

Date : 2024-02-20

CERTIFICATE OF ANALYSIS - GC PROFILING

SAMPLE IDENTIFICATION

**Internal code :** 24B06-PTH01

**Customer Identification :** Organic Bergamot - Italy - BQ0110R

**Type :** Essential Oil

**Source :** *Citrus bergamia* [syn. *Citrus aurantium* var. *bergamia*]

**Customer :** Plant Therapy

Checked and approved by:

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

**Date :** 2024-02-20

## PHYSICOCHEMICAL DATA

**Refractive index :**  $1.464 \pm 0.0003$  (20 °C)

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

**Analyst :** Cindy Caron B. Sc.

**Date :** 2024-02-08

## 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
Tricyclene	tr	Monoterpene
$\alpha$ -Thujene	0.24	Monoterpene
$\alpha$ -Pinene	1.07	Monoterpene
$\alpha$ -Fenchene	tr	Monoterpene
Camphene	0.04	Monoterpene
Thuja-2,4(10)-diene	0.02	Monoterpene
$\beta$ -Pinene	6.47	Monoterpene
Sabinene	0.90	Monoterpene
6-Methyl-5-hepten-2-one	0.02	Aliphatic ketone
Myrcene	0.79	Monoterpene
$\alpha$ -Phellandrene	0.03	Monoterpene
Octanal	0.04	Aliphatic aldehyde
$\Delta^3$ -Carene	tr	Monoterpene
$\alpha$ -Terpinene	0.14	Monoterpene
<i>para</i> -Cymene	0.45	Monoterpene
$\beta$ -Phellandrene	0.17	Monoterpene
Limonene	39.31	Monoterpene
1,8-Cineole	0.02	Monoterpenic ether
( <i>Z</i> )- $\beta$ -Ocimene	0.04	Monoterpene
( <i>E</i> )- $\beta$ -Ocimene	0.08	Monoterpene
$\gamma$ -Terpinene	6.26	Monoterpene
<i>cis</i> -Sabinene hydrate	0.02	Monoterpenic alcohol
<i>cis</i> -Linalool oxide (fur.)	0.02	Monoterpenic alcohol
Octanol	0.01	Aliphatic alcohol
Terpinolene	0.19	Monoterpene
<i>trans</i> -Linalool oxide (fur.)	0.04	Monoterpenic alcohol
<i>trans</i> -Sabinene hydrate	0.01	Monoterpenic alcohol
Nonanal	0.02	Aliphatic aldehyde
Linalool	14.78	Monoterpenic alcohol
<i>cis</i> -Limonene oxide	0.01	Monoterpenic ether
Citronellal	0.01	Monoterpenic aldehyde
Terpinen-4-ol	0.04	Monoterpenic alcohol
$\alpha$ -Terpineol	0.13	Monoterpenic alcohol
Nerol	0.01	Monoterpenic alcohol
Neral	0.07	Monoterpenic aldehyde
Geraniol	0.02	Monoterpenic alcohol
Linalyl acetate	26.40	Monoterpenic ester
( <i>trans</i> ?) -Linalool oxide acetate (fur.)?	0.06	Monoterpenic ester
Geranial	0.09	Monoterpenic aldehyde
Bornyl acetate	0.01	Monoterpenic ester

Unknown	0.01	Monoterpenic ester
Unknown	0.02	Oxygenated monoterpene
Neryl acetate	0.40	Monoterpenic ester
Geranyl acetate	0.31	Monoterpenic ester
$\beta$ -Caryophyllene	0.17	Sesquiterpene
<i>cis</i> - $\alpha$ -Bergamotene	0.01	Sesquiterpene
<i>trans</i> - $\alpha$ -Bergamotene	0.26	Sesquiterpene
$\alpha$ -Humulene	0.01	Sesquiterpene
( <i>E</i> )- $\beta$ -Farnesene	0.02	Sesquiterpene
Hodiendiol derivative II	tr	Oxygenated monoterpene
( <i>Z</i> )- $\alpha$ -Bisabolene	0.02	Sesquiterpene
$\beta$ -Bisabolene	0.21	Sesquiterpene
Caryophyllene oxide	0.01	Sesquiterpenic ether
<b>Consolidated total</b>	<b>99.49</b>	

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

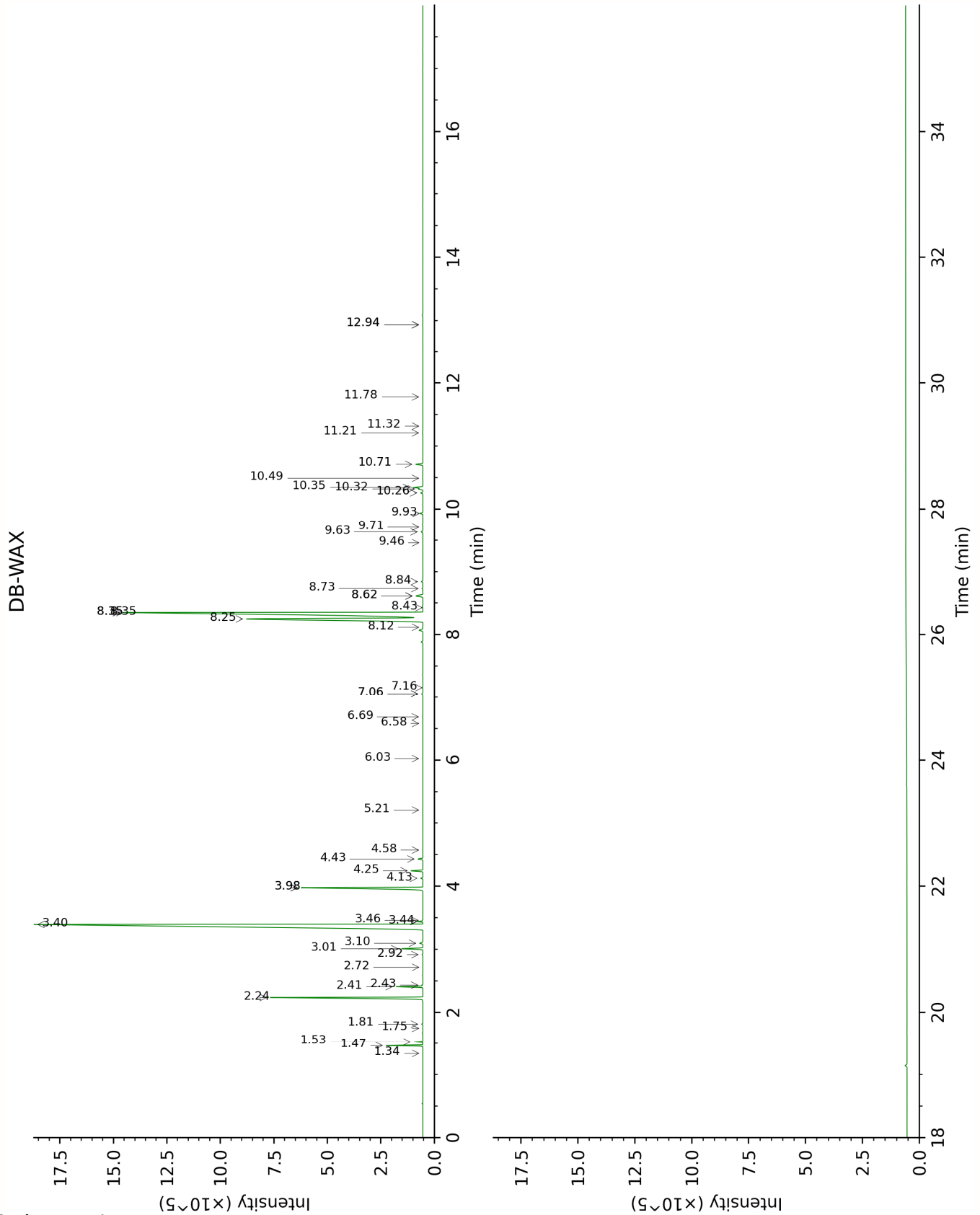
Note: no correction factor was applied

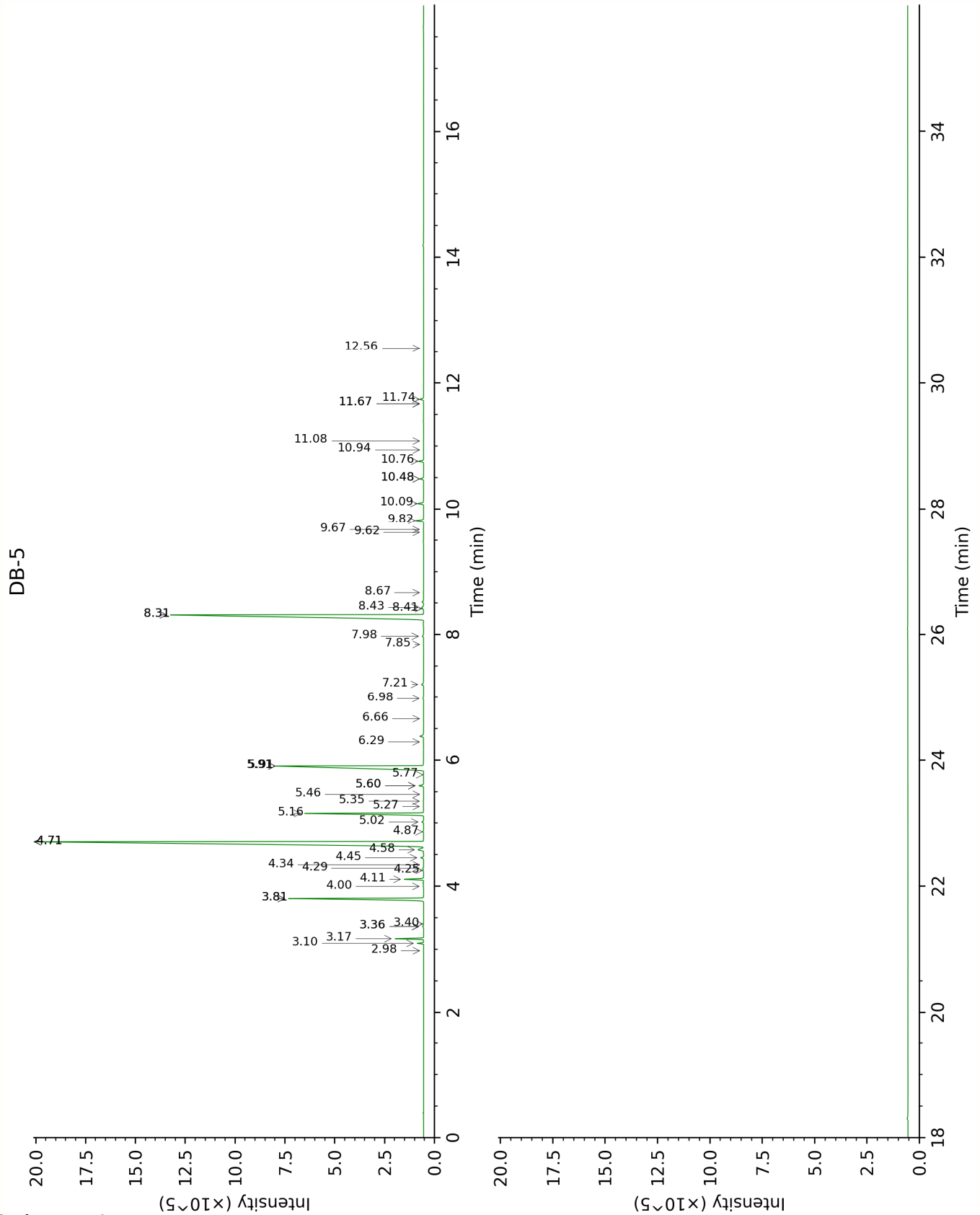
**About "consolidated" data:** The table above presents the breakdown of the sample volatile constituents after applying an algorithm to collapse data acquired from the multi-columns system of PhytoChemia into a single set of consolidated contents. In case of discrepancies between columns, the algorithm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

Tricyclene	Column DB-WAX			Column DB-5		
	1.34	974.0	tr	2.98	918.8	tr
$\alpha$ -Thujene	1.53	1002.2	0.24	3.10	926.5	0.24
$\alpha$ -Pinene	1.47	993.0	1.07	3.17	931.4	1.07
$\alpha$ -Fenchene	1.75	1023.2	tr	3.36*	944.0	[0.04]
Camphene	1.82	1029.5	0.04	3.36*	944.0	[0.04]
Thuja-2,4(10)-diene	2.43	1087.9	0.03	3.40	946.7	0.02
$\beta$ -Pinene	2.24	1069.3	6.47	3.81*	973.2	[7.36]
Sabinene	2.41	1085.6	0.90	3.81*	973.2	[7.36]
6-Methyl-5-hepten-2-one	5.21	1296.7	0.01	4.00	985.9	0.02
Myrcene	3.01	1134.7	0.81	4.11	993.3	0.79
$\alpha$ -Phellandrene	2.92	1127.6	0.03	4.25	1002.6	0.03
Octanal	4.58	1251.1	0.01	4.29	1004.8	0.04
$\Delta^3$ -Carene	2.72	1112.3	tr	4.34	1008.2	tr
$\alpha$ -Terpinene	3.10	1141.3	0.14	4.45	1015.2	0.14
<i>para</i> -Cymene	4.25	1227.5	0.45	4.58	1023.2	0.45
$\beta$ -Phellandrene	3.44	1167.5	0.17	4.71*	1031.1	[39.61]
Limonene	3.40	1164.0	39.31	4.71*	1031.1	[39.61]
1,8-Cineole	3.46	1168.9	0.02	4.71*	1031.1	[39.61]
( <i>Z</i> )- $\beta$ -Ocimene	3.98*	1208.2	[6.28]	4.86	1041.0	0.04
( <i>E</i> )- $\beta$ -Ocimene	4.13	1218.9	0.08	5.02	1050.7	0.08
$\gamma$ -Terpinene	3.98*	1208.2	[6.28]	5.16	1059.2	6.26
<i>cis</i> -Sabinene hydrate	7.06*	1429.5	[0.06]	5.27	1066.1	0.02
<i>cis</i> -Linalool oxide (fur.)	6.69	1401.7	0.02	5.35	1071.4	0.02
Octanol	8.35*†	1526.8	[26.26]	5.46	1078.1	0.01
Terpinolene	4.43	1240.9	0.19	5.60*	1086.7	[0.23]
<i>trans</i> -Linalool oxide (fur.)	7.06*	1429.5	[0.06]	5.60*	1086.7	[0.23]
<i>trans</i> -Sabinene hydrate	8.12	1508.6	0.01	5.77	1097.5	0.01
Nonanal	6.03	1354.0	0.02	5.91*†	1106.2	[14.53]
Linalool	8.25†	1518.9	14.58	5.91*†	1106.2	[14.53]
<i>cis</i> -Limonene oxide	6.58	1394.1	0.01	6.29	1130.6	0.01
Citronellal	7.16	1436.9	0.01	6.66	1154.1	0.01
Terpinen-4-ol	8.73	1556.5	0.04	6.98	1174.7	0.04
$\alpha$ -Terpineol	9.93	1652.0	0.13	7.21	1189.3	0.13
Nerol	11.21	1758.3	0.02	7.85	1231.0	0.01
Neral	9.63	1627.5	0.08	7.98	1239.7	0.07
Geraniol	11.78	1806.9	0.02	8.32*†	1262.3	[26.34]



Linalyl acetate	8.35*†	1526.8	[26.26]	8.32*†	1262.3	[26.34]
( <i>trans</i> ?)-Linalool oxide acetate ( <i>fur</i> .)?	8.84	1564.9	0.07	8.41	1269.0	0.06
Geranial	10.26	1678.6	0.10	8.43	1270.3	0.09
Bornyl acetate	8.43	1532.8	0.01	8.67	1285.9	0.01
Unknown MISC VII [m/z 43, 121 (52), 93 (48), 79 (33), 41 (30), 136 (26), 81 (25)...]				9.62	1352.3	0.01
Unknown SASC III [m/z 43, 79 (46), 71 (30), 94 (25), 41 (23), 81 (21)... 197 (0)]	11.32	1767.4	0.01	9.67	1355.5	0.02
Neryl acetate	10.35	1685.6	0.42	9.82	1365.9	0.40
Geranyl acetate	10.71	1716.0	0.32	10.09	1385.1	0.31
β-Caryophyllene	8.62*	1547.3	[0.43]	10.48*	1413.2	[0.18]
<i>cis</i> -α- Bergamotene	8.35*†	1526.8	[26.26]	10.48*	1413.2	[0.18]
<i>trans</i> -α- Bergamotene	8.62*	1547.3	[0.43]	10.76	1434.0	0.26
α-Humulene	9.46	1613.4	tr	10.94	1447.3	0.01
( <i>E</i> )-β-Farnesene	9.71	1633.7	0.01	11.08	1457.9	0.02
Hodiendiol derivative II	12.94*	1909.6	[0.02]	11.67*	1501.7	[0.02]
( <i>Z</i> )-α-Bisabolene	10.49	1697.4	0.02	11.67*	1501.7	[0.02]
β-Bisabolene	10.32	1683.7	0.19	11.74	1507.2	0.21
Caryophyllene oxide	12.94*	1909.6	[0.02]	12.56	1571.0	0.01
Total reported		99.42%			99.54%	

\*: 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