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COMPOSITION OF THE ESSENTIAL OIL FROM *Laser trilobum* GROWN IN THE WILD IN VIENNA

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Laser trilobum (L.) Borkh. (Apiaceae) is a perennial, up to 120 cm tall calcicolous, aromatic plant with pinnate leaves, broadly ovate leaflets growing in thermophile oak forests and their outskirts. In Vienna it occurs on the foothills of the Vienna Woods in the west and northwest of the city [1].

In former times the plants were occasionally cultivated in gardens where the fruits were used as condiment, sometimes as substitute for dill seeds [2]. The shoots were eaten as a vegetable [3]. As the German name of the plant "Rosskummel" may suggest, the fruits were formerly used in veterinary medicine for their carminative properties [4]. In Turkey the dried ground fruits are locally used as a cumin-like spice to flavor meat products where an inhibitory effect of these on microorganisms has been demonstrated [5]. The composition of the essential oil in the fruits was reported from Turkey where limonene and perillaldehyde were the main compounds [6, 7].

The present work reports the volatile oil composition of fruits and leaves of *Laser trilobum* collected in the wild in Vienna, Austria.

Limonene, with 77% of the oil fraction (Table 1), was the main component in the fruit oil from Leopoldsberg followed by α-pinene and perillaldehyde. In the oil from Ober St. Veit, limonene and perillaldehyde were present in nearly equal amounts (45 and 46%, respectively), followed by α-pinene (4.5%). The further compounds detected were monoterpenes, which made up in sum 4–5% of the oil. Sesquiterpenoids were almost absent in the fruit oil.

The composition of the leaf oil of *L. trilobum* has not yet been reported in the literature. The present study shows that the oils from the leaves displayed a completely different composition than the oil from the fruit. Bornyl angelate was the main compound in the leaf oils from both sites, reaching about 70% of the oil. In the fruits, bornyl angelate was present as a minor compound, an observation also reported for *L. trilobum* fruit from Germany [8]. Furthermore the leaf oils reported here contained monoterpenes as α-pinene, β-pinene, myrcene, and ocimene. Limonene was only present in small amounts. Perillaldehyde and perillalcohol could not be detected in leaves. Especially in the leaves from Leopoldsberg, small amounts of sesquiterpenoids were found.

Concerning the main components the oils presented here are similar to *Laser trilobum* fruit oils from Turkey where limonene and perillaldehyde in variyng proportions have already been reported as the main components [6–8]. The ratio of limonene to perillaldehyde depends on the distillation procedure [7]. When the fruits were crushed before the distillation, higher amounts of limonene were obtained [7]. A longer storage may reduce the limonene and enhance the perillaldehyde proportion [8].

A similar fruit oil composition could also be found in the oil in *Laserpitium siler* L. from Southern France where more than 90% of the essential was made up of perillaldehyde and limonene [9]. This close similarity in the fruit oil composition between *Laser trilobum* and *Laserpitium siler* has already been indicated earlier by Adcock and Betts [10]. These authors also pointed out a similarity in the fruit morphology of both species.

In contast, the main components of the volatile oil of the aerial parts of *L. trilobum* from Iran were myrcene, β-caryophyllene, and β-sesquiphellandrene [11].

Fruits of turkish origin displayed carveol, carvone, carvacrol, and eugenol as the minor compounds [6, 7], which were not detected in the present study.

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TABLE 1. Composition of the Leaf and Fruit Oil from *Laser trilobum*

Compound	RI	Leaves		Fruits		Compound	RI	Leaves		Fruits	
		1	2	1	2			1	2	1	2
Oil yield (% v/w)		0.1	0.2	4.0	4.7	Geraniol	1252		0.2		
α-Pinene	936	12.6	3.4	4.5	9.3	Methylcitronellate	1260			0.1	0.2
Camphene	952	0.6	0.2		0.1	Perillaldehyde	1274			46.3	8.6
Sabinene	975	0.5	1.2	0.1	0.2	Bornyl acetate	1282			0.5	
β-Pinene	978	4.2	1.2	0.5	0.7	Perill alcohol	1296			0.4	0.6
Myrcene	991	3.1	1.6	0.5	1.1	δ-Elemene	1329		0.1		
p-Cymene	1026	0.6	0.5			α-Copaene	1372		0.3		
Limonene	1030	2.3	1.0	45.1	77.3	β-Boubonene	1379		0.1		
trans-Ocimene	1040	1.4	0.7			β-Cubebene	1384		0.4		
cis-Ocimene	1050	3.1	1.6			α-Acoradiene	1461		0.4		
γ-Terpinene	1060	0.9	1.3	0.1	0.1	β-Acoradiene	1469		0.1		
Terpinolene	1085	0.4	0.2			γ-Muurolene	1475	0.5	1.2		
Linalool	1099	0.7	1.3		<0.1	*ar*-Curcurmene	1478		0.5		
Nonanal	1105	0.3	1.4		0.1	Bicyclogermacrene	1489	0.6	1.2		<0.1
cis-Limonene oxide	1137					α-Zingiberene	1491				<0.1
Citronellal	1155			0.1		Isobornyl isovalerate	1502	0.8	0.9		
trans-Nonen-1-al (2*E*)	1162		0.1			Bornyl angelate	1559	67.3	73.5	1.0	1.0
Terpinenen-4-ol	1179		0.1			Spathulenol	1571	<0.1	1.1		
α-Terpineol	1193		0.3			Neophytadiene	1836		0.4		
Citronellol	1228			0.1	0.2	Hexahydrofarnesylacetone	1840		0.1		

Plant origin: 1 - Ober St. Veit; 2 - Leopoldsberg.
RI: retention index on an apolar column.

Plant Material. The plants came from two sites in the outskirts of Vienna, Austria on the slopes of the Vienna Woods in deciduous forests rich in oaks (Leopoldsberg, near the top of the hill, and Ober St. Veit, Gemeindeberg). Umbels with ripe fruits and leaves from about 15 individual plants were collected in July 2005 on both sites. The plant was identified using the "Exkursionsflora von Osterreich" [12]. A voucher specimen was deposited in the herbarium of the University of Vienna (WU-Generale, http:\\herbarium.univie.ac.at).

The air dried plant material was stored at room temperature and distilled within two weeks.

Hydrodistillation. Ten grams of the plant parts were subjected to hydrodistillation for two hours in a Clevenger-type apparatus containing 200 ml of double distilled water. The collected essential oil was stored at –18°C until GC/MS analysis.

GC/MS. Prior to analysis, 5 μL of the essential oil were diluted with 495 μL dichloromethane. To record the pattern of volatile components in the oils, an HP 6890 GC was equipped with a 5972 quadrupole mass selective detector. The separation was done on a JW DB5-MS fused silica column: length 30 m, inner diameter 0.25 mm, film thickness 0.25μm. The analytical conditions were: carrier gas He 1.3 mL/min in the constant flow mode, injector temperature 250°C, split ratio 10:1, temperature program 5 min at 50°C, with 3°C/min up to 280°C. The injection volume was 1 μL.

The compounds were identified according to their mass spectra and their retention indices [13, 14]. The total ion current (*m/z* 40 to 550) has been used to calculate the relative amounts of the volatile components.

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