

Date : 2024-04-03

CERTIFICATE OF ANALYSIS - GC PROFILING

SAMPLE IDENTIFICATION

Internal code : 24C19-PTH04

Customer Identification : Bergamot - Italy - B30114R

Type : Essential Oil

Source : *Citrus aurantium var. bergamia*

Customer : Plant Therapy

Checked and approved by:

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

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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 : 2024-03-28

PHYSICOCHEMICAL DATA

Refractive index : 1.4646 ± 0.0003 (20 °C)

Method : PC-MAT-016 - Measure of the refractive index of a liquid.

Analyst : Cindy Caron B. Sc.

Date : 2024-03-20

CONCLUSION

No clear 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
α -Thujene	0.02	Monoterpene
α -Pinene	1.38	Monoterpene
Camphene	0.02	Monoterpene
α -Fenchene	tr	Monoterpene
Thuja-2,4(10)-diene	tr	Monoterpene
Sabinene	1.03	Monoterpene
β -Pinene	6.56	Monoterpene
Myrcene	0.93	Monoterpene
α -Phellandrene	0.02	Monoterpene
Pseudolimonene	0.01	Monoterpene
Octanal	0.06	Aliphatic aldehyde
Δ^3 -Carene	0.08	Monoterpene
α -Terpinene	tr	Monoterpene
<i>para</i> -Cymene	0.14	Monoterpene
1,8-Cineole	tr	Monoterpenic ether
β -Phellandrene	0.12	Monoterpene
Limonene	41.81	Monoterpene
(<i>Z</i>)- β -Ocimene	0.12	Monoterpene
(<i>E</i>)- β -Ocimene	0.22	Monoterpene
γ -Terpinene	6.92	Monoterpene
<i>cis</i> -Sabinene hydrate	0.01	Monoterpenic alcohol
<i>cis</i> -Linalool oxide (fur.)	0.02	Monoterpenic alcohol
Octanol	0.01	Aliphatic alcohol
Isoterpinolene	0.01	Monoterpene
<i>trans</i> -Linalool oxide (fur.)	0.03	Monoterpenic alcohol
Terpinolene	0.17	Monoterpene
Nonanal	0.01	Aliphatic aldehyde
Linalool	12.13	Monoterpenic alcohol
<i>trans-para</i> -Mentha-2,8-dien-1-ol	0.01	Monoterpenic alcohol
<i>cis</i> -Limonene oxide	0.03	Monoterpenic ether
<i>trans</i> -Limonene oxide	0.01	Monoterpenic ether
<i>cis-para</i> -Mentha-2,8-dien-1-ol	0.01	Monoterpenic alcohol
Camphor	0.02	Monoterpenic ketone
Borneol	0.01	Monoterpenic alcohol
Terpinen-4-ol	0.02	Monoterpenic alcohol
α -Terpineol	0.16	Monoterpenic alcohol
Hodiendiol (2,6-dimethylocta-3,7-diene-2,6-diol)	0.01	Monoterpenic alcohol
Unknown	0.01	Unknown
Decanal	0.01	Aliphatic aldehyde

Octyl acetate	0.08	Aliphatic ester
Nerol	0.02	Monoterpenic alcohol
Unknown	0.01	Unknown
Neral	0.26	Monoterpenic aldehyde
Geraniol	0.01	Monoterpenic alcohol
Linalyl acetate	25.30	Monoterpenic ester
Geranial	0.40	Monoterpenic aldehyde
(<i>trans</i> ?) - Linalool oxide acetate (fur.)?	0.06	Monoterpenic ester
Unknown	0.01	Unknown
Bornyl acetate	0.02	Monoterpenic ester
Hodiendiol derivative	0.01	Oxygenated monoterpene
α -Terpinyl acetate	0.09	Monoterpenic ester
Unknown	0.01	Monoterpenic ester
Neryl acetate	0.26	Monoterpenic ester
Geranyl acetate	0.17	Monoterpenic ester
β -Elemene	0.01	Sesquiterpene
β -Caryophyllene	0.23	Sesquiterpene
<i>trans</i> - α -Bergamotene	0.19	Sesquiterpene
(<i>E</i>)- β -Farnesene	0.01	Sesquiterpene
β -Bisabolene	0.46	Sesquiterpene
β -Sesquiphellandrene	0.03	Sesquiterpene
(<i>E</i>)- α -Bisabolene	0.01	Sesquiterpene
Consolidated total	99.75	

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

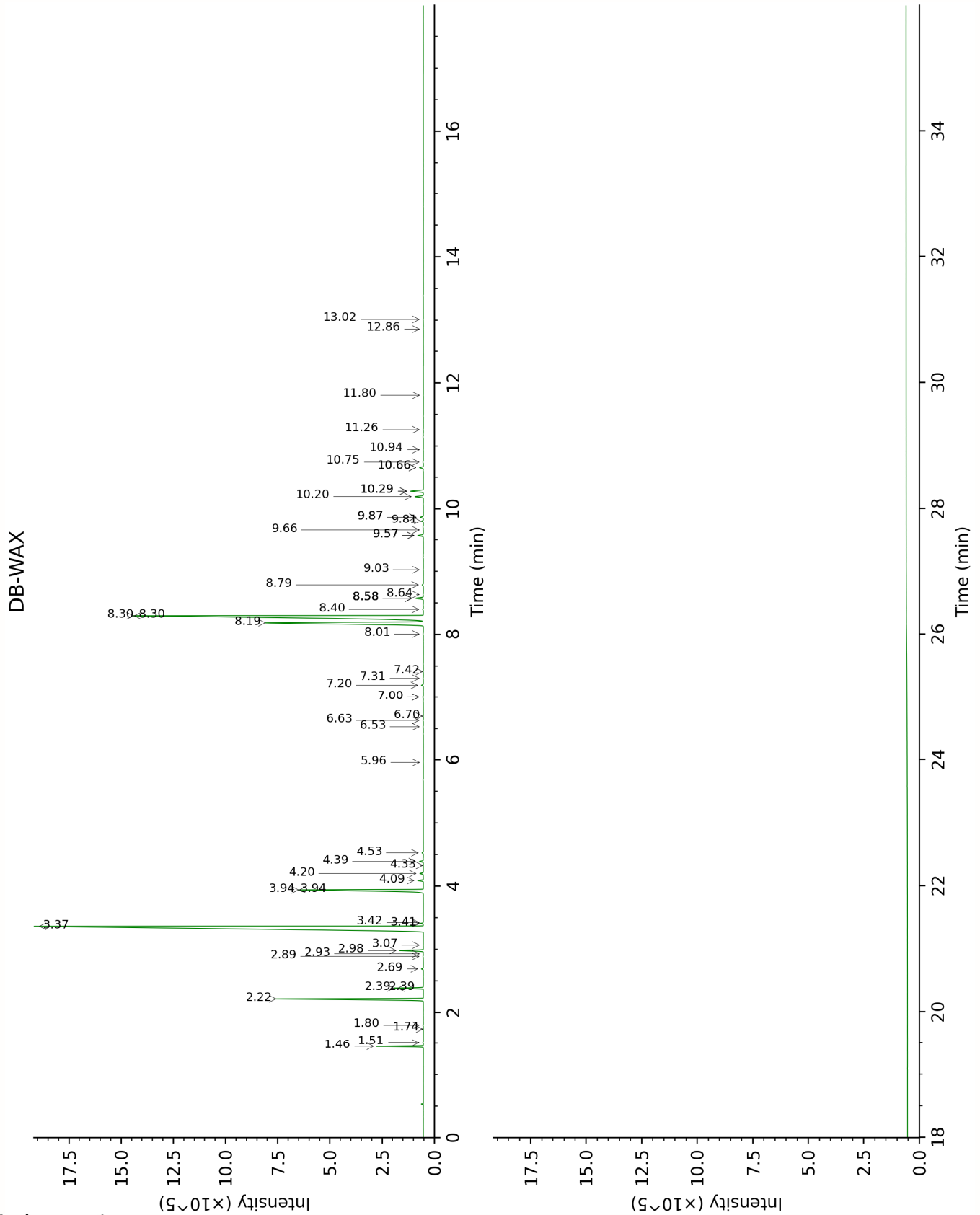
Note: no correction factor was applied

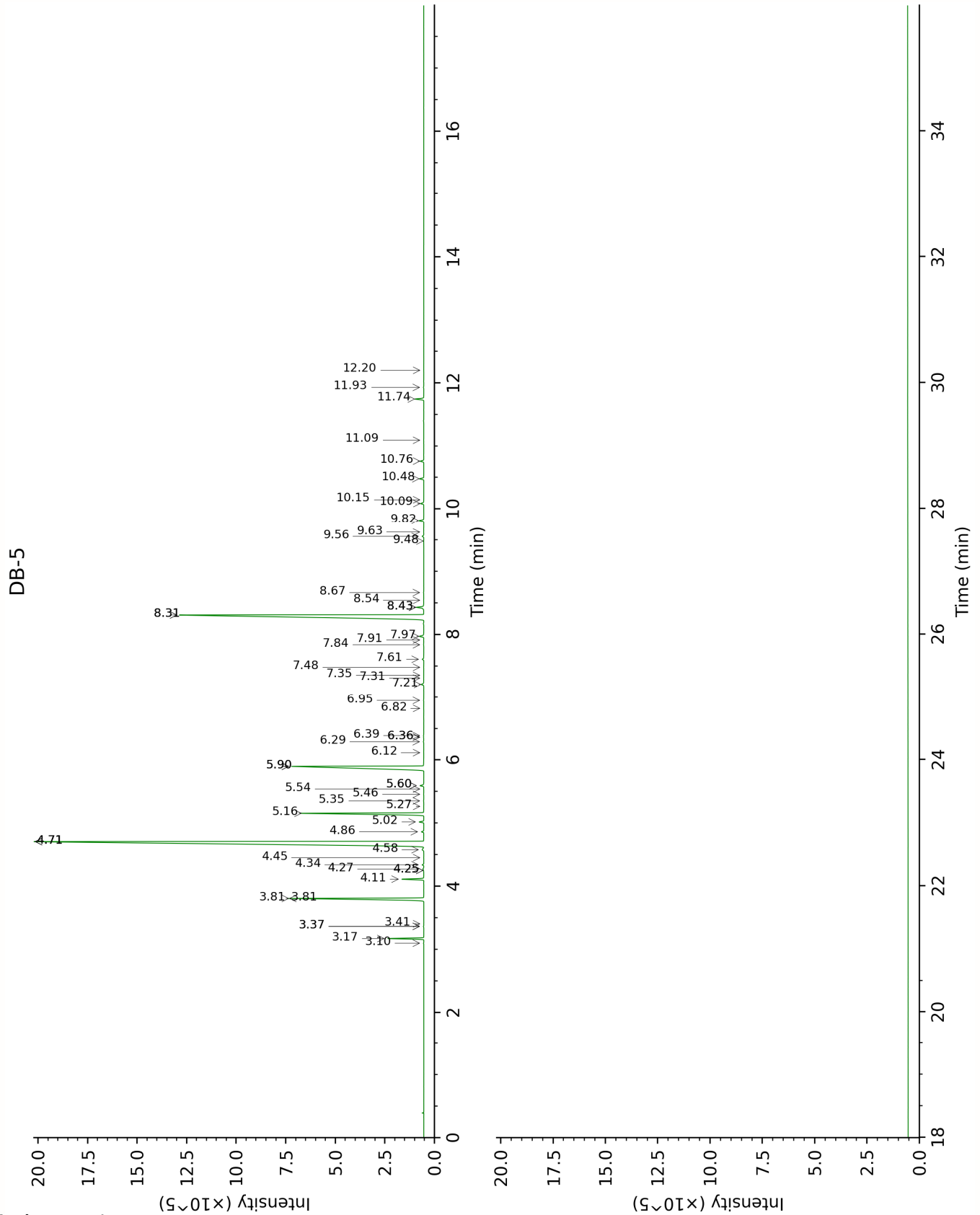
About "consolidated" data: The table above presents the breakdown of the sample volatile constituents after applying an algorithm to collapse data acquired from the multi-columns system of PhytoChemia into a single set of consolidated contents. In case of discrepancies between columns, the algorithm 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.

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





FULL ANALYSIS DATA

α-Thujene	Column DB-WAX			Column DB-5		
	1.52	1003.4	0.01	3.10	926.5	0.02
α -Pinene	1.46	994.5	1.38	3.17	931.4	1.38
Camphene	1.80	1031.0	0.02	3.36*	944.1	[0.02]
α -Fenchene	1.74	1025.3	tr	3.36*	944.1	[0.02]
Thuja-2,4(10)-diene	2.39*	1086.4	[1.02]	3.41	946.8	tr
Sabinene	2.39*	1086.4	[1.02]	3.81*	973.2	[7.59]
β -Pinene	2.22	1070.4	6.56	3.81*	973.2	[7.59]
Myrcene	2.98	1135.3	0.94	4.11	993.3	0.93
α -Phellandrene	2.89	1128.2	0.02	4.25*†	1002.4	[0.03]
Pseudolimonene	2.93	1131.4	0.01	4.25*†	1002.4	[0.03]
Octanal	4.53	1249.9	0.06	4.27*†	1003.9	[0.06]
Δ^3 -Carene	2.69	1113.3	0.08	4.34	1008.2	0.08
α -Terpinene	3.07	1141.9	0.01	4.45	1015.2	tr
<i>para</i> -Cymene	4.20	1226.5	0.14	4.58	1023.1	0.14
1,8-Cineole	3.42	1168.9	tr	4.71*	1031.1	[41.99]
β -Phellandrene	3.41	1167.8	0.12	4.71*	1031.1	[41.99]
Limonene	3.37	1164.4	41.81	4.71*	1031.1	[41.99]
(<i>Z</i>)- β -Ocimene	3.94*	1208.0	[7.03]	4.86	1040.9	0.12
(<i>E</i>)- β -Ocimene	4.09	1218.6	0.22	5.02	1050.7	0.22
γ -Terpinene	3.94*	1208.0	[7.03]	5.16	1059.2	6.92
<i>cis</i> -Sabinene hydrate	7.00*	1428.4	[0.04]	5.27	1066.0	0.01
<i>cis</i> -Linalool oxide (fur.)	6.63	1400.8	0.02	5.35	1071.5	0.02
Octanol	8.30*†	1526.6	[25.31]	5.46	1078.0	0.01
Isoterpinolene	4.33	1235.6	tr	5.54	1083.2	0.01
<i>trans</i> -Linalool oxide (fur.)	7.00*	1428.4	[0.04]	5.60*	1086.6	[0.20]
Terpinolene	4.39	1240.1	0.17	5.60*	1086.6	[0.20]
Nonanal	5.96	1352.5	0.01	5.90*	1105.7	[12.14]
Linalool	8.19*†	1517.9	[12.15]	5.90*	1105.7	[12.14]
<i>trans-para</i> -Mentha-2,8-dien-1-ol	9.03	1584.0	0.01	6.12	1119.5	0.01
<i>cis</i> -Limonene oxide	6.53	1393.4	0.02	6.29	1130.6	0.03
<i>trans</i> -Limonene oxide	6.70	1405.6	0.01	6.36*	1135.2	[0.02]
<i>cis-para</i> -Mentha-2,8-dien-1-ol	9.57*	1627.7	[0.27]	6.36*	1135.2	[0.02]
Camphor	7.31	1451.3	0.02	6.39	1136.8	0.02
Borneol	9.87*	1652.5	[0.15]	6.82	1164.4	0.01
Terpinen-4-ol	8.64	1553.1	0.02	6.95	1172.5	0.02
α -Terpineol	9.87*	1652.5	[0.15]	7.21	1189.2	0.16
Hodiendiol (2,6-	12.86	1904.6	0.01	7.31	1195.5	0.01

dimethylocta-3,7-diene-2,6-diol)						
Unknown SASC VI [m/z 43, 71 (80), 67 (55), 59 (51), 68 (44), 41 (43)...]	10.94	1742.8	0.01	7.35	1198.4	0.01
Decanal	7.42	1459.4	0.02	7.48	1206.6	0.01
Octyl acetate	7.20	1443.0	0.09	7.61	1215.1	0.08
Nerol	11.26	1760.2	0.01	7.84	1230.5	0.02
Unknown MISC III [m/z 43, 71 (64), 68 (54), 81 (49), 93 (34), 121 (33)...]	8.01	1504.0	0.02	7.91	1235.5	0.01
Neral	9.57*	1627.7	[0.27]	7.97	1239.5	0.26
Geraniol	11.80	1808.3	0.01	8.31*	1262.0	[25.31]
Linalyl acetate	8.30*†	1526.6	[25.31]	8.31*	1262.0	[25.31]
Geranial	10.20	1679.6	0.40	8.43*	1270.1	[0.45]
(<i>trans</i> ?) - Linalool oxide acetate (fur.)?	8.79	1565.1	0.06	8.43*	1270.1	[0.45]
Unknown MISC CCLXXIV [m/z 43, 121 (79), 136 (42), 107 (37), 68 (35), 95 (27), 93 (24)...]				8.54	1277.6	0.01
Bornyl acetate	8.40	1534.5	0.03	8.67	1285.8	0.02
Hodiendiol derivative	13.02	1919.1	0.01	9.48	1342.3	0.01
α -Terpinyl acetate	9.81	1647.3	0.09	9.56	1347.6	0.09
Unknown MISC VII [m/z 43, 121 (52), 93 (48), 79 (33), 41 (30), 136 (26), 81 (25)...]				9.63	1352.4	0.01
Neryl acetate	10.28*	1686.8	[0.72]	9.82	1365.7	0.26
Geranyl acetate	10.66*	1718.2	[0.18]	10.09	1385.0	0.17
β -Elemene	8.58*	1548.5	[0.41]	10.15	1389.1	0.01
β -Caryophyllene	8.58*	1548.5	[0.41]	10.48	1413.1	0.23
<i>trans</i> - α -Bergamotene	8.58*	1548.5	[0.41]	10.76	1433.8	0.19
(<i>E</i>)- β -Farnesene	9.66	1635.0	0.01	11.09	1458.5	0.01
β -Bisabolene	10.28*	1686.8	[0.72]	11.74	1507.1	0.46
β -Sesquiphellandrene	10.66*	1718.2	[0.18]	11.93	1521.6	0.03
(<i>E</i>)- α -Bisabolene	10.75	1725.7	0.03	12.20	1542.8	0.01
Total reported		99.70%			99.80%	

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*: 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