

Date : December 10, 2020

CERTIFICATE OF ANALYSIS – GC PROFILING

SAMPLE IDENTIFICATION

Internal code : 20L04-PTH03

Customer identification : Cinnamon Leaf - CB0105208R

Type : Essential oil

Source : *Cinnamomum verum*

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

Analysis date : December 07, 2020

Checked and approved by :

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

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PHYSICOCHEMICAL DATA

Physical aspect: Light yellow liquid

Refractive index: 1.5331 ± 0.0003 (20 °C; method PC-MAT-016)

ISO 3524:2004 - OIL OF CINNAMON LEAF, SRI LANKA TYPE

Compound	Min. %	Max. %	Observed %	Complies?
Benzyl benzoate	2.0	4.0	3.3	Yes
Eugenyl acetate	1.3	3.0	1.5	Yes
(E)-Cinnamyl acetate	1.1	1.8	0.9	No
Eugenol	70.0	83.0	77.6	Yes
(E)-Cinnamal	0.8	1.5	1.2	Yes
Refractive index	1.5270	1.5400	1.5331	Yes

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
Isovaleral	tr	Aliphatic aldehyde
Styrene	0.02	Simple phenolic
Tricyclene	0.01	Monoterpene
α -Thujene	0.08	Monoterpene
α -Pinene	1.06	Monoterpene
α -Fenchene	0.01	Monoterpene
Camphene	0.22	Monoterpene
Benzaldehyde	0.14	Simple phenolic
β -Pinene	0.29	Monoterpene
Sabinene	0.01	Monoterpene
Myrcene	0.10	Monoterpene
α -Phellandrene	0.73	Monoterpene
Octanal	0.02	Aliphatic aldehyde
Δ^3 -Carene	0.06	Monoterpene
α -Terpinene	0.08	Monoterpene
ortho-Cymene	0.02	Monoterpene
para-Cymene	0.60	Monoterpene
Limonene	0.32	Monoterpene
β -Phellandrene	0.28	Monoterpene
1,8-Cineole	0.08	Monoterpenic ether
Benzyl alcohol	0.01	Simple phenolic
(Z)- β -Ocimene	0.03	Monoterpene
(E)- β -Ocimene	0.04	Monoterpene
γ -Terpinene	tr	Monoterpene
Acetophenone	0.01	Simple phenolic
cis-Sabinene hydrate	0.01	Monoterpenic alcohol
cis-Linalool oxide (fur.)	0.01	Monoterpenic alcohol
Isoterpinolene	0.01	Monoterpene
Terpinolene	0.07	Monoterpene
trans-Linalool oxide (fur.)	0.01	Monoterpenic alcohol
para-Cymenene	0.01	Monoterpene
trans-Sabinene hydrate	0.01	Monoterpenic alcohol
Linalool	2.21	Monoterpenic alcohol
(3E)-2,7-Dimethyl-3,6-octadien-2-ol	0.04	Monoterpenic alcohol
cis-para-Menth-2-en-1-ol	0.01	Monoterpenic alcohol
trans-Pinocarveol	0.01	Monoterpenic alcohol
Camphor	0.01	Monoterpenic ketone
Camphene hydrate	0.01	Monoterpenic alcohol
Hydrocinnamal	0.04	Phenylpropanoid
Borneol	0.07	Monoterpenic alcohol
Benzyl acetate	0.02	Phenolic ester
Terpinen-4-ol	0.07	Monoterpenic alcohol
Cryptone	0.01	Normonoterpenic ketone
para-Cymen-8-ol	0.03	Monoterpenic alcohol
α -Terpineol	0.25	Monoterpenic alcohol

<i>cis</i> -Piperitol	0.02	Monoterpenic alcohol
<i>cis</i> - α -Phellandrene epoxide (IPP vs Me)	0.03	Monoterpenic ether
Hydrocinnamyl alcohol	0.06	Phenylpropanoid
Phenylethyl acetate	0.01	Phenolic ester
(<i>E</i>)-Cinnamal	1.18	Phenylpropanoid
Safrole	0.88	Phenylpropanoid
(<i>E</i>)-Cinnamyl alcohol	0.06	Phenylpropanoid
α -Cubebene	0.02	Sesquiterpene
Eugenol	77.61	Phenylpropanoid
Hydrocinnamyl acetate	0.07	Phenylpropanoid ester
ortho-Methoxyhydrocinnamal?	0.03	Phenylpropanoid
α -Copaene	0.62	Sesquiterpene
β -Cubebene	0.01	Sesquiterpene
β -Elemene	0.02	Sesquiterpene
α -Gurjunene	tr	Sesquiterpene
Methyleugenol	0.04	Phenylpropanoid
β -Caryophyllene	3.73	Sesquiterpene
Caryophylla-4(12),8(13)-diene	tr	Sesquiterpene
(<i>E</i>)-Cinnamyl acetate	0.89	Phenylpropanoid ester
α -Humulene	0.48	Sesquiterpene
(<i>E</i>)-Isoeugenol	0.13	Phenylpropanoid
allo-Aromadendrene	0.03	Sesquiterpene
<i>trans</i> -Cadina-1(6),4-diene	0.01	Sesquiterpene
γ -Murolene	0.02	Sesquiterpene
Germacrene D	0.01	Sesquiterpene
Unknown	0.02	Sesquiterpene
ar-Curcumene	0.01	Sesquiterpene
Bicyclogermacrene	0.03	Sesquiterpene
Viridiflorene	0.04	Sesquiterpene
α -Murolene	0.02	Sesquiterpene
γ -Cadinene	0.03	Sesquiterpene
Cubebol	0.01	Sesquiterpenic alcohol
δ -Cadinene	0.12	Sesquiterpene
<i>trans</i> -Calamenene	0.03	Sesquiterpene
Eugenyl acetate	1.52	Phenylpropanoid ester
<i>trans</i> -Cadina-1,4-diene	0.02	Sesquiterpene
(<i>E</i>)-ortho-Methoxycinnamal	0.02	Phenylpropanoid
α -Calacorene	0.02	Sesquiterpene
Isocaryophyllene epoxide B	0.02	Sesquiterpenic ether
Spathulenol	0.04	Sesquiterpenic alcohol
Caryophyllene oxide	0.32	Sesquiterpenic ether
Humulene epoxide II	0.05	Sesquiterpenic ether
Tetradecanal	0.03	Aliphatic aldehyde
1,10-diepi-Cubenol	0.01	Sesquiterpenic alcohol
Caryophylladienol I	0.02	Sesquiterpenic alcohol
Caryophylladienol II	0.03	Sesquiterpenic alcohol
τ -Cadinol	0.01	Sesquiterpenic alcohol
τ -Muurolool	0.02	Sesquiterpenic alcohol
α -Cadinol	0.01	Sesquiterpenic alcohol
(3 <i>Z</i>)-Caryophylla-3,8(13)-dien-5 β -ol	0.03	Sesquiterpenic alcohol
(<i>E</i>)-Coniferyl alcohol	0.01	Phenylpropanoid
(<i>E</i>)-Coniferaldehyde	0.01	Phenylpropanoid

Benzyl benzoate	3.33	Phenolic ester
Phenylethyl benzoate	0.04	Phenolic ester
Unknown	0.01	Unknown
Unknown	0.01	Unknown
Unknown	0.01	Unknown
Unknown	0.06	Lignan
Unknown	0.02	Lignan
Unknown	0.02	Unknown
Consolidated total	99.06%	

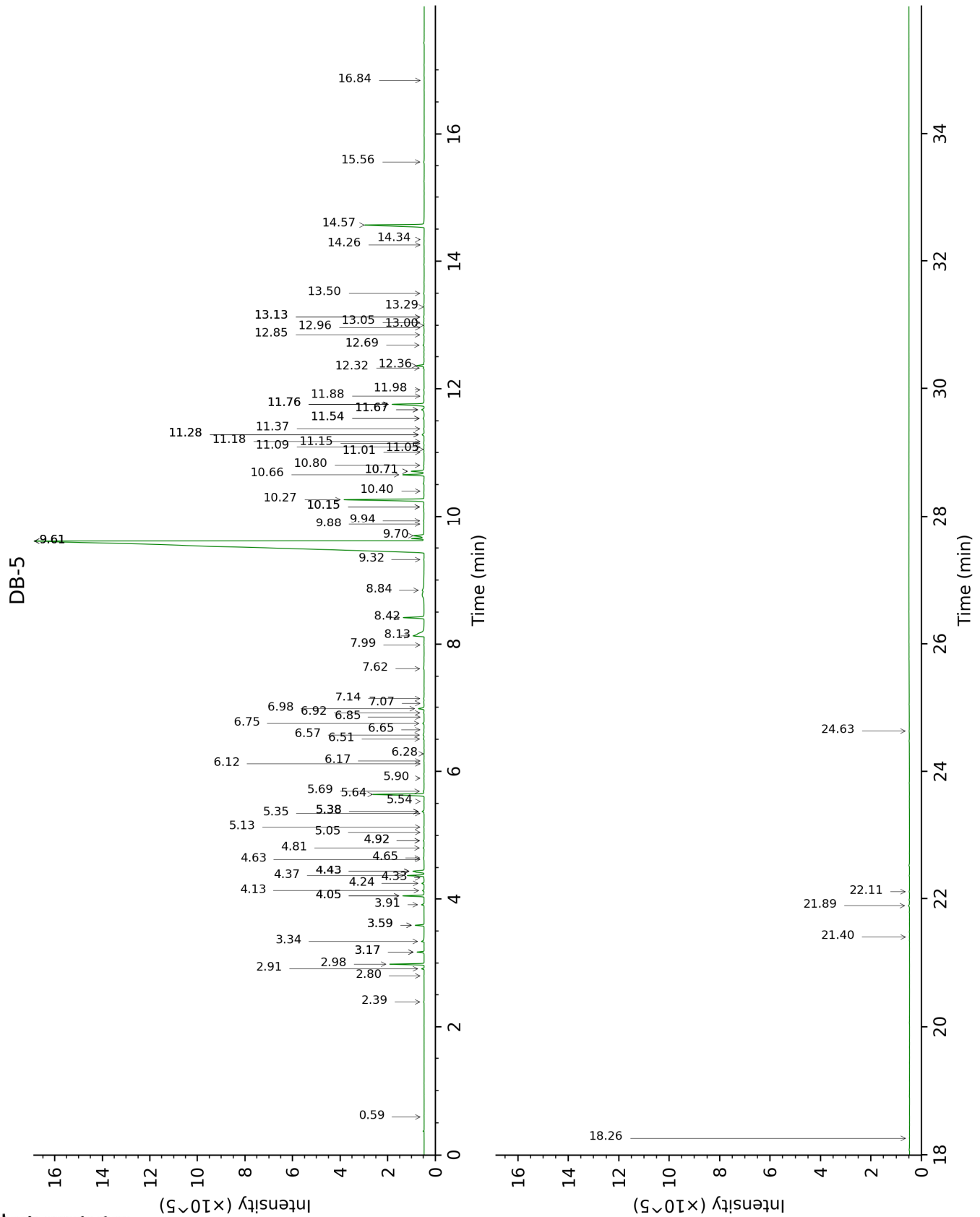
tr: The compound has been detected below 0.005% of total signal.

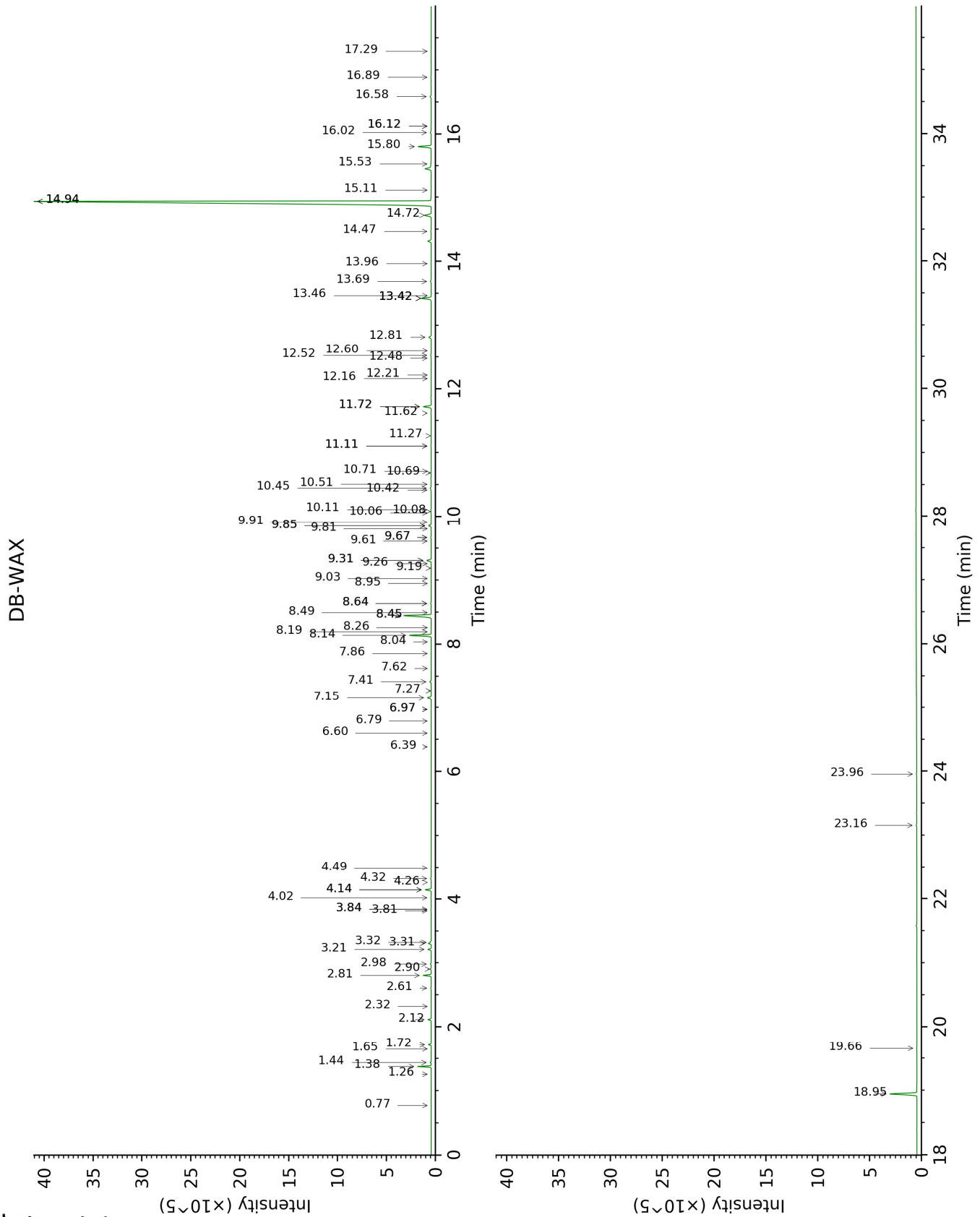
Note: no correction factor was applied

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	%
Isovaleral	0.59	639	tr	0.77	888	tr
Styrene	2.39	888	0.02	3.84*†	1205	[0.05]
Tricyclene	2.80	918	0.01	1.26	970	0.01
α-Thujene	2.91	926	0.08	1.44	997	0.08
α-Pinene	2.98	930	1.06	1.38	990	1.04
α-Fenchene	3.17*	943	0.24	1.65	1018	0.01
Camphene	3.17*	943	[0.24]	1.72	1025	0.22
Benzaldehyde	3.34	954	0.14	7.41	1464	0.15
β-Pinene	3.59*	970	0.30	2.12	1065	0.29
Sabinene	3.59*	970	[0.30]	2.32	1086	0.01
Myrcene	3.91	992	0.10	2.90	1133	0.10
α-Phellandrene	4.05*	1001	0.75	2.81	1125	0.73
Octanal	4.05*	1001	[0.75]	4.49	1253	0.02
Δ ³ -Carene	4.13	1006	0.06	2.61	1110	0.06
α-Terpinene	4.24	1013	0.08	2.98	1139	0.08
ortho-Cymene	4.33	1019	0.02	4.14*	1227	0.61
para-Cymene	4.37	1021	0.60	4.14*	1227	[0.61]
Limonene	4.43*	1025	0.68	3.21	1157	0.32
β-Phellandrene	4.43*	1025	[0.68]	3.31	1164	0.28
1,8-Cineole	4.43*	1025	[0.68]	3.32	1166	0.08
Benzyl alcohol	4.63	1037	0.01	11.72*	1810	0.91
(Z)-β-Ocimene	4.65	1039	0.03	3.81†	1203	0.05
(E)-β-Ocimene	4.81	1049	0.04	4.02	1218	0.04
γ-Terpinene	4.92*	1056	0.03	3.84*†	1205	[0.05]
Acetophenone	4.92*	1056	[0.03]	8.95	1581	0.01
cis-Sabinene hydrate	5.05	1064	0.01	6.97*	1431	0.02
cis-Linalool oxide (fur.)	5.13	1069	0.01	6.60	1404	0.01
Isoterpinolene	5.35	1083	0.01	4.26	1236	0.01
Terpinolene	5.38*	1085	0.09	4.32	1240	0.07
trans-Linalool oxide (fur.)	5.38*	1085	[0.09]	6.97*	1431	[0.02]
para-Cymenene	5.38*	1085	[0.09]	6.39	1388	0.01
trans-Sabinene hydrate	5.54	1095	0.01	8.04	1511	0.01
Linalool	5.64	1102	2.21	8.14	1519	2.19
(3E)-2,7-Dimethyl-3,6-octadien-2-ol	5.69	1105	0.04	8.26	1528	0.01
cis-para-Menth-2-en-1-ol	5.90	1118	0.01	8.19	1523	0.02
trans-Pinocarveol	6.12	1132	0.01	9.19	1600	0.01
Camphor	6.17	1135	0.01	7.27	1454	0.01
Camphene hydrate	6.28	1142	0.01	8.49	1546	0.01
Hydrocinnamal	6.51	1157	0.04	10.51	1707	0.04
Borneol	6.57	1161	0.07	9.85*	1654	0.28
Benzyl acetate	6.65	1167	0.02	10.08	1672	0.03
Terpinen-4-ol	6.75	1173	0.07	8.64*	1557	0.08
Cryptone	6.85	1179	0.01	9.26	1606	0.01
para-Cymen-8-ol	6.92	1184	0.03	11.62	1801	0.04
α-Terpineol	6.98	1188	0.25	9.85*	1654	[0.28]
cis-Piperitol	7.06	1193	0.02	9.61	1634	0.02

<i>cis</i> - α -Phellandrene epoxide (IPP vs Me)	7.14	1198	0.03	11.10*	1757	0.06
Hydrocinnamyl alcohol	7.62	1231	0.06	13.69	1987	0.09
Phenylethyl acetate	7.99	1256	0.01	11.10*	1757	[0.06]
(<i>E</i>)-Cinnamal	8.13	1266	1.18	13.42*	1963	1.22
Safrole	8.42	1285	0.88	11.72*	1810	[0.91]
(<i>E</i>)-Cinnamyl alcohol	8.84	1310	0.06	16.02	2216	0.10
α -Cubebene	9.32	1344	0.02	6.79	1418	0.01
Eugenol	9.61*†	1365	77.70	14.94*	2107	76.03
Hydrocinnamyl acetate	9.61*†	1365	[77.70]	12.52	1880	0.07
ortho-Methoxyhydrocinnamal?	9.61*†	1365	[77.70]	13.96	2013	0.03
α -Copaene	9.70	1371	0.62	7.15	1445	0.42
β -Cubebene	9.88	1384	0.01	7.86	1497	0.01
β -Elemene	9.94	1388	0.02	8.45*	1542	3.64
α -Gurjunene	10.16*	1404	0.05	7.62	1479	tr
Methyleugenol	10.16*	1404	[0.05]	13.42*	1963	[1.22]
β -Caryophyllene	10.27	1412	3.73	8.45*	1542	[3.64]
Caryophylla-4(12),8(13)-diene	10.40	1422	tr	8.64*	1557	[0.08]
(<i>E</i>)-Cinnamyl acetate	10.66	1442	0.89	14.72	2085	0.93
α -Humulene	10.71*	1446	0.61	9.31*	1610	0.53
(<i>E</i>)-Isoeugenol	10.71*	1446	[0.61]	16.58	2273	0.13
allo-Aromadendrene	10.80	1453	0.03	9.03	1587	0.03
<i>trans</i> -Cadina-1(6),4-diene	11.01	1468	0.01	9.31*	1610	[0.53]
γ -Muurolene	11.05	1471	0.02	9.67*	1639	0.06
Germacrene D	11.09	1474	0.01	9.81	1650	0.01
Unknown [m/z 91, 93 (92), 105 (71), 77 (69), 79 (68), 133 (63)... 204 (32)]	11.15	1478	0.02	9.91	1658	0.02
ar-Curcumene	11.18	1480	0.01	10.71	1724	0.01
Bicyclogermacrene	11.28*	1488	0.11	10.11	1674	0.03
Viridiflorene	11.28*	1488	[0.11]	9.67*	1639	[0.06]
α -Muurolene	11.37	1495	0.02	10.06	1670	0.01
γ -Cadinene	11.54*	1508	0.06	10.42	1700	0.03
Cubebol	11.54*	1508	[0.06]	12.60	1887	0.01
δ -Cadinene	11.67*	1518	0.15	10.45	1702	0.12
<i>trans</i> -Calamenene	11.67*	1518	[0.15]	11.26	1771	0.03
Eugenyl acetate	11.76*	1525	1.55	15.80	2193	1.52
<i>trans</i> -Cadina-1,4-diene	11.76*	1525	[1.55]	10.69	1722	0.02
(<i>E</i>)-ortho-Methoxycinnamal	11.76*	1525	[1.55]	17.29	2349	0.02
α -Calacorene	11.88	1535	0.02	12.16	1848	0.02
Isocaryophyllene epoxide B	11.98	1543	0.02	12.21	1853	0.01
Spathulenol	12.32	1570	0.04	14.47	2061	0.06
Caryophyllene oxide	12.36	1573	0.32	12.82	1907	0.31
Humulene epoxide II	12.69	1599	0.05	13.42*	1963	[1.22]
Tetradecanal	12.85	1612	0.03	12.48	1876	0.03
1,10-diepi-Cubenol	12.96	1621	0.01	13.46	1966	0.01
Caryophylladienol I	13.00	1624	0.02	16.12*	2226	0.03

Caryophylladienol II	13.05	1628	0.03	16.12*	2226	[0.03]
τ-Cadinol	13.13*	1635	0.03	14.94*	2107	[76.03]
τ-Muurolol	13.13*	1635	[0.03]	15.11	2124	0.02
α-Cadinol	13.29	1648	0.01	15.53	2166	0.02
(3Z)-Caryophylla-3,8(13)-dien-5β-ol	13.50	1665	0.03	16.89	2305	0.04
(E)-Coniferyl alcohol	14.26	1729	0.01	23.16	3056	0.09
(E)-Coniferaldehyde	14.34	1737	0.01	23.96	3166	0.03
Benzyl benzoate	14.57	1756	3.33	18.95	2532	3.30
Phenylethyl benzoate	15.56	1844	0.04	19.66	2614	0.03
Unknown [m/z 93, 92 (57), 136 (34), 91 (23), 77 (13), 134 (11)...]	16.84	1962	0.01			
Unknown [m/z 69, 91 (57), 41 (49), 181 (32), 169 (25), 167 (22)...]	18.26	2100	0.01			
Unknown [m/z 151, 93 (44), 153 (29), 92 (21), 179 (18)... 314? (10)]	21.40	2437	0.01			
Unknown [m/z 326, 148 (67), 147 (41), 117 (30), 91 (22)...]	21.89	2493	0.06			
Unknown [m/z 326, 150 (54), 161 (42), 202 (41), 201 (28)]	22.11	2519	0.02			
Unknown [m/z 137, 166 (86), 177 (80), 138 (72), 342 (37), 178 (12)...]	24.63	2830	0.02			
Total identified		99.00%			97.12%	
Total reported		99.14%			97.14%	

*: 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