caryophyllene (12.75%), and β -pinene (11.23%), and in the roots they were spathulenol (29.5%), 1,8-cineol (19.42%), p-cymene (17.03%), and α -bisabolol (15.33%).

The oil composition of some *Prangos* species has been the subject of several investigations [9–18]. A comparison of the chemical composition of *Prangos latiloba* Korov. with previous studies on volatile oils of other species showed variation of the major components. α -Pinene is the main constituent of oils of fruits of *P. uloptera* (41.9%) and *P. ferulacea* (16.7%) [13–15]. The previous study on volatile oils of leaves and stems of *P. latiloba* [14] showed that the main constituents are α -pinene (25.1%), limonene (16.1%), and myrcene (9.51%). However, according to the results of our study on volatile oils of stems, leaves, and roots, γ -cadinene (30.39%), spathulenol (29.5%), germacrene D (27.79%), and α -pinene (25.47%) are the major components of different parts of *Prangos latiloba* Korov.

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TABLE 1. Percentage Composition of Oils from Stems, Leaves, and Roots of *Prangos latiloba*

Compound	Retention indices	Stems	Leaves	Roots
α -Thujene	928	-	-	0.78
α -Pinene	936	25.47	17.81	2.1
Sabinene	970	12.55	-	-
β -Pinene	974	-	11.23	-
β -Myrcene	986	-	0.71	-
α -Phellandrene	1000	-	-	0.59
δ -3-Carane	1010	3.75	4.54	-
<i>p</i> -Cymene	1020	-	-	17.03
Limonene	1025	5.43	5.24	-
1,8-Cineol	1027	-	-	19.42
Bornyl acetate	1285	2.58	1.64	-
α -Terpinenyl acetate	1346	-	7.08	-
β -Bourbonene	1380	-	1.34	-
β -Caryophyllene	1414	-	12.75	-
β -Gurjunene	1427	-	-	1.96
α -Humulene	1449	-	2.57	-
Germacrene D	1478	-	27.79	-
Bicyclogermacrene	1494	-	-	2.02
γ -Cadinene	1511	30.39	-	-
δ -Cadinene	1526	2.96	2.69	-
Spathulenol	1589	-	-	29.5
Ethyl dodecanoate	1591	1.59	-	-
α -Bisabolol	1682	-	-	15.33
Total percentage		84.72	95.39	88.73

The compounds have been sorted according to retention indices on an HP-5MS capillary column.

EXPERIMENTAL

Plant Material. The plant material was collected in May 2004 near the Sheshtamad river of Sabzevar in Khorasan Province of Iran, at an altitude of 1400 msl. A voucher specimen has been deposited in the herbarium of the Research Institute of Forests and Rangelands, Tehran, Iran.

Essential Oil Isolation. Air-dried stems, leaves, and roots of *Prangos latiloba* (100 g) were subjected to hydrodistillation for 3 h using a Clevenger-type apparatus to produce the oils. The oils were dried over anhydrous sodium sulfate and stored in sealed vials at low temperature (4°C) before analysis.

GC Analysis. GC analysis was performed using a Shimadzu GC-9A gas chromatograph, equipped with an HP-5MS fused silica column (30 m \times 0.25 mm i.d., film thickness 0.25 μ m). Oven temperature was held at 50°C for 5 min and then programmed to 250°C at a rate of 3°C/min. Injector and detector (FID) temperature were 290°C. Helium was used as carrier gas with a linear velocity of 32 cm/s.

GC/MS Analysis. GC/MS analysis was carried out on a Hewlett-packard 6890 gas chromatograph fitted with a fused silica HP-5MS capillary column (30 m \times 0.25 mm; film thickness 0.32 μ m). The oven temperature was programmed from 60 to 220°C at 6°C/min. Helium was used as carrier gas at a flow rate of 1 ml/min. The chromatograph was coupled to a Hewlett-Packard 5973 mass selective detector with an ionization voltage of 70 eV.

Qualitative and Quantitative Analyses. The constituents of the volatile oils were identified by comparison of their retention indices [16] relative to C9-C21 *n*-alkanes and their mass spectral fragmentation pattern with those reported in the literature [17], and stored in the MS library (Wiley 275). The quantification of the components was performed on the basis of their GC peak areas on the HP-5MS column.

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