

**Date :** December 10, 2020

**CERTIFICATE OF ANALYSIS – GC PROFILING**

*SAMPLE IDENTIFICATION*

**Internal code :** 20L04-PTH01


**Customer identification :** Rosalina - Australia - R20106205R

**Type :** Essential oil

**Source :** *Melaleuca ericifolia* ct. Linalool

**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 :** Fanny Charlier, B. Sc., chimiste à l'entraînement

**Analysis date :** December 08, 2020

Checked and approved by :

---

Alexis St-Gelais, M. Sc., chimiste 2013-174

*Notes: This report may not be published, including online, without the written consent from Laboratoire PhytoChemia. This report is digitally signed, it is only considered valid if the digital signature is intact. The results only describe the samples that were submitted to the assays.*

*PHYSICOCHEMICAL DATA*

**Physical aspect:** Clear liquid with small red particles

**Refractive index:**  $1.4649 \pm 0.0003$  (20 °C; method PC-MAT-016)

*CONCLUSION*

No adulterant, contaminant or diluent has been detected using this method.

## ANALYSIS SUMMARY – CONSOLIDATED CONTENTS

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

Identification	%	Class
Isobutyral	tr	Aliphatic aldehyde
Isovaleral	tr	Aliphatic aldehyde
3-Methyl-2-butanone	tr	Aliphatic ketone
2-Methylbutyral	tr	Aliphatic aldehyde
2-Methylbutanol	tr	Aliphatic alcohol
3-Methyl-2-pentanone	tr	Aliphatic ketone
Hexanal	tr	Aliphatic aldehyde
$\alpha$ -Thujene	0.08	Monoterpene
$\alpha$ -Pinene	4.10	Monoterpene
$\alpha$ -Fenchene	0.01	Monoterpene
Camphene	0.04	Monoterpene
Benzaldehyde	0.08	Simple phenolic
$\beta$ -Pinene	1.04	Monoterpene
Sabinene	0.02	Monoterpene
6-Methyl-5-hepten-2-one	0.01	Aliphatic ketone
Myrcene	0.42	Monoterpene
Pseudolimonene	0.02	Monoterpene
$\alpha$ -Phellandrene	0.05	Monoterpene
$\Delta^3$ -Carene	0.01	Monoterpene
$\alpha$ -Terpinene	0.18	Monoterpene
para-Cymene	0.56	Monoterpene
Limonene	3.26	Monoterpene
1,8-Cineole	26.40	Monoterpenic ether
(Z)- $\beta$ -Ocimene	0.03	Monoterpene
(E)- $\beta$ -Ocimene	0.07	Monoterpene
$\gamma$ -Terpinene	2.82	Monoterpene
cis-Linalool oxide (fur.)	0.89	Monoterpenic alcohol
Terpinolene	0.31	Monoterpene
trans-Linalool oxide (fur.)	0.87	Monoterpenic alcohol
para-Cymenene	0.02	Monoterpene
$\alpha$ -Pinene oxide	0.03	Monoterpenic ether
Hotrienol	0.02	Monoterpenic alcohol
Linalool	45.67	Monoterpenic alcohol
endo-Fenchol	0.05	Monoterpenic alcohol
cis-para-Menth-2-en-1-ol	0.04	Monoterpenic alcohol
$\alpha$ -Campholenal	0.02	Monoterpenic aldehyde
Unknown	0.01	Unknown
trans-Pinocarveol	0.03	Monoterpenic alcohol
trans-para-Menth-2-en-1-ol	0.05	Monoterpenic alcohol
cis- $\alpha$ -Dihydroterpineol	0.06	Monoterpenic alcohol
Nerol oxide	0.02	Aliphatic ether
Borneol	0.02	Monoterpenic alcohol
$\delta$ -Terpineol	0.07	Monoterpenic alcohol
Terpinen-4-ol	2.94	Monoterpenic alcohol
trans-Linalool oxide (pyr.)	0.01	Monoterpenic alcohol

α-Terpineol	2.86	Monoterpenic alcohol
cis-Piperitol	0.05	Monoterpenic alcohol
Unknown	0.01	Unknown
trans-Carveol	0.02	Monoterpenic alcohol
Nerol	0.01	Monoterpenic alcohol
Citronellol	0.02	Monoterpenic alcohol
Carvone	0.01	Monoterpenic ketone
Unknown	0.03	Unknown
trans-Ascaridole glycol	0.01	Monoterpenic alcohol
cis-Ascaridole glycol	0.02	Monoterpenic alcohol
Unknown	0.01	Monoterpenic alcohol
Methyl geranate	0.01	Monoterpenic ester
α-Terpinyl acetate	0.62	Monoterpenic ester
Citronellyl acetate	0.02	Monoterpenic ester
Isoledene	0.02	Sesquiterpene
α-Copaene	0.02	Sesquiterpene
Geranyl acetate	0.01	Monoterpenic ester
Unknown	0.02	Sesquiterpene
α-Gurjunene	0.06	Sesquiterpene
β-Caryophyllene	0.58	Sesquiterpene
γ-Maaliene	0.01	Sesquiterpene
β-Gurjunene	0.02	Sesquiterpene
α-Maaliene	0.01	Sesquiterpene
Aromadendrene	0.13	Sesquiterpene
Selina-5,11-diene	0.02	Sesquiterpene
α-Humulene	0.10	Sesquiterpene
allo-Aromadendrene	0.19	Sesquiterpene
Valerena-4,7(11)-diene	0.01	Sesquiterpene
γ-Gurjunene	0.01	Sesquiterpene
trans-Cadina-1(6),4-diene	0.03	Sesquiterpene
β-Selinene	0.09	Sesquiterpene
allo-Aromadendr-9-ene	0.05	Sesquiterpene
δ-Selinene	0.01	Sesquiterpene
α-Selinene	0.08	Sesquiterpene
Bicyclogermacrene	0.01	Sesquiterpene
Viridiflorene	0.27	Sesquiterpene
α-Muurolene	0.03	Sesquiterpene
γ-Cadinene	0.08	Sesquiterpene
δ-Cadinene	0.08	Sesquiterpene
trans-Calamenene	0.02	Sesquiterpene
α-Elemol	0.01	Sesquiterpenic alcohol
Epiglobulol	0.01	Sesquiterpenic alcohol
Palustrol	0.06	Sesquiterpenic alcohol
(E)-Nerolidol	0.52	Sesquiterpenic alcohol
Spathulenol	0.01	Sesquiterpenic alcohol
Caryophyllene oxide	0.12	Sesquiterpenic ether
Globulol	0.05	Sesquiterpenic alcohol
Viridiflorol	1.84	Sesquiterpenic alcohol
Cubeban-11-ol	0.01	Sesquiterpenic alcohol
Ledol	0.28	Sesquiterpenic alcohol
Unknown	0.01	Oxygenated sesquiterpene
Rosifoliol	0.02	Sesquiterpenic alcohol

1-epi-Cubenol	0.02	Sesquiterpenic alcohol
Isospathulenol	0.01	Sesquiterpenic alcohol
Cubenol	0.03	Sesquiterpenic alcohol
$\alpha$ -Muurolol	0.02	Sesquiterpenic alcohol
$\alpha$ -Eudesmol	0.03	Sesquiterpenic alcohol
(3Z)-Caryophylla-3,8(13)-dien-5 $\beta$ -ol	0.01	Sesquiterpenic alcohol
<b>Consolidated total</b>	<b>99.06%</b>	

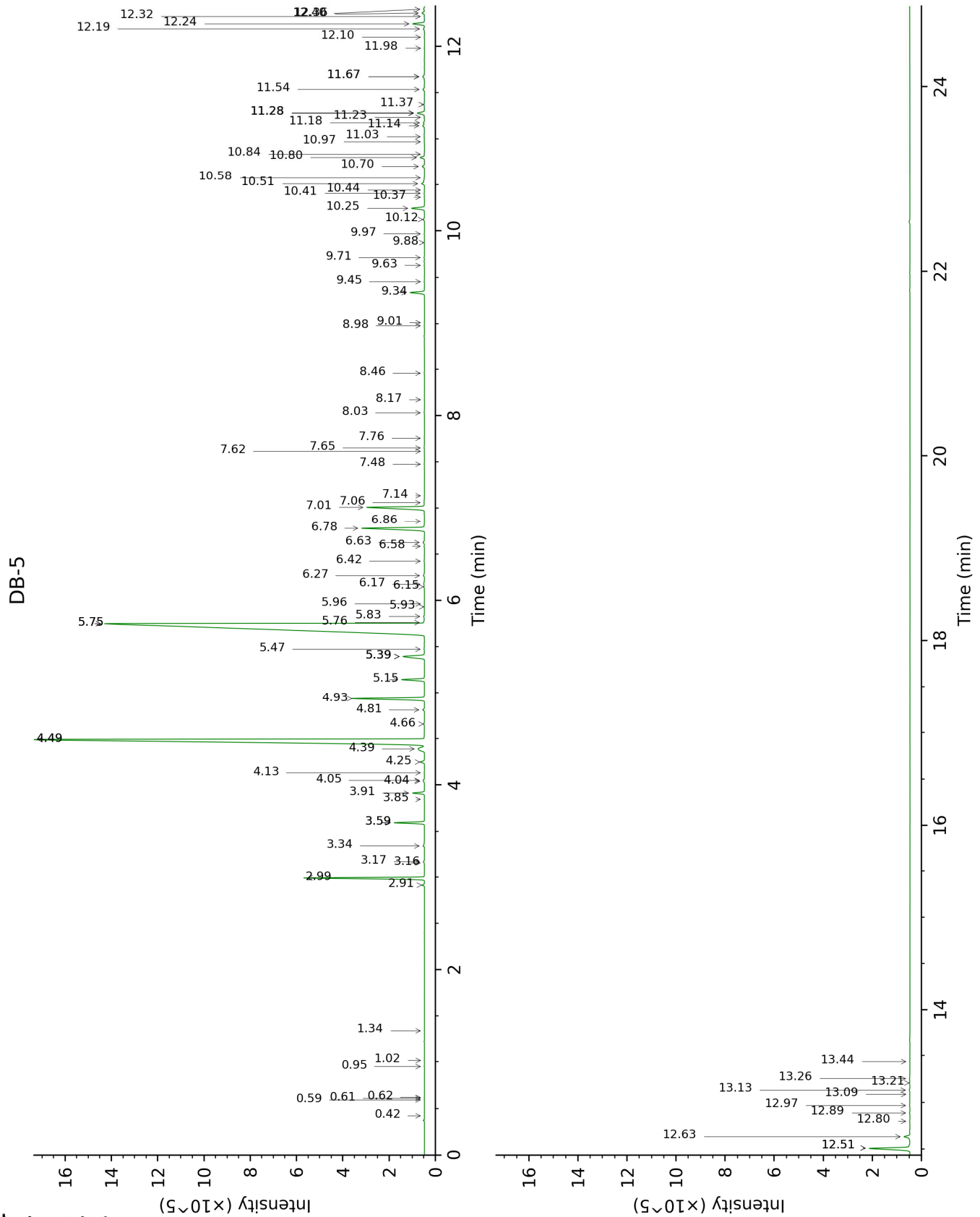
tr: The compound has been detected below 0.005% of total signal.

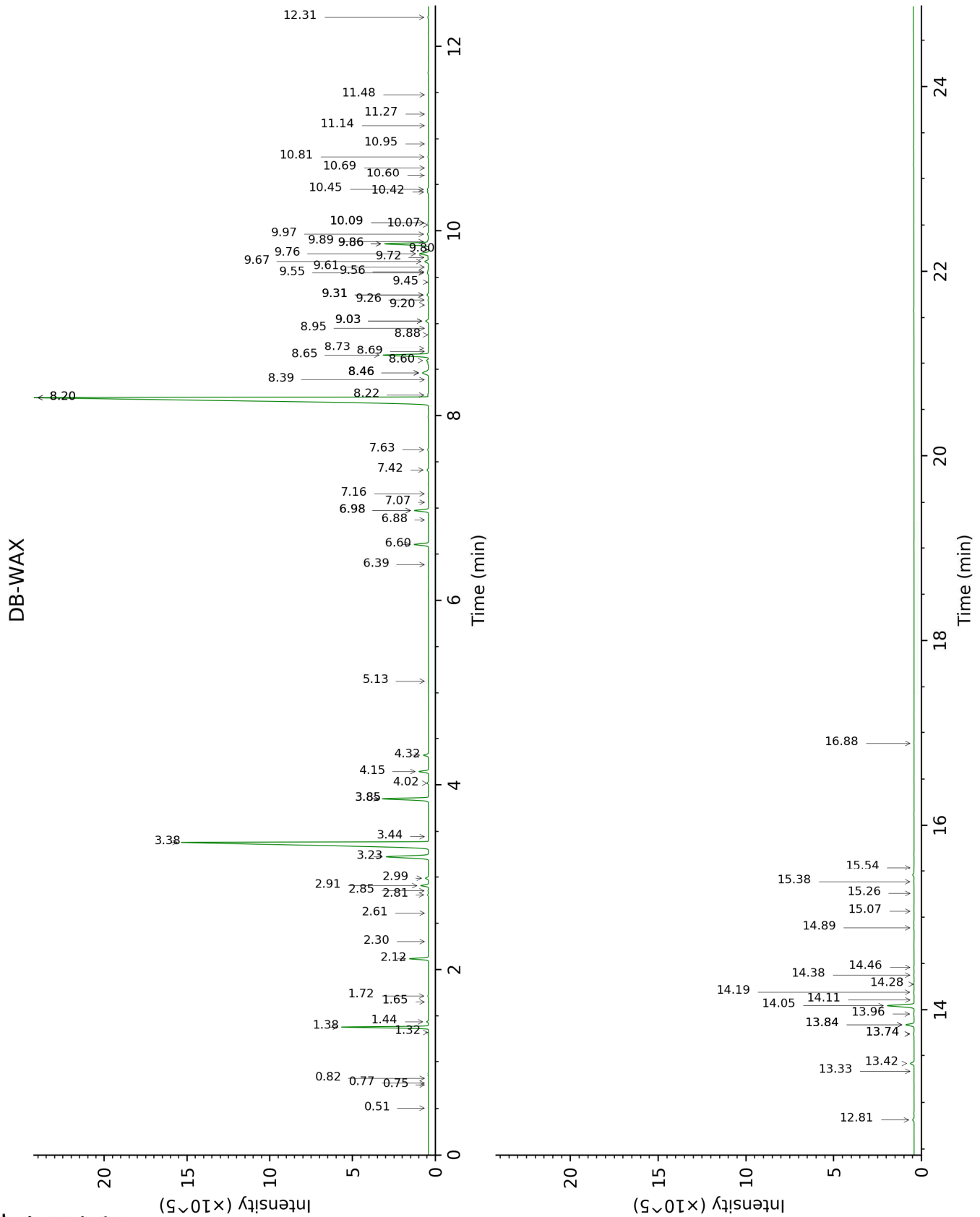
Note: no correction factor was applied

**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	%
Isobutyral	0.42	540	tr	0.50	782	0.01
Isovaleral	0.59	638	tr	0.77	888	tr
3-Methyl-2-butanone	0.61	646	tr	0.82	899	tr
2-Methylbutyral	0.62	650	tr	0.75	881	tr
2-Methylbutanol	0.95	739	tr	3.44	1175	0.01
3-Methyl-2-pentanone	1.02	749	tr	1.32	982	tr
Hexanal	1.34	795	tr			
$\alpha$ -Thujene	2.91	926	0.08	1.44	997	0.08
$\alpha$ -Pinene	2.99	931	4.10	1.38	991	4.10
$\alpha$ -Fenchene	3.16†	942	0.05	1.65	1019	0.01
Camphene	3.17†	943	[0.05]	1.72	1025	0.04
Benzaldehyde	3.34	954	0.08	7.42	1464	0.09
$\beta$ -Pinene	3.59*	971	1.04	2.12	1065	1.04
Sabinene	3.59*	971	[1.04]	2.30	1084	0.02
6-Methyl-5-hepten-2-one	3.85	988	0.01	5.13	1298	0.01
Myrcene	3.91	992	0.42	2.91	1133	0.43
Pseudolimonene	4.04	1000	0.02	2.85	1129	0.03
$\alpha$ -Phellandrene	4.05	1001	0.05	2.81	1125	0.05
$\Delta$ 3-Carene	4.13	1006	0.01	2.61	1110	0.01
$\alpha$ -Terpinene	4.25	1014	0.18	2.99	1140	0.18
para-Cymene	4.39	1022	0.56	4.15	1228	0.57
Limonene	4.49*	1029	29.99	3.23	1158	3.26
1,8-Cineole	4.49*	1029	[29.99]	3.38	1170	26.40
(Z)- $\beta$ -Ocimene	4.66	1039	0.03	3.85*	1206	2.89
(E)- $\beta$ -Ocimene	4.81	1049	0.07	4.02	1218	0.08
$\gamma$ -Terpinene	4.94	1057	2.82	3.85*	1206	[2.89]
cis-Linalool oxide (fur.)	5.15	1070	0.89	6.60	1404	0.90
Terpinolene	5.40*	1086	1.20	4.32	1240	0.31
trans-Linalool oxide (fur.)	5.40*	1086	[1.20]	6.98*	1432	0.90
para-Cymenene	5.40*	1086	[1.20]	6.39	1388	0.02
$\alpha$ -Pinene oxide	5.47	1091	0.03			
Hotrienol	5.75*	1108	45.69	8.88	1576	0.02
Linalool	5.75*	1108	[45.69]	8.20*	1523	45.73
endo-Fenchol	5.76	1109	0.05	8.46*	1544	0.60
cis-para-Menth-2-en-1-ol	5.83	1113	0.04	8.20*	1523	[45.73]
$\alpha$ -Campholenal	5.93	1120	0.02	7.07	1438	0.01
Unknown [m/z 43, 70 (95), 81 (71), 55 (55), 41 (47)...]	5.96	1122	0.01			
trans-Pinocarveol	6.15	1134	0.03	9.26	1606	0.04
trans-para-Menth-2-en-1-ol	6.17	1136	0.05	9.03*	1587	0.20

<i>cis</i> - $\alpha$ -Dihydroterpineol	6.27	1142	0.06	8.22	1525	0.06
Nerol oxide	6.42	1152	0.02	6.88	1424	0.02
Borneol	6.58	1162	0.02	9.86*	1654	2.92
$\delta$ -Terpineol	6.63	1165	0.07	9.55	1629	0.08
Terpinen-4-ol	6.78	1175	2.94	8.65	1558	2.91
<i>trans</i> -Linalool oxide (pyr.)	6.86	1180	0.01	10.69	1722	0.01
$\alpha$ -Terpineol	7.01	1190	2.86	9.86*	1654	[2.92]
<i>cis</i> -Piperitol	7.06	1193	0.05	9.56	1630	0.04
Unknown [m/z 43, 71 (80), 67 (55), 59 (51), 68 (44), 41 (43)...]	7.14	1198	0.01	10.95	1744	0.01
<i>trans</i> -Carveol	7.48	1221	0.02	11.48	1789	0.01
Nerol	7.62	1230	0.01	11.14	1761	0.02
Citronellol	7.65	1233	0.02	10.81	1732	0.04
Carvone	7.76	1240	0.01	10.07	1671	0.02
Unknown [m/z 69, 41 (75), 109 (35), 95 (34), 55 (28), 43 (27), 110 (26)...]	8.03	1259	0.03			
<i>trans</i> -Ascaridole glycol	8.17	1269	0.01	14.28	2043	0.01
<i>cis</i> -Ascaridole glycol	8.46	1288	0.02	14.89	2102	0.02
Unknown [m/z 97, 112 (92), 83 (62), 43 (44), 41 (25)... 170? (4)]	8.98	1320	0.01	15.07	2120	0.01
Methyl geranate	9.01	1322	0.01	9.80	1649	0.01
$\alpha$ -Terpinyl acetate	9.34	1346	0.62	9.76	1646	0.61
Citronellyl acetate	9.45	1354	0.02	9.45	1621	0.02
Isoledene	9.63	1366	0.02	6.98*	1432	[0.90]
$\alpha$ -Copaene	9.71	1372	0.02	7.16	1445	0.02
Geranyl acetate	9.88	1384	0.01	10.60	1715	0.01
Unknown [m/z 93, 122 (98), 161 (98), 107 (86), 95 (46), 105 (72)... 204 (34)]	9.97	1390	0.02			
$\alpha$ -Gurjunene	10.12	1402	0.06	7.63	1480	0.06
$\beta$ -Caryophyllene	10.25	1411	0.58	8.46*	1544	[0.60]
$\gamma$ -Maaliene	10.36	1420	0.01	8.46*	1544	[0.60]
$\beta$ -Gurjunene	10.41	1423	0.02	8.39	1538	0.03
$\alpha$ -Maaliene	10.44	1425	0.01	8.69	1562	0.01
Aromadendrene	10.51	1431	0.13	8.60	1554	0.13
Selina-5,11-diene	10.58	1435	0.02	8.73	1564	0.02
$\alpha$ -Humulene	10.70	1445	0.10	9.31*	1610	0.10
allo-Aromadendrene	10.80	1452	0.19	9.03*	1587	[0.20]
Valerena-4,7(11)-diene	10.84	1455	0.01	8.95	1581	0.01

$\gamma$ -Gurjunene	10.97	1465	0.01	9.20	1601	0.02
<i>trans</i> -Cadina-1(6),4-diene	11.03	1469	0.03	9.31*	1610	[0.10]
$\beta$ -Selinene	11.14	1478	0.09	9.89	1656	0.07
allo-Aromadendrene	11.18	1480	0.05	9.61	1634	0.02
$\delta$ -Selinene	11.24	1485	0.01	9.72	1642	0.04
$\alpha$ -Selinene	11.28*	1488	0.36	9.97	1663	0.08
Bicyclogermacrene	11.28*	1488	[0.36]	10.09*	1672	0.04
Viridiflorene	11.28*	1488	[0.36]	9.67	1639	0.27
$\alpha$ -Muurolene	11.37	1495	0.03	10.09*	1672	[0.04]
$\gamma$ -Cadinene	11.54	1508	0.08	10.42	1700	0.07
$\delta$ -Cadinene	11.67*	1518	0.11	10.45	1702	0.08
<i>trans</i> -Calamenene	11.67*	1518	[0.11]	11.27	1771	0.02
$\alpha$ -Elemol	11.98	1543	0.01	14.11	2027	0.01
Epiglobulol	12.10	1552	0.01	13.33	1954	0.01
Palustrol	12.19	1559	0.06	12.31	1862	0.06
( <i>E</i> )-Nerolidol	12.24	1563	0.52	13.84*	2002	0.54
Spathulenol	12.32	1570	0.01	14.46	2061	0.02
Caryophyllene oxide	12.36	1573	0.12	12.81	1907	0.11
Globulol	12.40	1576	0.05	13.96	2013	0.04
Viridiflorol	12.51*	1584	1.88	14.05	2021	1.84
Cubeban-11-ol	12.51*	1584	[1.88]	13.74*	1992	0.05
Ledol	12.63	1594	0.28	13.42	1962	0.26
Unknown [m/z 179, 161 (30), 109 922), 95 (18), 81 (17)... 204 (5), 222 (3)]	12.80	1607	0.01	14.19	2035	0.03
Rosifoliol	12.89	1615	0.02	14.38	2053	0.02
1-epi-Cubenol	12.97	1621	0.02	13.84*	2002	[0.54]
Isospathulenol	13.09	1631	0.01	15.54	2167	0.02
Cubenol	13.13	1635	0.03	13.74*	1992	[0.05]
$\alpha$ -Muurolol	13.21	1641	0.02	15.26	2139	0.01
$\alpha$ -Eudesmol	13.26	1645	0.03	15.38	2151	0.02
(3 <i>Z</i> )-Caryophylla-3,8(13)-dien-5 $\beta$ -ol	13.44	1660	0.01	16.88	2305	0.01
<b>Total identified</b>		<b>99.32%</b>			<b>98.93%</b>	
<b>Total reported</b>		<b>99.41%</b>			<b>98.98%</b>	

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

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

†: Peaks apexes were resolved, but peaks overlapped and were summed for analysis

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

Note: no correction factor was applied

R.T.: Retention time (minutes)

R.I.: Retention index