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Essential Oils of Plants from Hispaniola: 5. The Volatile Leaf Oil of *Lepechinia urbanii* (Briq.) Epling (Lamiaceae)

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The essential oil from the leaves of *Lepechinia urbanii* (Briq.) Epling from the Dominican Republic is dominated by δ-car-3-ene (32.55%), α-copaene (13.82) and δ-cadinene (12.51) with lesser amounts of β-phellandrene (4.54), γ-cadinene (3.41) and *allo*-aromadendrene (2.83). Fifty-six of 59 components were identified. Oil yield was 0.46 g/100g fresh weight (0.46%).

KEY WORDS *Lepechinia urbanii* (Briq.) Epling Lamiaceae (Labiatae) Essential oil Terpenes Gas chromatography Ion trap mass spectrometry

INTRODUCTION

Lepechinia urbanii (Briq.) Epling, Lamiaceae, is a 1–1.5 m tall shrub with aromatic foliage ('sage-like' odour), endemic to the island of Hispaniola. It is known from the higher parts of the Cordillera Central in the Dominican Republic near Valle Nuevo (south of Constanza) at 2100–2600 m elevation and in the region of Pico Duarte–Loma La Rucilla at from 2000 to 3170 m (to the summit of Pico Duarte, the highest peak on the island). It is also known in the Massif de la Selle in southeastern Haiti, near the peak Morne La Selle, 2000 m and higher. These distributions notes are based on herbarium specimens at the Jardin Botanico Nacional, Santo Domingo (JBSD).

The shrub grows in open pine forests (*Pinus occidentalis* Swartz) and forms part of the understory. The regions are generally uninhabited as the areas are not suited to agriculture.

The plant has few folk uses. It has been used by some of the guides in the national parks in the Dominican Republic to make herb tea. No other uses are known. The few who know the plant have no common name for it, but the name 'Rucilla' (as in Loma Rucilla) appears to refer to this plant.

The essential oil of the leaves of *L. urbanii* has not been examined, but Lawrence and Morton[1] analysed the leaf oil of *Lepechinia calycina* and found major components of 1,8-cineole (19.7%), camphor (17.5%) and δ-car-3-ene (17.4%) with lesser amounts of camphene (7.8%), α-pinene (6.5%) and caryophyllene (5.7%). *Lepechinia salviae* is reported[2] to have limonene + 1,8-cineole (30%), phellandrene (α or β?) (15%), thymol (9%), α-pinene (3%), β-pinene (3%), linalol (2%), terpineol (α-, β-, or γ-?) (2%) and borneol (1.6%), plus approximately 20 other components.

The purpose of this paper is to present the composition of the leaf essential oil of *Lepechinia urbanii* as a part of a series on the volatile oils of plants of Hispaniola.

EXPERIMENTAL

Fresh foliage of *L. urbanii* was collected from several shrubs, 36 km S. of Constanza on the road to San Jose de Ocoa, elevation 2200–2400 m, Cordillera Central, Prov. La Vega, Dominican Republic, 17 June, 1987, T. Zanoni and R. Garcia 39602. A voucher specimen is deposited in the herbarium at Jardin Botanico Nacional, Santo Domingo (JBSD). Two hundred grams of the fresh foliage was steam distilled in a modified Clevenger apparatus[3] with the oil collected over water. Steam distillations were performed for 2 h. The oil was diluted to 10% concentration with diethyl ether,

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then tightly sealed in glass vials with teflon-lined caps and stored at −20 °C until analysed.

Mass spectra were recorded with a Finnigan Ion Trap mass spectrometer (ITMS), model 800, directly coupled to a Varian 6500 gas chromatograph, using a J & W DB5, 30 m × 0.26 mm id, 0.25 micrometre coating thickness, fused-silica capillary column. The GC/ITD was operated under the following conditions: injector temperature: 220 °C; transfer line: 240 °C; oven temperature programmed: 60 °C–240 °C at 3 °C/min; carrier gas: He at 31.9 cm/s or 1.017 ml/min (at 210 °C); injection: 0.1 μl (10% solution), split 1:20, 500 ng/ on column. Tuning values for the ITD were 100, 100, 100, 100 using cedrol as a tuning standard. Internal standards (*n*-octane and *n*-eicosane) were added to each sample to aid in the standardization of retention times. Identifications were made by library searches of our volatile oil library, LIBR(TP)[4] using the Finnigan library search routines based on fit and standardized retention times.[4,5]

RESULTS AND DISCUSSION

The composition of the leaf essential oil of *L. urbanii* is reported in Table 1. The oil is dominated by δ-car-3-ene (32.55%), α-copaene (13.82) and δ-cadinene (12.51) with lesser amounts of β-phellandrene (4.54), γ-cadinene (3.41) and *allo*-aromadendrene (2.83). Fifty-six of 59 components were identified. There were three unidentified compounds (larger than 0.5% total oil). RT604, ITMS,

Table 1. The volatile oil composition of *Lepechinia urbanii* (Briq.) Epling leaves from the Dominican Republic. Compounds are listed in order of their elution from a DB5 (= SE54) column. Data expressed as percentage total oil using total ion counts (TIC). Unidentified compounds with values less than 0.5% of the total oil are not listed. Compounds enclosed in parenthesis () are tentatively identified.

RT	Compound	% total oil	RT	Compound	% total oil
307	α-Thujene	trace	1267	α-Cubebene	0.35
319	α-Pinene	0.17	1334	α-Copaene	13.82
348	(*m*-Cymene)	0.35	1403	Methyl eugenol	1.26
383	Oct-1-en-3-ol	0.21	1421	α-Gurjunene	0.24
386	β-Pinene	0.24	1442	Caryophyllene	1.04
397	Octan-3-one	0.24	1475	β-Gurjunene	0.20
408	Myrcene	1.18	1491	Aromadendrene	0.76
412	Octan-3-ol	trace	1519	α-Cadinene	trace
427	Car-2-ene	trace	1352	Geranyl acetate	0.62
435	α-Phellandrene	1.96	1527	α-Humulene	0.30
444	Car-3-ene	32.55	1546	*allo*-Aromadendrene	2.83
457	α-Terpinene	0.53	1575	γ-Gurjunene	trace
465	*o*-Cymene	0.34	1577	β-Cadinene	0.58
471	*p*-Cymene	1.05	1586	γ-Muurolene	1.72
481	Limonene	1.51	1631	α-Selinene	0.90
482	β-Phellandrene	4.54	1628	(Viridiflorene)	0.31
485	1,8-Cineole	trace	1643	α-Muurolene	1.45
545	γ-Terpinene	0.30	1676	γ-Cadinene	3.41
604	RT604	0.65	1700	δ-Cadinene	12.51
609	*p*-Cymenene	0.25	1722	RT1722	0.58
608	Terpinolene	0.76	1744	α-Calacorene	0.32
632	Linalol	0.25	1837	Caryophyllene oxide	0.34
662	Oct-1-en-3-yl acetate	0.63	1841	Globulol	0.21
683	*cis*-Pinene hydrate	0.39	1860	RT1860	0.61
690	Octan-3-yl acetate	0.20	1944	Cubenol	0.81
725	*trans*-Pinene hydrate	0.25	1973	T-Cadinol	1.04
792	*p*-Mentha-1,5-dien-8-ol	0.28	1976	T-Muurolol	0.68
837	*p*-Cymen-8-ol	0.22	1984	Torreyol	0.29
865	*cis*-Piperitol	trace	2003	α-Cadinol	0.52
896	*trans*-Piperitol	0.18			

Trace = less than 0.1% total oil.

m/z(rel. int): 136[M]$^+$(52), 41(36), 53(21), 67(30). 79(55), 93(100), 105(23), 121(44), a monoterpene. RT1722, ITMS, *m/z* (rel. int.): 204[M]$^+$(18), 41(57), 55(23), 69(14), 77(21), 91(50), 105(94), 119(100), 133(10), 161(51), 189(,4), a sesquiterpene. RT1860, ITMS, *m/z* (rel. int.): 204[M]$^+$(10), 43(100), 55(32), 67(44), 81(36), 93(37), 109(32), 121(22), 133(12), 149(15), 161(22), 176(3), 189(13), a sesquiterpene.

Lepechinia urbanii oil shares some resemblance to that of *L. calycina*[1] *which has* 17.4% δ-car-3-ene although *L. urbanii* contains only a trace of 1,8-cineole and no camphor (which are the major components of *L. calycina*[1]). *Lepechinia urbanii* is even less like *L. salviae*, whose oil is dominated by limonene and 1,8-cineole.[2] *Lepechinia urbanii* appears to be a good source of δ-cae-3-ene as well as α-copaene.

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REFERENCES

1. B. M. Lawrence and J. C. Morton, *Phytochemistry*, **18,** 1887 (1979).
2. M. A. Montes, G. L. Valenzuela R., and T. Wilkomirsky F., *An. Real Acad. Farm.*, **49,** 257 (1983).
3. E. Von Rudloff, *Can. J. Bot.*, **45,** 891 (1967).
4. R. P. Adams, *Indentification of Essential Oils by Ion Trap Mass Spectroscopy*, Academic Press, New York (1989).
5. R. P. Adams, M. Granat, L. R. Hogge, and E. von Rudloff, *J. Chromatog. Sci.*, **17,** 75 (1979).