Date : 2024-07-02

Certificate of Analysis - GC Profiling

Sample Identification

Internal code : 24E15-NPA02
Customer Identification : Cassia - Vietnam - Sample# NSP00153 - Lot# NP0370
Type : Essential Oil
Source : *Cinnamomum cassia*
Customer : Nature Packaged

Checked an approved by:

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

Notes: 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.

This report is an update from the first version issued on 2024-05-30 to format it for online publication.

Méthode certifiée ISO 17025:2017 Certified method

Laboratoire PhytoChemia

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Gas Chromatographic Analysis

Method : PC-MAT-014 - Analysis of the composition of an essential oil or other volatile liquide by FAST GC-FID
ISO
Results : See analysis summary (next page)
Analyst : Sylvain Mercier, M. Sc., Chimiste 2014-005
Date : 2024-05-22

Physicochemical data

Refractive index : 1.609 ± 0.0003 (20 °C)
Method : PC-MAT-016 - Measure of the refractive index of a liquid.
Analyst : Cindy Caron B. Sc.
Date : 2024-05-16

Conclusion

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

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Analysis Summary - Consolidated Contents

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

Identification	%	Class
Hexanal	0.01	Aliphatic aldehyde
Styrene	0.68	Simple phenolic
α-Pinene	0.11	Monoterpene
Camphene	0.05	Monoterpene
Benzaldehyde	0.80	Simple phenolic
β-Pinene	0.04	Monoterpene
6-Methyl-5-hepten-2-one	0.02	Aliphatic ketone
Benzofuran	0.02	Simple phenolic
Octanal	0.01	Aliphatic aldehyde
para-Cymene	0.02	Monoterpene
β-Phellandrene	[0.02]	Monoterpene
1,8-Cineole	[0.02]	Monoterpenic ether
Limonene	0.02	Monoterpene
Salicylaldehyde	0.28	Simple phenolic
γ-Terpinene	0.01	Monoterpene
Acetophenone	0.08	Simple phenolic
ortho-Guaiacol	0.01	Simple phenolic
Nonanal	0.01	Aliphatic aldehyde
Phenylethyl alcohol	0.27	Simple phenolic
ortho-Vinylanisole	0.01	Simple phenolic
2-Methylbenzofuran	0.04	Phenylpropanoid
Unknown	0.14	Phenylpropanoid
Hydrocinnamal	0.40	Phenylpropanoid
Borneol	0.05	Monoterpenic alcohol
3-Methylbenzofuran?	0.11	Phenylpropanoid
Terpinen-4-ol	0.01	Monoterpenic alcohol
α-Terpineol	0.02	Monoterpenic alcohol
Methyl salicylate	0.01	Phenolic ester
(*Z*)-Cinnamal	0.47	Phenylpropanoid
Hydrocinnamyl alcohol	0.13	Phenylpropanoid
ortho-Anisaldehyde	0.06	Simple phenolic
Phenylethyl acetate	0.04	Phenolic ester
(*E*)-Cinnamal	83.20	Phenylpropanoid
(*E*)-Cinnamyl alcohol	0.23	Phenylpropanoid
Eugenol	0.04	Phenylpropanoid
Cyclosativene I	0.04	Sesquiterpene
Cyclosativene II	0.01	Sesquiterpene
ortho-Methoxyhydrocinnamal?	0.06	Phenylpropanoid
α-Copaene	0.29	Sesquiterpene
Methyl (*E*)-cinnamate	0.02	Phenylpropanoid ester

β-Elemene	0.02	Sesquiterpene
β-Caryophyllene	0.11	Sesquiterpene
cis-α-Bergamotene	0.03	Sesquiterpene
Coumarin	5.80	Coumarin
trans-α-Bergamotene	0.13	Sesquiterpene
(*E*)-Cinnamyl acetate	1.53	Phenylpropanoid ester
α-Humulene	0.02	Sesquiterpene
(*E*)-Cinnamic acid	0.04	Phenylpropanoid
(*Z*)-*ortho*-Methoxycinnamal	0.04	Phenylpropanoid
allo-Aromadendrene	0.09	Sesquiterpene
(*E*)-β-Farnesene	0.05	Sesquiterpene
γ-Muurolene	0.12	Sesquiterpene
ar-Curcumene	0.09	Sesquiterpene
Viridiflorene	0.06	Sesquiterpene
α-Selinene	0.02	Sesquiterpene
α-Muurolene	0.07	Sesquiterpene
(3-Phenyloxiran-2-yl)methyl acetate	0.01	Aliphatic alcohol
γ-Cadinene	0.07	Sesquiterpene
β-Bisabolene	0.19	Sesquiterpene
trans-Calamenene	0.04	Sesquiterpene
δ-Cadinene	0.14	Sesquiterpene
(*E*)-*ortho*-Methoxycinnamal	1.46	Phenylpropanoid
α-Calacorene	0.04	Sesquiterpene
(*E*)-α-Bisabolene	0.02	Sesquiterpene
(*E*)-Nerolidol	0.20	Sesquiterpenic alcohol
Spathulenol	0.07	Sesquiterpenic alcohol
Caryophyllene oxide isomer	0.01	Sesquiterpenic ether
Caryophyllene oxide	0.06	Sesquiterpenic ether
Humulene epoxide II	0.01	Sesquiterpenic ether
1-epi-Cubenol	0.02	Sesquiterpenic alcohol
Caryophylladienol II	0.02	Sesquiterpenic alcohol
τ-Muurolol	0.02	Sesquiterpenic alcohol
τ-Cadinol	0.02	Sesquiterpenic alcohol
α-Muurolol	0.02	Sesquiterpenic alcohol
α-Cadinol	0.03	Sesquiterpenic alcohol
(3*Z*)-Caryophylla-3,8(13)-dien-5β-ol	0.03	Sesquiterpenic alcohol
Mustakone	0.01	Sesquiterpenic ketone
Cadalene	0.01	Sesquiterpene
α-Bisabolol	0.03	Sesquiterpenic alcohol
Benzyl benzoate	0.03	Phenolic ester
Phenylethyl benzoate	0.04	Phenolic ester
Biformene?	0.05	Diterpene
Sandaracopimaradiene?	0.03	Diterpene
Manoyl oxide	0.01	Diterpenic ether
Dolabradiene	0.03	Diterpene

Kaur-16-ene	0.01	Diterpene
Consolidated total	**98.80**	

tr: The compound has been detected below 0.005% of the 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.
Bracketed value ([xx]): A bracketed percent value indicate that two or more compound percentage could not be solved due to coelution.

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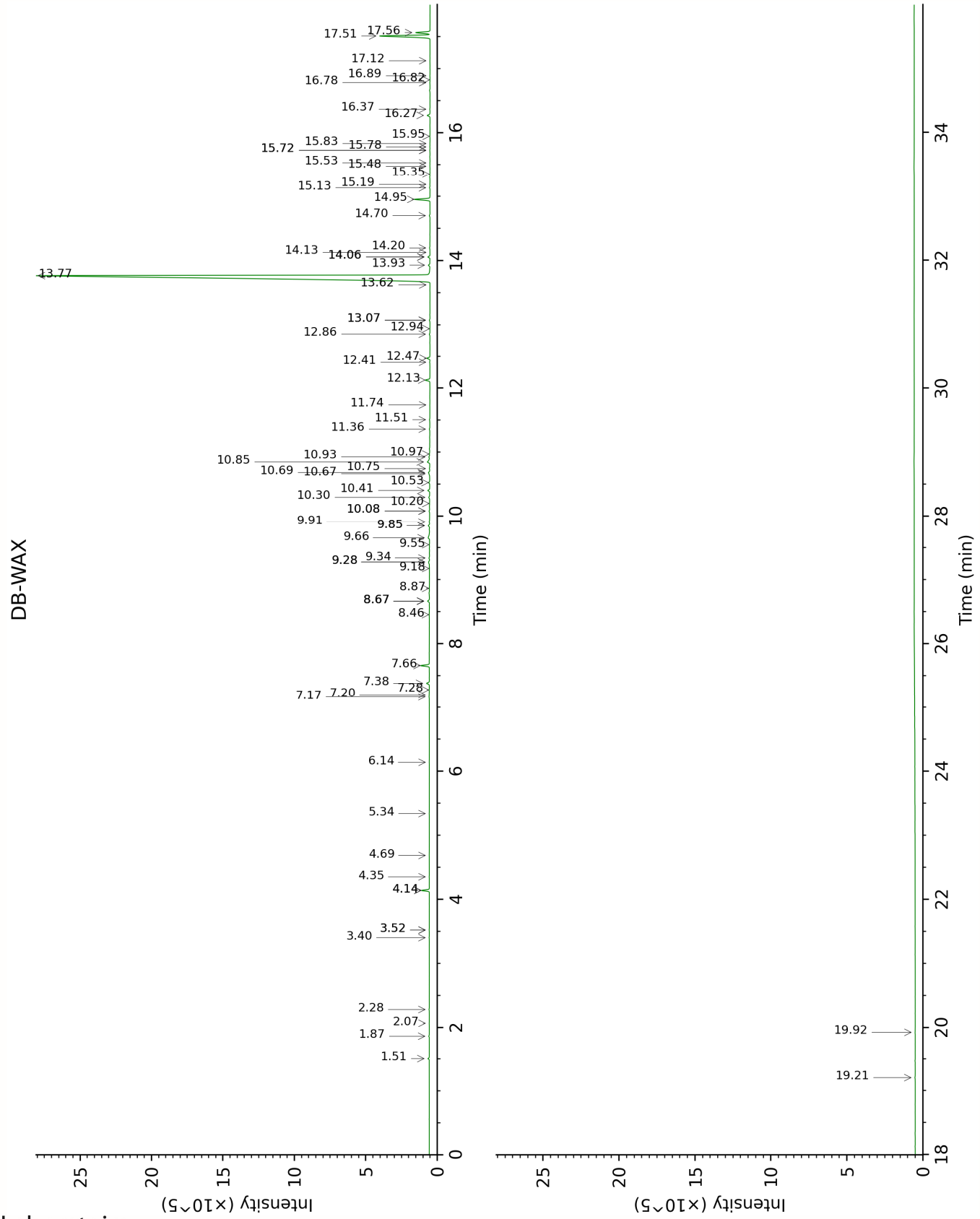
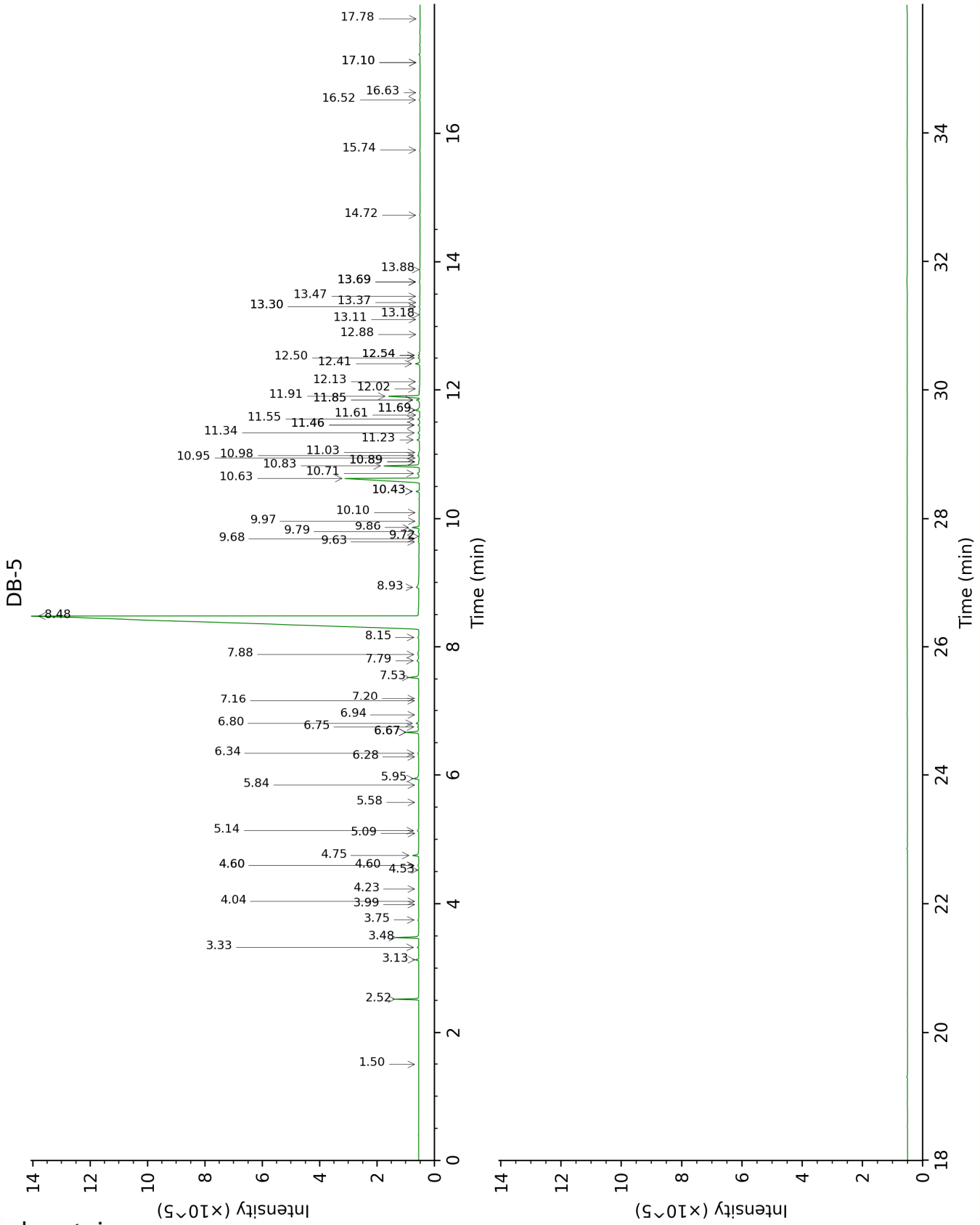

DB-WAX
Time (min)
Intensity (×10^5)
17.51
17.56
17.12
16.78
16.89
16.82
16.37
16.27
15.95
15.72
15.83
15.78
15.53
15.48
15.35
15.13
15.19
14.95
14.70
14.13
14.06
14.20
13.93
13.77
13.62
13.07
12.86
12.94
12.41
12.47
12.13
11.74
11.51
11.36
10.85
10.93
10.97
10.69
10.67
10.75
10.53
10.41
10.30
10.20
10.08
9.91
9.85
9.66
9.55
9.28
9.34
9.18
8.87
8.67
8.46
7.66
7.38
7.28
7.17
7.20
6.14
5.34
4.69
4.35
4.14
3.52
3.40
2.28
2.07
1.87
1.51
19.92
19.21


DB-5
17.78
17.10
16.63
16.52
15.74
14.72
13.88
13.69
13.47
13.37
13.30
13.18
13.11
12.88
12.54
12.50
12.41
12.13
12.02
11.91
11.85
11.69
11.61
11.55
11.46
11.34
11.23
11.03
10.98
10.95
10.89
10.83
10.71
10.63
10.43
10.10
9.97
9.86
9.79
9.72
9.68
9.63
8.93
8.48
8.15
7.88
7.79
7.53
7.20
7.16
6.94
6.80
6.75
6.67
6.34
6.28
5.95
5.84
5.58
5.14
5.09
4.75
4.60
4.60
4.53
4.23
4.04
3.99
3.75
3.48
3.33
3.13
2.52
1.50
Time (min)
Intensity (×10^5)
Time (min)
Intensity (×10^5)

FULL ANALYSIS DATA

Hexanal	**Column DB-WAX**			**Column DB-5**		
	2.07	1045.7	0.01	1.50	800.5	0.01
Styrene	4.14*	1210.8	[0.69]	2.52	887.2	0.68
α-Pinene	1.51	990.9	0.10	3.13	931.2	0.11
Camphene	1.87	1026.4	0.05	3.33	944.0	0.05
Benzaldehyde	7.66	1465.8	0.82	3.48	954.1	0.80
β-Pinene	2.28	1066.2	0.03	3.75	972.1	0.04
6-Methyl-5-hepten-2-one	5.34	1297.4	0.02	3.99	988.0	0.02
Benzofuran	7.28	1437.7	0.02	4.04	991.3	0.02
Octanal	4.69	1248.8	0.01	4.23	1004.0	0.01
para-Cymene	4.35	1225.6	0.02	4.53	1022.4	0.02
β-Phellandrene	3.52*	1165.6	[0.02]	4.60*	1027.0	[0.04]
1,8-Cineole	3.52*	1165.6	[0.02]	4.60*	1027.0	[0.04]
Limonene	3.40	1156.7	0.02	4.60*	1027.0	[0.04]
Salicylaldehyde	9.66	1619.4	0.31	4.75	1036.7	0.28
γ-Terpinene	4.14*	1210.8	[0.69]	5.09	1058.1	0.01
Acetophenone	9.28*	1589.2	[0.14]	5.14	1060.8	0.08
ortho-Guaiacol	11.74	1791.3	0.01	5.58	1088.4	0.01
Nonanal	6.14	1354.8	0.01	5.84	1105.2	0.01
Phenylethyl alcohol	12.47	1855.1	0.30	5.95	1111.7	0.27
ortho-Vinylanisole	9.18	1581.3	0.01	6.28	1133.3	0.01
2-Methylbenzofuran	9.34	1594.1	0.05	6.34	1136.9	0.04
Unknown CICA I [m/z 133, 77 (86), 105 (75), 79 (68), 134 (48)]	13.07*	1908.7	[0.07]	6.67*	1157.7	[0.54]
Hydrocinnamal	10.85	1716.6	0.40	6.67*	1157.7	[0.54]
Borneol	10.08*	1653.7	[0.05]	6.75	1163.0	0.05
3-Methylbenzofuran?	10.53	1689.5	0.10	6.80	1166.6	0.11
Terpinen-4-ol	8.87	1557.5	0.02	6.94	1175.0	0.01
α-Terpineol	10.08*	1653.7	[0.05]	7.16	1189.1	0.02
Methyl salicylate	10.75	1707.9	0.04	7.20	1191.9	0.01
(*Z*)-Cinnamal	12.13	1825.3	0.47	7.53	1213.3	0.47
Hydrocinnamyl alcohol	13.93	1986.8	0.18	7.79	1230.6	0.13
ortho-Anisaldehyde	12.86	1888.9	0.07	7.88	1237.2	0.06
Phenylethyl acetate	11.36	1759.5	0.04	8.15	1255.0	0.04
(*E*)-Cinnamal	13.76	1971.8	82.75	8.48	1277.1	83.20
(*E*)-Cinnamyl alcohol	16.27	2214.8	0.30	8.93	1307.3	0.23
Eugenol	15.13	2101.7	0.04	9.63	1357.0	0.04
Cyclosativene I	7.17	1429.2	0.04	9.68	1360.3	0.04
Cyclosativene II	7.20	1431.8	0.03	9.72	1363.1	0.01
ortho-Methoxyhydrocinnamal?	14.20	2012.2	0.06	9.79	1368.4	0.06
α-Copaene	7.38	1445.3	0.29	9.86	1372.9	0.29

Methyl (*E*)-cinnamate	14.13	2005.6	0.01	9.97	1380.5	0.02
β-Elemene	8.67*	1542.2	[0.19]	10.10	1389.9	0.02
β-Caryophyllene	8.67*	1542.2	[0.19]	10.43*	1413.6	[0.14]
cis-α-Bergamotene	8.46	1525.9	0.03	10.43*	1413.6	[0.14]
Coumarin	17.51	2343.6	5.88	10.63	1428.6	5.80
trans-α-Bergamotene	8.67*	1542.2	[0.19]	10.71	1434.5	0.13
(*E*)-Cinnamyl acetate	14.95	2083.9	1.54	10.83	1443.2	1.53
α-Humulene	9.55	1610.8	0.02	10.89*	1447.9	[0.07]
(*E*)-Cinnamic acid				10.89*	1447.9	[0.07]
(*Z*)-*ortho*-Methoxycinnamal	15.94	2181.6	0.03	10.95	1452.3	0.04
allo-Aromadendrene	9.28*	1589.2	[0.14]	10.98	1455.1	0.09
(*E*)-β-Farnesene	9.85*	1634.8	[0.15]	11.03	1458.7	0.05
γ-Muurolene	9.85*	1634.8	[0.15]	11.23	1473.3	0.12
ar-Curcumene	10.93	1723.1	0.11	11.34	1481.4	0.09
Viridiflorene	9.91	1639.8	0.06	11.46*	1490.4	[0.07]
α-Selinene	10.20	1663.3	0.02	11.46*	1490.4	[0.07]
α-Muurolene	10.30	1671.0	0.11	11.55	1497.3	0.07
(3-Phenyloxiran-2-yl)methyl acetate	16.89	2278.0	0.02	11.61	1502.0	0.01
γ-Cadinene	10.67	1701.1	0.07	11.69*	1507.9	[0.25]
β-Bisabolene	10.41	1679.7	0.19	11.69*	1507.9	[0.25]
trans-Calamenene	11.51	1771.9	0.04	11.85*	1520.3	[0.18]
δ-Cadinene	10.68	1702.6	0.14	11.85*	1520.3	[0.18]
(*E*)-*ortho*-Methoxycinnamal	17.56	2349.2	1.49	11.91	1524.9	1.46
α-Calacorene	12.41	1849.8	0.03	12.02	1533.9	0.04
(*E*)-α-Bisabolene	10.98	1727.0	0.05	12.13	1542.6	0.02
(*E*)-Nerolidol	14.06*	1998.9	[0.21]	12.41	1564.6	0.20
Spathulenol	14.70	2059.7	0.07	12.50	1571.6	0.07
Caryophyllene oxide isomer	12.94	1896.7	0.01	12.54*	1574.7	[0.07]
Caryophyllene oxide	13.07*	1908.7	[0.07]	12.54*	1574.7	[0.07]
Humulene epoxide II	13.62	1958.8	0.01	12.88	1601.0	0.01
1-epi-Cubenol	14.06*	1998.9	[0.21]	13.11	1620.0	0.02
Caryophylladienol II	16.37	2224.7	0.03	13.18	1626.1	0.02
τ-Muurolol	15.35	2123.1	0.02	13.30*	1636.2	[0.04]
τ-Cadinol	15.19	2106.9	0.02	13.30*	1636.2	[0.04]
α-Muurolol	15.53	2140.6	0.02	13.37	1641.7	0.02
α-Cadinol	15.78	2165.1	0.02	13.47	1649.6	0.03
(3*Z*)-Caryophylla-3,8(13)-dien-5β-ol	17.12	2302.8	0.03	13.69*	1668.1	[0.07]
Mustakone	15.83	2170.4	0.01	13.69*	1668.1	[0.07]
Cadalene	15.72*	2159.9	[0.04]	13.69*	1668.1	[0.07]
α-Bisabolol	15.72*	2159.9	[0.04]	13.88	1683.8	0.03

Benzyl benzoate	19.21	2529.8	0.05	14.72	1755.7	0.03
Phenylethyl benzoate	19.92	2612.2	0.03	15.74	1846.3	0.04
Biformene?				16.52	1917.6	0.05
Sandaracopimaradiene?	15.48	2135.4	0.03	16.63	1928.4	0.03
Manoyl oxide	16.82	2271.4	0.01	17.10*	1972.8	[0.04]
Dolabradiene	16.78	2267.1	0.03	17.10*	1972.8	[0.04]
Kaur-16-ene				17.78	2038.9	0.01
Total reported		98.41%			98.79%	

*: Two or more compounds are coeluting on this column

[xx]: Duplicate percentage due to coelutions, only the first one is 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

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