Date : 2025-07-10

Certificate of Analysis - GC Profiling

Sample Identification

Internal code : 25E06-PTH04
Customer Identification : Organic Clove Bud - Madagascar - CH0119R
Type : Essential Oil
Source : *Syzygium aromaticum*
Customer : Plant Therapy

Checked an approved by:

Alexis St-Gelais, Ph. D., 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Notes: This report may not be published, including online, without the written consent from Laboratoire PhytoChemia.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.

This report is an update from the first version issued on 2025-05-08 to correct the customer identification.

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 : 2025-05-07

Physicochemical data

Refractive index : 1.5344 ± 0.0003 (20 °C)
Method : PC-MAT-016 - Measure of the refractive index of a liquid.
Analyst : Cindy Caron B. Sc.
Date : 2025-05-06

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
Isovaleral	tr	Aliphatic aldehyde
2-Methylbutyral	tr	Aliphatic aldehyde
Furfural	0.03	Furan
2-Heptanone	0.01	Aliphatic ketone
5-Methylfurfural	tr	Furan
6-Methyl-5-hepten-2-one	0.01	Aliphatic ketone
Limonene	tr	Monoterpene
Benzyl alcohol	tr	Simple phenolic
2-Heptyl acetate	0.02	Aliphatic ester
(*E*)-β-Ocimene	0.01	Monoterpene
Terpinolene	0.01	Monoterpene
2-Nonanone	0.02	Aliphatic ketone
Linalool	0.02	Monoterpenic alcohol
(*E*)-4,8-Dimethylnona-1,3,7-triene	0.02	Terpene derivative
Benzyl acetate	0.01	Phenolic ester
Ethyl benzoate	0.01	Phenolic ester
Methyl salicylate	0.25	Phenolic ester
Chavicol	0.17	Phenylpropanoid
Chavicyl acetate	0.01	Phenylpropanoid ester
Eugenol	81.90	Phenylpropanoid
α-Copaene	0.05	Sesquiterpene
Vanillin	0.02	Simple phenolic
Methyleugenol	0.04	Phenylpropanoid
β-Caryophyllene	3.90	Sesquiterpene
Caryophylla-4(12),8(13)-diene	0.01	Sesquiterpene
9-epi-Isocaryophyllene	0.03	Sesquiterpene
α-Humulene	0.47	Sesquiterpene
(*E*)-Isoeugenol	0.02	Phenylpropanoid
trans-Cadina-1(6),4-diene	0.01	Sesquiterpene
γ-Muurolene	0.01	Sesquiterpene
Germacrene D	0.01	Sesquiterpene
β-Selinene	0.01	Sesquiterpene
α-Selinene	0.01	Sesquiterpene
α-Muurolene	0.01	Sesquiterpene
(3*Z*,6*E*)-α-Farnesene	0.01	Sesquiterpene
γ-Cadinene	0.01	Sesquiterpene
(3*E*,6*E*)-α-Farnesene	0.04	Sesquiterpene
trans-Calamenene	0.02	Sesquiterpene
δ-Cadinene	0.03	Sesquiterpene
Eugenyl acetate	11.37	Phenylpropanoid ester

Unknown	0.05	Unknown
Unknown	0.01	Phenylpropanoid
Caryophyllenyl alcohol	0.04	Sesquiterpenic alcohol
Caryophyllene oxide isomer	0.02	Sesquiterpenic ether
Clovenol?	0.02	Sesquiterpenic alcohol
Caryophyllene oxide	0.33	Sesquiterpenic ether
Widdrol	0.03	Sesquiterpenic alcohol
Humulene epoxide II	0.04	Sesquiterpenic ether
(*E*)-Isoeugenyl acetate	0.04	Phenylpropanoid ester
1-epi-Cubenol	0.01	Sesquiterpenic alcohol
Caryophylladienol I	0.03	Sesquiterpenic alcohol
Humulenol II	0.03	Sesquiterpenic alcohol
Caryophylladienol II	0.13	Sesquiterpenic alcohol
τ-Muurolol	0.01	Sesquiterpenic alcohol
τ-Cadinol	0.01	Sesquiterpenic alcohol
α-Muurolol	0.01	Sesquiterpenic alcohol
α-Cadinol	0.01	Sesquiterpenic alcohol
14-Hydroxy-(*Z*)-caryophyllene	0.06	Sesquiterpenic alcohol
(3*Z*)-Caryophylla-3,8(13)-dien-5β-ol	0.08	Sesquiterpenic alcohol
Germacra-4(15),5,10(14)-trien-1α-ol	0.01	Sesquiterpenic alcohol
Trimethoxypropylbenzene analog	0.01	Phenylpropanoid
(*E*)-Coniferyl alcohol	0.03	Phenylpropanoid
Benzyl benzoate	0.03	Phenolic ester
Benzyl salicylate	0.01	Phenolic ester
Unknown	0.01	Lignan
Unknown	0.02	Lignan
Consolidated total	**99.72**	

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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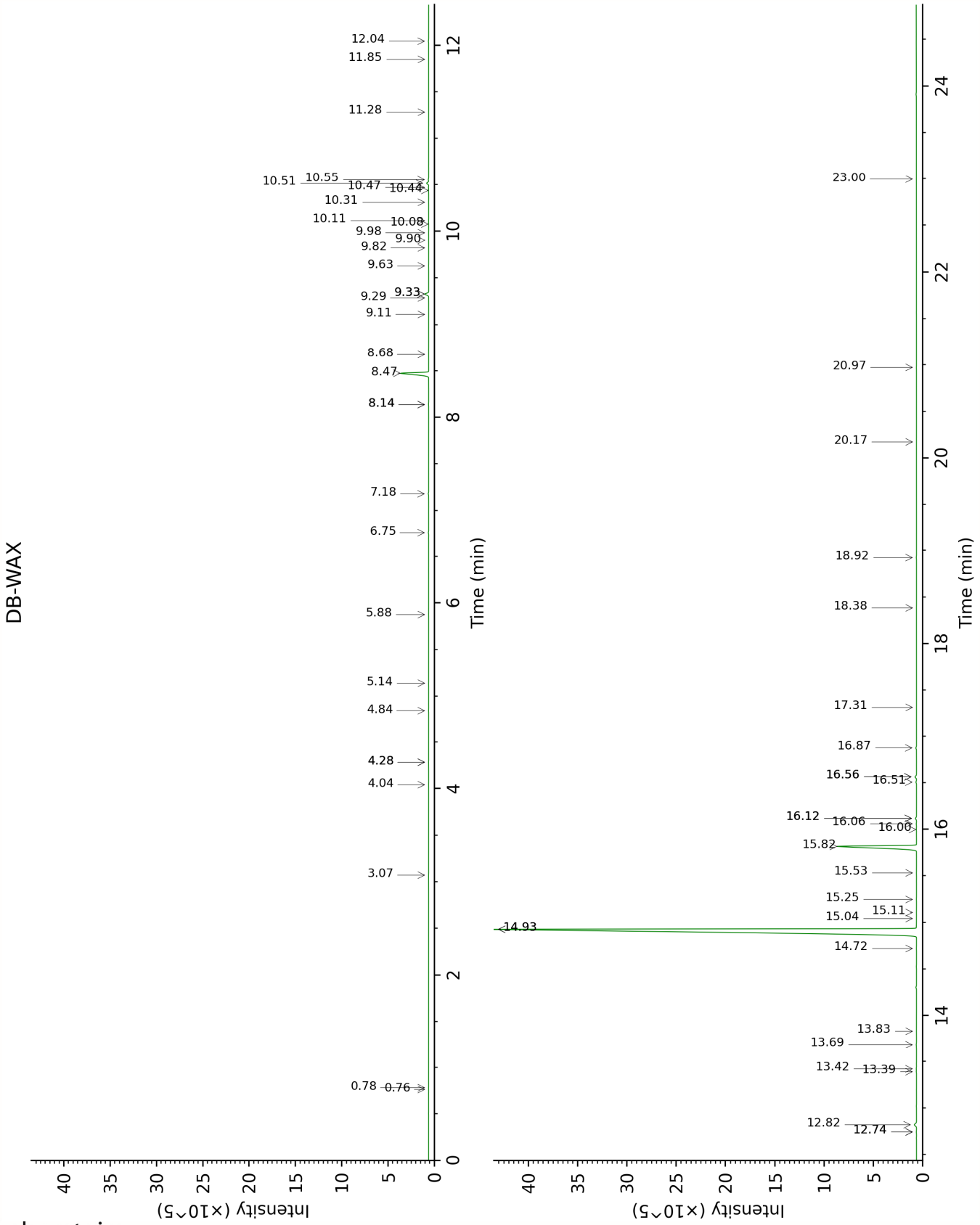
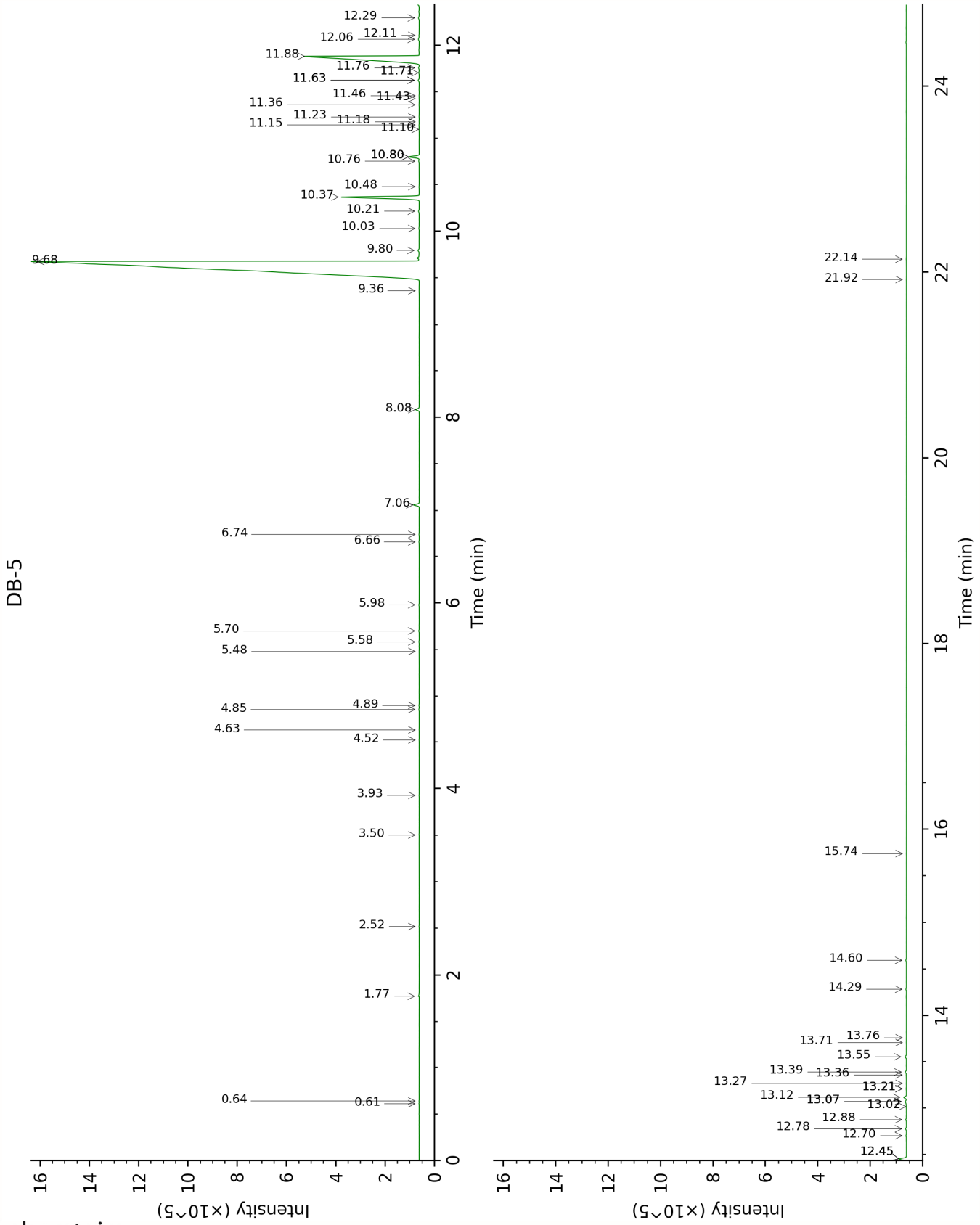

DB-WAX
12.04
11.85
11.28
10.51
10.55
10.47
10.44
10.31
10.11
10.08
9.98
9.90
9.82
9.63
9.29
9.33
9.11
8.68
8.47
8.14
7.18
6.75
5.88
5.14
4.84
4.28
4.04
3.07
0.78
0.76
Time (min)
Intensity (×10^5)
23.00
20.97
20.17
18.92
18.38
17.31
16.87
16.56
16.51
16.12
16.06
16.00
15.82
15.53
15.25
15.11
15.04
14.93
14.72
13.83
13.69
13.42
13.39
12.82
12.74
Time (min)
Intensity (×10^5)


DB-5
Time (min)
Intensity (×10^5)
12.29
12.06
12.11
11.88
11.76
11.71
11.63
11.46
11.43
11.36
11.23
11.18
11.15
11.10
10.76
10.80
10.48
10.37
10.21
10.03
9.80
9.68
9.36
8.08
7.06
6.74
6.66
5.98
5.70
5.58
5.48
4.85
4.89
4.63
4.52
3.93
3.50
2.52
1.77
0.64
0.61
22.14
21.92
15.74
14.60
14.29
13.71
13.76
13.55
13.39
13.36
13.27
13.21
13.12
13.07
13.02
12.88
12.78
12.70
12.45

FULL ANALYSIS DATA

	Column DB-WAX			Column DB-5		
Isovaleral	0.78	889.2	tr	0.61	643.0	tr
2-Methylbutyral	0.76	882.3	tr	0.64	653.7	tr
Furfural	6.76	1415.3	0.04	1.77	828.6	0.03
2-Heptanone	3.07	1145.0	0.01	2.52	891.5	0.01
5-Methylfurfural	8.14*	1517.7	[0.03]	3.50	959.7	tr
6-Methyl-5-hepten-2-one	5.14	1300.1	0.01	3.93	988.3	0.01
Limonene				4.52	1026.8	tr
Benzyl alcohol	11.85	1819.3	0.01	4.63	1033.6	tr
2-Heptyl acetate	4.28*	1237.2	[0.01]	4.85	1047.5	0.02
(*E*)-β-Ocimene	4.04	1219.5	0.01	4.89	1050.3	0.01
Terpinolene	4.28*	1237.2	[0.01]	5.48	1087.6	0.01
2-Nonanone	5.88	1352.3	0.01	5.58	1094.1	0.02
Linalool	8.14*	1517.7	[0.03]	5.70	1101.6	0.02
(*E*)-4,8-Dimethylnona-1,3,7-triene	4.84	1277.7	0.02	5.98	1119.7	0.02
Benzyl acetate	10.11	1672.8	0.01	6.66	1163.5	0.01
Ethyl benzoate	9.33*	1609.9	[0.48]	6.74	1168.7	0.01
Methyl salicylate	10.51	1705.7	0.25	7.06	1189.9	0.25
Chavicol	16.56*	2271.8	[0.19]	8.08	1258.8	0.17
Chavicyl acetate	12.74*	1898.3	[0.03]	9.36	1344.2	0.01
Eugenol	14.93*†	2104.8	[81.94]	9.68†	1366.5	81.80
α-Copaene	7.18	1446.5	0.05	9.80	1375.0	0.05
Vanillin	18.38	2471.2	0.01	10.03	1391.6	0.02
Methyleugenol	13.39	1957.9	0.03	10.21	1404.8	0.04
β-Caryophyllene	8.47	1543.5	3.91	10.37	1416.1	3.90
Caryophylla-4(12),8(13)-diene	8.68	1559.1	0.01	10.48	1424.5	0.01
9-epi-Isocaryophyllene	9.11	1592.4	0.01	10.76	1445.6	0.03
α-Humulene	9.33*	1609.9	[0.48]	10.80*	1449.1	[0.48]
(*E*)-Isoeugenol	16.56*	2271.8	[0.19]	10.80*	1449.1	[0.48]
trans-Cadina-1(6),4-diene	9.29	1606.5	tr	11.10	1471.2	0.01
γ-Muurolene	9.63	1634.0	0.02	11.15	1474.8	0.01
Germacrene D	9.82	1649.5	0.01	11.18	1477.3	0.01
β-Selinene	9.90	1656.0	0.01	11.23	1481.2	0.01
α-Selinene	9.98	1662.4	0.01	11.36	1491.0	0.01
α-Muurolene	10.08	1669.9	0.01	11.43	1495.9	0.01
(3*Z*,6*E*)-α-Farnesene	10.31	1688.6	0.01	11.46	1498.3	0.01
γ-Cadinene	10.44	1699.2	0.01	11.63*	1511.0	[0.05]
(3*E*,6*E*)-α-Farnesene	10.55	1708.9	0.04	11.63*	1511.0	[0.05]
trans-Calamenene	11.28	1770.4	0.01	11.71	1517.4	0.02
δ-Cadinene	10.47	1701.9	0.03	11.76	1521.5	0.03
Eugenyl acetate	15.82	2194.1	11.34	11.88	1531.4	11.37
Unknown SYAR II [m/z	12.04	1836.5	0.04	12.06	1545.7	0.05

164, 135 (98), 93 (86), 107 (83), 79 (69)...]						
Unknown SYAR III [m/z 180, 93 (70), 55 (62), 77 (55), 164 (55), 103 (50)]	20.97	2782.2	0.02	12.11	1549.1	0.01
Caryophyllenyl alcohol	13.69	1985.1	0.05	12.29	1563.9	0.04
Caryophyllene oxide isomer	12.74*	1898.3	[0.03]	12.45*	1576.5	[0.37]
Clovenol?	15.04	2116.3	0.02	12.45*	1576.5	[0.37]
Caryophyllene oxide	12.82	1905.5	0.33	12.45*	1576.5	[0.37]
Widdrol	14.72	2084.2	0.02	12.70	1596.2	0.03
Humulene epoxide II	13.42	1960.8	0.04	12.78	1602.1	0.04
(*E*)-Isoeugenyl acetate	17.31	2351.7	0.01	12.88	1610.0	0.04
1-epi-Cubenol	13.83	1999.0	0.02	13.02	1621.7	0.01
Caryophylladienol I	16.06	2219.4	0.03	13.07*	1626.2	[0.08]
Humulenol II	16.00	2213.0	0.03	13.07*	1626.2	[0.08]
Caryophylladienol II	16.12*	2225.4	[0.13]	13.12	1630.1	0.13
τ-Muurolol	15.11	2122.8	0.01	13.21*	1637.7	[0.02]
τ-Cadinol	14.93*†	2104.8	[81.94]	13.21*	1637.7	[0.02]
α-Muurolol	15.25	2136.8	0.02	13.27	1642.4	0.01
α-Cadinol	15.53	2165.3	0.01	13.36	1650.0	0.01
14-Hydroxy-(*Z*)-caryophyllene	16.51	2265.9	0.07	13.39	1652.6	0.06
(3*Z*)-Caryophylla-3,8(13)-dien-5β-ol	16.87	2304.9	0.08	13.55	1666.2	0.08
Germacra-4(15),5,10(14)-trien-1α-ol	16.12*	2225.4	[0.13]	13.71	1679.6	0.01
Trimethoxypropylbenzene analog				13.76	1683.8	0.01
(*E*)-Coniferyl alcohol	23.00	3049.9	0.01	14.28	1728.1	0.03
Benzyl benzoate	18.92	2533.6	0.03	14.60	1755.2	0.03
Benzyl salicylate	20.17	2682.4	0.01	15.74	1857.1	0.01
Unknown OCSA V [m/z 326, 148 (67), 147 (41), 117 (30), 91 (22)...]				21.92	2498.3	0.01
Unknown CIZE V [m/z 326, 150 (54), 161 (42), 202 (41), 201 (28)]				22.14	2524.2	0.02
Total reported		99.63%			99.64%	

*: 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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