

**cDate :** February 27, 2022

**CERTIFICATE OF ANALYSIS – GC PROFILING**

*SAMPLE IDENTIFICATION*

**Internal code :** 22B14-PTH02

**Customer identification :** White Cypress Leaf - Australia - CQ410192R

**Type :** Essential oil

**Source :** *Callitris columellaris*

**Customer :** Plant Therapy

*ANALYSIS*

**Method:** PC-MAT-014  - Analysis of the composition of an essential oil or other volatile liquid by FAST GC-FID (in French); identifications validated by GC-MS.

**Analyst :** Sylvain Mercier, M. Sc., Chimiste 2014-005

**Analysis date :** February 15, 2022

Checked and approved by :

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Alexis St-Gelais, Ph. D., Chimiste 2013-174

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## PHYSICOCHEMICAL DATA

**Physical aspect:** Clear liquid

**Refractive index:** 1.4719 ± 0.0003 (20 °C; method PC-MAT-016)

## CONCLUSION

The presence of a significant proportion of caryophyllene is not reported in the literature for *C. columellaris* (or *C. glaucophylla*, a synonym) leaf oils, while myrcene is reported to be more prominent.<sup>1-3</sup> The major constituents are otherwise as expected for the species, and we cannot rule that that these observations could arise from an undocumented variability in the species.

## REFERENCES

- (1) Brophy, J. J.; Goldsack, R. J.; Forster, P. I.; Copeland, L. M.; O'sullivan, W.; Rozefelds, A. C. Chemistry of the Australian Gymnosperms. Part IX. The Leaf Oils of the Australian Members of the Genus *Callitris* (Cupressaceae). *J. Essent. Oil Res.* **2007**, *19* (1), 57–71. <https://doi.org/10.1080/10412905.2007.9699232>.
- (2) Ogunwande, I. A.; Olawore, N. O.; Kasali, A. A.; König, W. A. Chemical Composition of the Leaf Volatile Oils of *Callitris Intratropica* R. T. Baker & H. G. Smith from Nigeria. *Flavour Fragr. J.* **2003**, *18* (5), 387–389. <https://doi.org/10.1002/ffj.1214>.
- (3) Ogunwande, I. A.; Olawore, N. O.; Adeleke, K. A.; König, W. A. Analyses of the Volatile Compounds of *Callitris Columellaris* F. Muell. Needles from Two Different Regions of Nigeria. *J. Essent. Oil Res.* **2005**, *17* (1), 44–46. <https://doi.org/10.1080/10412905.2005.9698825>.

## ANALYSIS SUMMARY – CONSOLIDATED CONTENTS

New readers of similar reports are encouraged to read table footnotes at least once.

Identification	%	Class
Heptane	tr	Alkane
Toluene	tr	Simple phenolic
(4E)-2,6-Dimethyloctene	0.02	Monoterpene
Tricyclene	0.10	Monoterpene
$\alpha$ -Thujene	0.06	Monoterpene
$\alpha$ -Pinene	44.46	Monoterpene
Camphene	0.72	Monoterpene
$\alpha$ -Fenchene	0.02	Monoterpene
Thuja-2,4(10)-diene	0.02	Monoterpene
$\beta$ -Pinene	0.88	Monoterpene
Sabinene	0.11	Monoterpene
Myrcene	0.39	Monoterpene
$\alpha$ -Phellandrene	0.01	Monoterpene
Octanal	0.06	Aliphatic aldehyde
$\Delta^3$ -Carene	0.04	Monoterpene
para-Cymene	0.02	Monoterpene
$\beta$ -Phellandrene	0.07	Monoterpene
Limonene	24.34	Monoterpene
(Z)- $\beta$ -Ocimene	0.02	Monoterpene
(E)- $\beta$ -Ocimene	0.01	Monoterpene
$\gamma$ -Terpinene	0.02	Monoterpene
cis-Sabinene hydrate	0.01	Monoterpenic alcohol
Octanol	0.03	Aliphatic alcohol
Terpinolene	0.01	Monoterpene
$\alpha$ -Pinene oxide	0.08	Monoterpenic ether
Verbenol analog?	0.09	Monoterpenic alcohol
Linalool	0.14	Monoterpenic alcohol
Nonanal	0.01	Aliphatic aldehyde
trans-para-Mentha-2,8-dien-1-ol	0.02	Monoterpenic alcohol
cis-Limonene oxide	0.02	Monoterpenic ether
trans-Limonene oxide	0.01	Monoterpenic ether
cis-para-Mentha-2,8-dien-1-ol	0.01	Monoterpenic alcohol
trans-Pinocarveol	0.03	Monoterpenic alcohol
trans-Verbenol	0.08	Monoterpenic alcohol
Isoborneol	0.03	Monoterpenic alcohol
$\delta$ -Terpineol	0.02	Monoterpenic alcohol
Terpinen-4-ol	0.02	Monoterpenic alcohol
$\alpha$ -Terpineol	4.54	Monoterpenic alcohol
Verbenone	0.02	Monoterpenic ketone
trans-Carveol	0.02	Monoterpenic alcohol
cis-Carveol	0.04	Monoterpenic alcohol
Unknown	0.04	Unknown
Carvone	0.03	Monoterpenic ketone
Unknown	0.27	Unknown
Unknown	0.02	Unknown

Geranial	0.03	Monoterpenic aldehyde
Bornyl acetate	9.68	Monoterpenic ester
Unknown	0.01	Oxygenated monoterpene
Unknown	0.03	Unknown
$\alpha$ -Cubebene	0.05	Sesquiterpene
$\alpha$ -Copaene	0.18	Sesquiterpene
$\beta$ -Elemene	0.02	Sesquiterpene
Isocaryophyllene	0.04	Sesquiterpene
$\alpha$ -Cedrene	0.03	Sesquiterpene
$\beta$ -Caryophyllene	10.96	Sesquiterpene
Caryophylla-4(12),8(13)-diene	0.05	Sesquiterpene
<i>trans</i> - $\alpha$ -Bergamotene	0.01	Sesquiterpene
$\alpha$ -Humulene	0.93	Sesquiterpene
Isocaryophyllene epoxide B	0.03	Sesquiterpenic ether
Caryophyllene oxide	0.32	Sesquiterpenic ether
Caryophyllene oxide isomer	0.08	Sesquiterpenic ether
Humulene epoxide II	0.03	Sesquiterpenic ether
Caryophylladienol II	0.03	Sesquiterpenic alcohol
<b>Consolidated total</b>	<b>99.46%</b>	

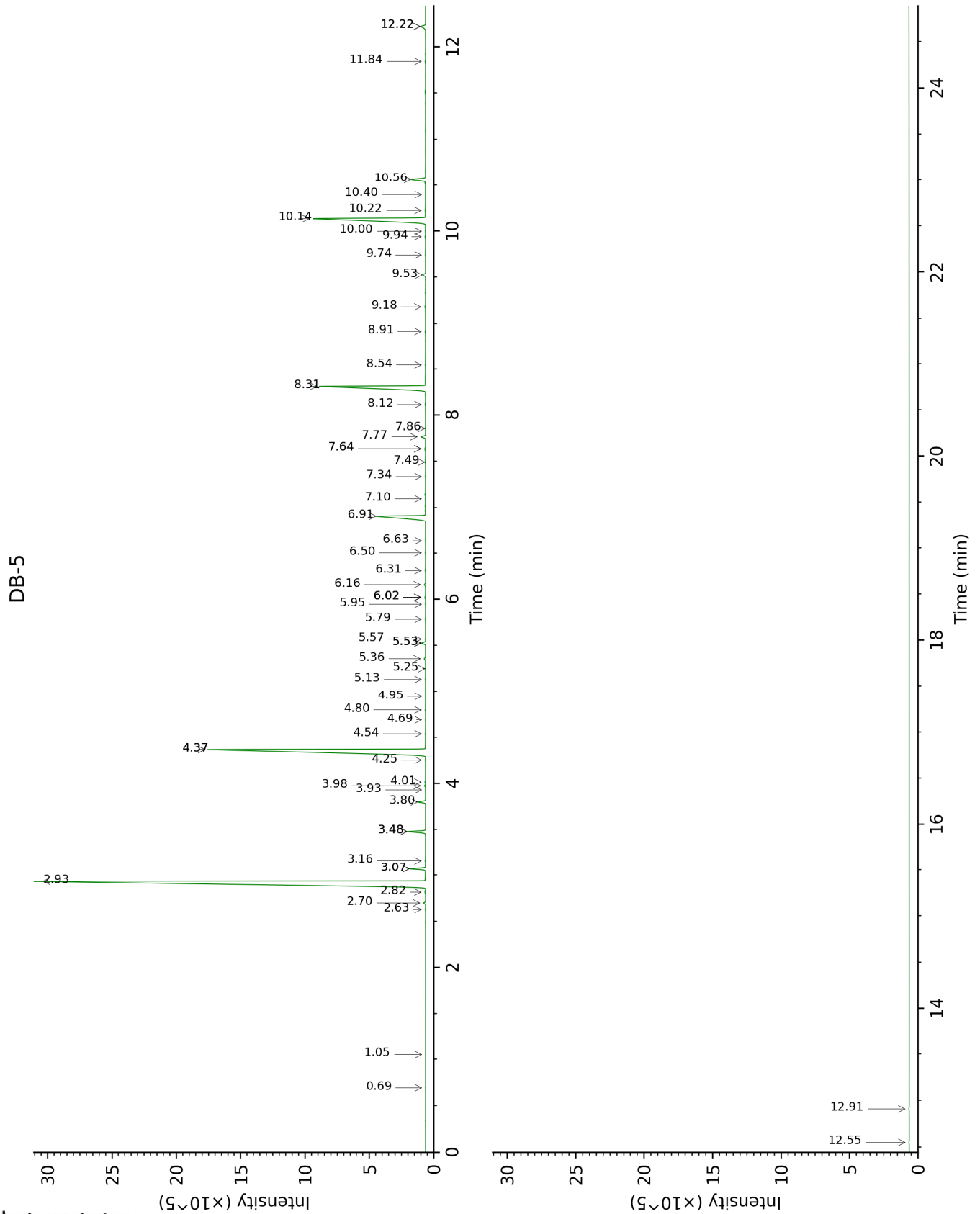
tr: The compound has been detected below 0.005% of total signal.

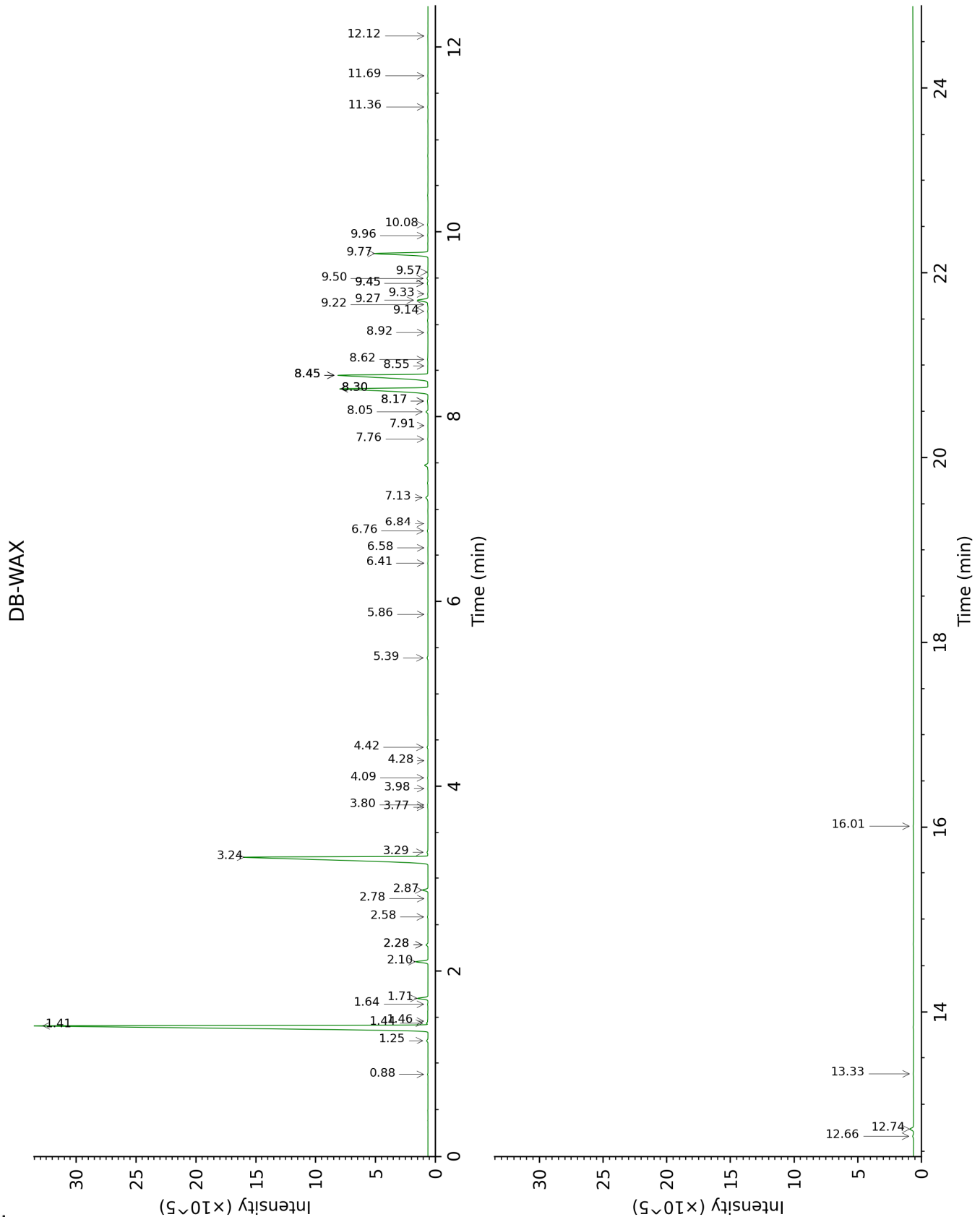
Note: no correction factor was applied

**About "consolidated" data:** The table above presents the breakdown of the sample volatile constituents after applying an algorithm to collapse data acquired from the multi-columns system of PhytoChemia into a single set of consolidated contents. In case of discrepancies between columns, the algorithm is set to prioritize data from the most standard DB-5 column, and smallest values so as to avoid overestimating individual content. This process is semi-automatic. Advanced users are invited to consult the "Full analysis data" table after the chromatograms in this report to access the full untreated data and perform their own calculations if needed.

**Unknowns:** Unknown compounds' mass spectral data is presented in the "Full analysis data" table. The occurrence of unknown compounds is to be expected in many samples, and does not denote particular problems unless noted otherwise in the conclusion.

This page was intentionally left blank. The following pages present the complete data of the analysis.





FULL ANALYSIS DATA

Identification	Column DB-5			Column DB-WAX		
	R.T	R.I	%	R.T	R.I	%
Heptane	0.70	699	tr			
Toluene	1.05	758	tr	1.46	1001	0.03
(4E)-2,6-Dimethyloctene	2.63	913	0.02	0.88	911	0.02
Tricyclene	2.70	918	0.10	1.25	970	0.10
α-Thujene	2.82	926	0.06	1.44	999	0.08
α-Pinene	2.93	934	44.46	1.41	996	44.20
Camphene	3.07*	943	0.75	1.71	1025	0.72
α-Fenchene	3.07*	943	[0.75]	1.64	1019	0.02
Thuja-2,4(10)-diene	3.16	950	0.02	2.28*	1082	0.13
β-Pinene	3.48*	971	0.99	2.10	1064	0.88
Sabinene	3.48*	971	[0.99]	2.28*	1082	[0.13]
Myrcene	3.80	993	0.39	2.87	1132	0.38
α-Phellandrene	3.93	1002	0.01	2.78	1124	0.01
Octanal	3.98	1005	0.06	4.42	1251	0.06
Δ <sup>3</sup> -Carene	4.02	1007	0.04	2.58	1109	0.03
para-Cymene	4.25	1022	0.02	4.09	1226	0.03
β-Phellandrene	4.37*	1030	24.41	3.29	1165	0.07
Limonene	4.37*	1030	[24.41]	3.24	1160	24.34
(Z)-β-Ocimene	4.54	1040	0.02	3.77	1203	0.02
(E)-β-Ocimene	4.69	1050	0.01	3.98	1218	0.01
γ-Terpinene	4.80	1057	0.02	3.80	1205	0.02
cis-Sabinene hydrate	4.94	1066	0.01	6.84	1423	0.01
Octanol	5.13	1078	0.03	8.17*	1523	0.06
Terpinolene	5.25	1086	0.01	4.28	1240	0.01
α-Pinene oxide	5.36	1092	0.08	5.39	1318	0.07
Verbenol analog?	5.53*	1103	0.23	8.30*	1533	9.85
Linalool	5.53*	1103	[0.23]	8.05	1514	0.14
Nonanal	5.57	1106	0.01	5.86	1352	0.01
trans-para-Mentha-2,8-dien-1-ol	5.78	1120	0.02	8.92	1581	0.02
cis-Limonene oxide	5.95	1130	0.02	6.41	1391	0.02
trans-Limonene oxide	6.02*	1135	0.05	6.58	1403	0.01
cis-para-Mentha-2,8-dien-1-ol	6.02*	1135	[0.05]	9.45*	1623	0.06
trans-Pinocarveol	6.02*	1135	[0.05]	9.14	1598	0.03
trans-Verbenol	6.16	1144	0.08	9.50	1627	0.08
Isoborneol	6.31	1154	0.03	9.33	1614	0.02
δ-Terpineol	6.50	1166	0.02	9.45*	1623	[0.06]
Terpinen-4-ol	6.63	1174	0.02	8.55	1552	0.02
α-Terpineol	6.91	1192	4.54	9.77	1649	4.60
Verbenone	7.10	1204	0.02	9.57	1633	0.02
trans-Carveol	7.34	1220	0.02	11.36	1782	0.02



<i>cis</i> -Carveol	7.49	1231	0.04	11.69	1811	0.01
Unknown [m/z 41, 69 (93), 43 (61), 95 (60), 94 (48), 139 (39)...]	7.64*	1240	0.07			
Carvone	7.64*	1240	[0.07]	9.96	1665	0.03
Unknown [m/z 121, 136 (66), 43 (48), 109 (48), 80 (30), 93 (29)...]	7.77	1249	0.27			
Unknown [m/z 109, 108 (82), 95 (42), 43 (36), 93 (23), 121 (21)...]	7.86	1255	0.02	7.76	1491	0.02
Geranial	8.12	1272	0.03	10.08	1674	0.04
Bornyl acetate	8.31	1286	9.68	8.30*	1533	[9.85]
Unknown [m/z 43, 93 (66), 91 (44), 41 (38), 69 (35)... 152? (1)]	8.54	1301	0.01			
Unknown [m/z 43, 93 (80), 121 (64), 107 (35), 136 (34)...]	8.91	1327	0.03	9.22	1604	0.03
$\alpha$ -Cubebene	9.18	1346	0.05	6.76	1417	0.05
$\alpha$ -Copaene	9.53	1370	0.18	7.13	1444	0.21
$\beta$ -Elemene	9.74	1386	0.02	8.45*	1544	11.02
Isocaryophyllene	9.94	1400	0.04	8.17*	1523	[0.06]
$\alpha$ -Cedrene	10.00	1404	0.03	7.90	1502	0.01
$\beta$ -Caryophyllene	10.14	1414	10.96	8.45*	1544	[11.02]
Caryophylla- 4(12),8(13)-diene	10.22	1421	0.05	8.62	1558	0.04
<i>trans</i> - $\alpha$ - Bergamotene	10.40	1434	0.01	8.45*	1544	[11.02]
$\alpha$ -Humulene	10.56	1446	0.93	9.26	1608	0.93
Isocaryophyllene epoxide B	11.84	1544	0.03	12.12	1849	0.01
Caryophyllene oxide	12.22*	1574	0.41	12.74	1904	0.32
Caryophyllene oxide isomer	12.22*	1574	[0.41]	12.66	1897	0.08
Humulene epoxide II	12.55	1600	0.03	13.33	1958	0.02
Caryophylladienol II	12.91	1629	0.03	16.01	2221	0.03
<b>Total identified</b>		<b>99.16%</b>			<b>99.02%</b>	
<b>Total reported</b>		<b>99.49%</b>			<b>99.07%</b>	

\*: Two or more compounds are coeluting on this column

[xx]: Duplicate percentage due to coelutions, not taken into account in the consolidated total

tr: The compound has been detected below 0.005% of total signal.

Note: no correction factor was applied  
R.T.: Retention time (minutes)

