

**Date :** 2024-01-11

*CERTIFICATE OF ANALYSIS - GC PROFILING*

*SAMPLE IDENTIFICATION*

**Internal code :** 24A04-PTH01

**Customer Identification :** May Chang - China - M30111R

**Type :** Essential Oil

**Source :** *Litsea cubeba*

**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 :** Benoit Roger, Ph. D.

**Date :** 2024-01-10

## *PHYSICOCHEMICAL DATA*

**Refractive index :**  $1.4825 \pm 0.0003$  (20 °C)

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

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

**Date :** 2024-01-05

## *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	0.02	Aliphatic aldehyde
2-Methylbutyral	0.01	Aliphatic aldehyde
Unknown	tr	Unknown
Unknown	tr	Unknown
2,6-Dimethyl-1,5-heptadiene	tr	Normonoterpene
$\alpha$ -Thujene	0.06	Monoterpene
$\alpha$ -Pinene	0.51	Monoterpene
Camphene	0.02	Monoterpene
Sabinene	0.93	Monoterpene
$\beta$ -Pinene	0.29	Monoterpene
6-Methyl-5-hepten-2-one	4.86	Aliphatic ketone
6-Methyl-5-hepten-2-ol	0.15	Aliphatic alcohol
$\alpha$ -Phellandrene	0.02	Monoterpene
$\Delta^3$ -Carene	0.13	Monoterpene
$\alpha$ -Terpinene	0.04	Monoterpene
<i>para</i> -Cymene	0.02	Monoterpene
Limonene	4.05	Monoterpene
$\beta$ -Phellandrene	0.03	Monoterpene
1,8-Cineole	0.43	Monoterpenic ether
(Z)- $\beta$ -Ocimene	0.03	Monoterpene
(E)- $\beta$ -Ocimene	0.05	Monoterpene
2,6-Dimethyl-5-heptenal (melonal)	0.02	Aliphatic aldehyde
$\gamma$ -Terpinene	0.07	Monoterpene
<i>cis</i> -Sabinene hydrate	0.02	Monoterpenic alcohol
<i>cis</i> -Linalool oxide (fur.)	0.02	Monoterpenic alcohol
<i>trans</i> -Linalool oxide (fur.)	0.01	Monoterpenic alcohol
Terpinolene	0.06	Monoterpene
6,7-Epoxyterpinene	0.01	Monoterpenic ether
Rosefuran	0.01	Monoterpenic ether
Linalool	2.00	Monoterpenic alcohol
<i>cis</i> -Chrysanthemal?	0.01	Monoterpenic aldehyde
<i>cis-para</i> -Menth-2-en-1-ol	0.04	Monoterpenic alcohol
<i>cis</i> -Limonene oxide	0.01	Monoterpenic ether
<i>trans</i> -Limonene oxide	0.01	Monoterpenic ether
<i>trans-para</i> -Menth-2-en-1-ol	0.04	Monoterpenic alcohol
<i>trans</i> -Chrysanthemal	0.14	Monoterpenic aldehyde
Citronellal	3.80	Monoterpenic aldehyde
Isoneral	0.67	Monoterpenic aldehyde
Borneol	0.18	Monoterpenic alcohol
Rosefuran oxide	[0.25]	Monoterpenic ether



Terpinen-4-ol	[0.25]	Monoterpenic alcohol
Unknown	0.18	Oxygenated monoterpene
Isogeranial	1.23	Monoterpenic aldehyde
Methyl salicylate	0.03	Phenolic ester
$\alpha$ -Terpineol	0.25	Monoterpenic alcohol
<i>trans</i> -Isopiperitenol	0.04	Monoterpenic alcohol
<i>trans</i> -Piperitol	0.09	Monoterpenic alcohol
<i>cis</i> -Isopiperitenol	0.04	Monoterpenic alcohol
Nerol	0.77	Monoterpenic alcohol
Citronellol	0.53	Monoterpenic alcohol
Neral	32.91	Monoterpenic aldehyde
Piperitone	0.04	Monoterpenic ketone
Geraniol	1.66	Monoterpenic alcohol
Geranial	40.56	Monoterpenic aldehyde
Unknown	0.09	Oxygenated monoterpene
Unknown	0.07	Unknown
Neric acid	0.05	Monoterpenic acid
$\alpha$ -Terpinyl acetate	0.01	Monoterpenic ester
Geranic acid	0.14	Aliphatic acid
Unknown	0.10	Unknown
Geranyl acetate	0.04	Monoterpenic ester
$\beta$ -Elemene	0.01	Sesquiterpene
$\beta$ -Caryophyllene	0.13	Sesquiterpene
$\alpha$ -Humulene	0.02	Sesquiterpene
( <i>E</i> )- $\beta$ -Farnesene	0.02	Sesquiterpene
Bicyclogermacrene	0.02	Sesquiterpene
$\delta$ -Cadinene	0.01	Sesquiterpene
Spathulenol	0.02	Sesquiterpenic alcohol
Caryophyllene oxide	0.03	Sesquiterpenic ether
<b>Consolidated total</b>	<b>98.14</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.

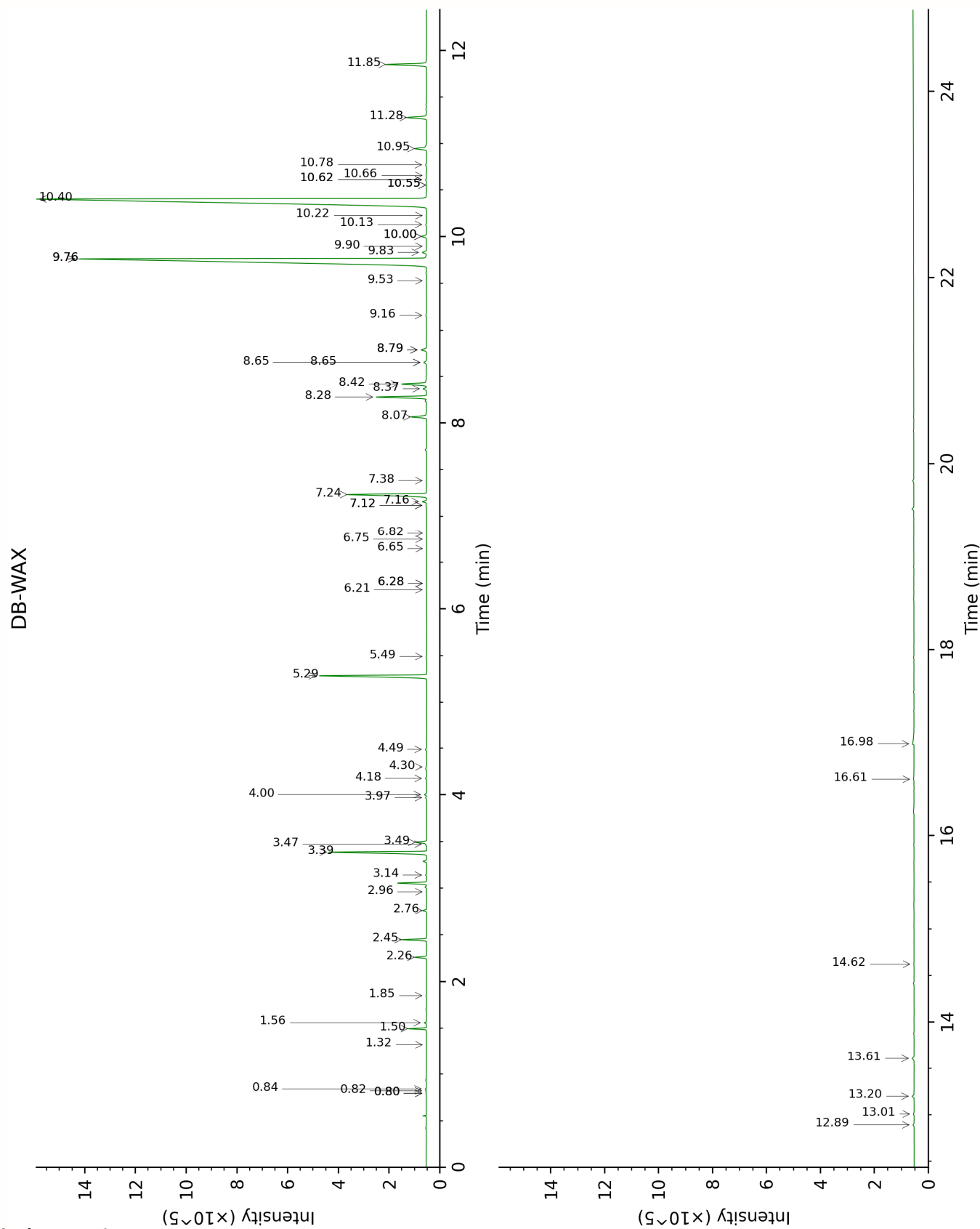
**Unknowns:** Unknown compounds' mass spectral data is presented in the "Full analysis data" table. The occurrence of unknown compounds is to be expected in many samples, and does not denote particular problems unless noted otherwise in the conclusion.

**Bracketed value ([xx]):** A bracketed percent value indicate that two or more compound percentage could not be solved due to coelution.

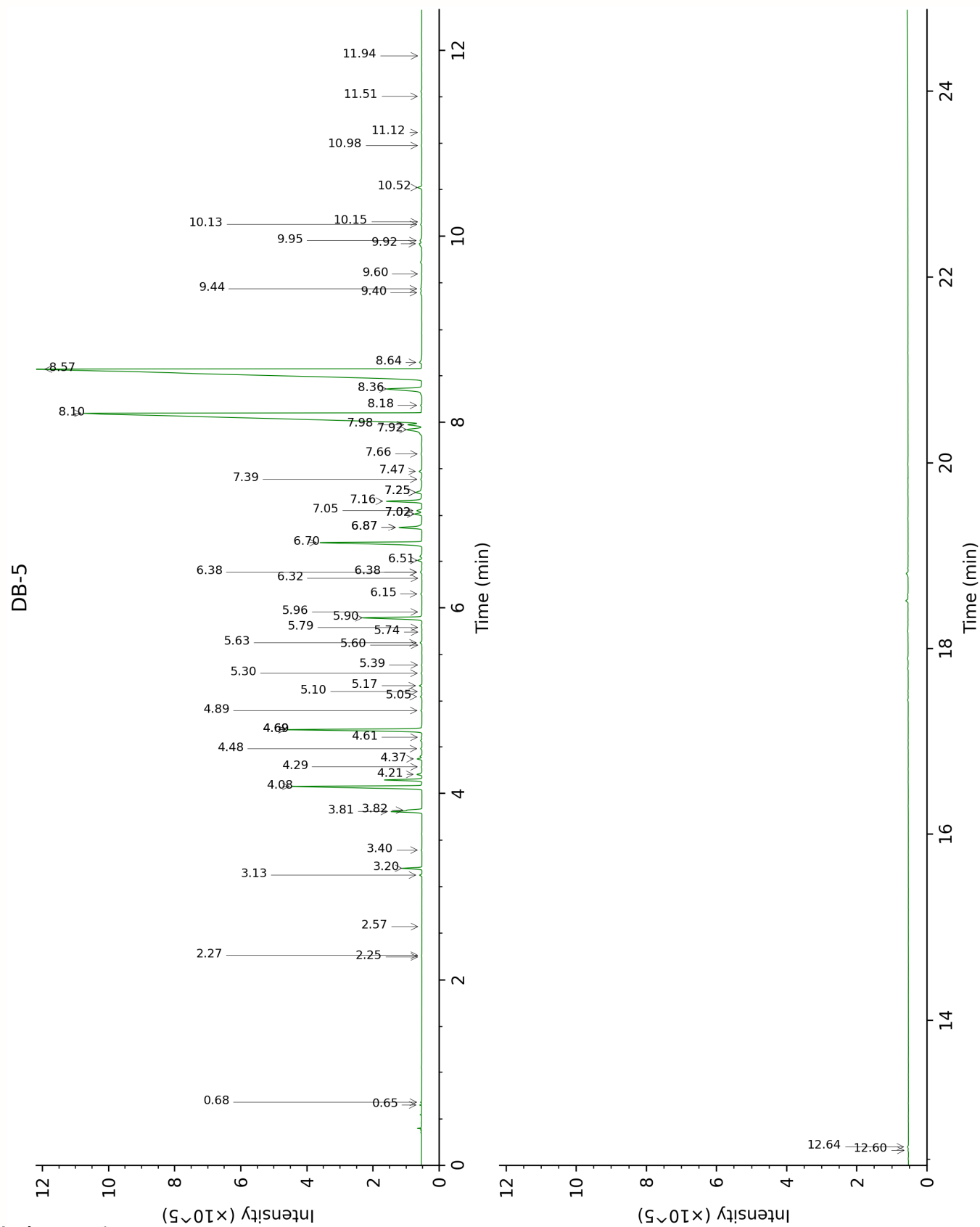


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FULL ANALYSIS DATA

Isovaleral	Column DB-WAX			Column DB-5		
	0.84	888.8	0.02	0.65	643.8	0.02
2-Methylbutyral	0.82	882.1	0.01	0.68	653.9	0.01
Unknown COCI I [m/z 55, 83 (89), 82 (70), 67 (66), 41 (55), 69 (46), 111 (37)... 126 (2)]	0.80*	872.9	[0.01]	2.25	861.5	tr
Unknown COCI II [m/z 55, 83 (79), 67 (65), 41 (63), 82 (60), 69 (58)... 111 (27), 126 (9)]	0.80*	872.9	[0.01]	2.27	863.0	tr
2,6-Dimethyl-1,5- heptadiene	1.32	967.8	tr	2.57	888.2	tr
$\alpha$ -Thujene	1.56	1002.1	0.06	3.13	927.9	0.06
$\alpha$ -Pinene	1.50	993.9	0.51	3.20	932.7	0.51
Camphene	1.85	1029.4	0.02	3.40	945.6	0.02
Sabinene	2.45	1086.1	0.83	3.81	972.8	0.93
$\beta$ -Pinene	2.26	1068.3	0.39	3.82	973.7	0.29
6-Methyl-5- hepten-2-one	5.29	1297.1	4.76	4.08	990.6	4.86
6-Methyl-5- hepten-2-ol	7.16	1433.7	0.17	4.21	999.0	0.15
$\alpha$ -Phellandrene	2.96	1127.5	0.02	4.29	1004.3	0.02
$\Delta^3$ -Carene	2.76	1112.2	0.13	4.37	1009.7	0.13
$\alpha$ -Terpinene	3.14	1141.1	0.04	4.48	1016.5	0.04
<i>para</i> -Cymene	4.30	1227.1	0.02	4.61	1024.2	0.02
Limonene	3.39	1159.8	4.05	4.69*	1029.4	[4.52]
$\beta$ -Phellandrene	3.47	1166.2	0.03	4.69*	1029.4	[4.52]
1,8-Cineole	3.49	1167.8	0.43	4.69*	1029.4	[4.52]
(Z)- $\beta$ -Ocimene	3.97	1203.7	0.04	4.89	1042.1	0.03
(E)- $\beta$ -Ocimene	4.18	1218.4	0.04	5.05	1051.9	0.05
2,6-Dimethyl-5- heptenal (melonal)	5.49	1313.4	0.02	5.10	1055.3	0.02
$\gamma$ -Terpinene	4.00	1206.0	0.08	5.17	1059.3	0.07
<i>cis</i> -Sabinene hydrate	7.12*	1430.6	[0.04]	5.30	1067.6	0.02
<i>cis</i> -Linalool oxide (fur.)	6.75	1403.4	0.01	5.39	1073.2	0.02
<i>trans</i> -Linalool oxide (fur.)	7.12*	1430.6	[0.04]	5.60	1086.5	0.01
Terpinolene	4.49	1240.5	0.05	5.63	1088.1	0.06
6,7-Epoxy myrcene	6.28*	1369.3	[0.01]	5.74	1095.2	0.01



Rosefuran	6.21	1364.4	0.02	5.79	1098.3	0.01
Linalool	8.28	1517.2	2.00	5.90	1104.8	2.00
<i>cis</i> -Chrysanthemal?	6.28*	1369.3	[0.01]	5.96	1108.8	0.01
<i>cis</i> - <i>para</i> -Menth-2-en-1-ol	8.37	1524.1	0.14	6.15	1121.1	0.04
<i>cis</i> -Limonene oxide	6.65	1396.0	0.01	6.32	1131.9	0.01
<i>trans</i> -Limonene oxide	6.82	1408.2	0.01	6.38*	1136.0	[0.05]
<i>trans</i> - <i>para</i> -Menth-2-en-1-ol	9.16	1585.1	0.04	6.38*	1136.0	[0.05]
<i>trans</i> -Chrysanthemal	7.38	1450.3	0.02	6.51	1144.1	0.14
Citronellal	7.24	1439.2	3.72	6.70	1156.3	3.80
Isoneral	8.07	1500.9	0.67	6.87*	1167.2	[0.85]
Borneol	10.00*	1652.6	[0.21]	6.87*	1167.2	[0.85]
Rosefuran oxide	8.79*	1556.8	[0.25]	7.02*	1176.3	[0.25]
Terpinen-4-ol	8.79*	1556.8	[0.25]	7.02*	1176.3	[0.25]
Unknown CYFL V [m/z 84, 83 (74), 137 (56), 41 (47), 93 (43), 108 (40)... 152 (2)]	9.83	1638.8	0.19	7.05	1178.6	0.18
Isogeranial	8.42	1528.0	1.09	7.16	1185.1	1.23
Methyl salicylate	10.66	1706.1	0.03	7.25*	1191.1	[0.28]
$\alpha$ -Terpineol	10.00*	1652.6	[0.21]	7.25*	1191.1	[0.28]
<i>trans</i> -Isopiperitenol	10.62*	1702.2	[0.06]	7.39	1200.1	0.04
<i>trans</i> -Piperitol	10.55*	1696.8	[0.02]	7.48	1205.5	0.09
<i>cis</i> -Isopiperitenol	10.55*	1696.8	[0.02]	7.66	1218.0	0.04
Nerol	11.28	1758.5	0.90	7.92	1235.5	0.77
Citronellol	10.95	1730.4	0.58	7.98	1239.0	0.53
Neral	9.76*	1633.2	[32.77]	8.10	1247.2	32.91
Piperitone	10.13	1662.8	0.04	8.18	1252.9	0.04
Geraniol	11.85	1806.9	1.79	8.36	1264.7	1.66
Geranial	10.40	1684.8	40.66	8.57	1278.9	40.56
Unknown CYFL VII [m/z 43, 69 (77), 41 (70), 109 (54)... 152 (6)]	13.20	1927.2	0.09	8.64	1283.7	0.09
Unknown CYFL VIII [m/z 82, 59 (44), 41 (43), 95 (31), 43 (29), 81 (24)...]	12.89	1898.9	0.05	9.40	1335.7	0.07



Neric acid	16.60	2259.8	0.03	9.44	1338.5	0.05
$\alpha$ -Terpinyl acetate	9.90	1644.0	0.02	9.60	1349.7	0.01
Geranic acid	16.98	2299.4	0.17	9.92	1372.5	0.14
Unknown ZIOF XI [m/z 81, 59 (94), 41 (74), 85 (40), 43 (55)...]	13.61	1964.7	0.11	9.95	1374.8	0.10
Geranyl acetate	10.78	1715.7	0.04	10.13	1387.0	0.04
$\beta$ -Elemene	8.65*	1545.8	[0.14]	10.15	1388.9	0.01
$\beta$ -Caryophyllene	8.65*	1545.8	[0.14]	10.52	1415.4	0.13
$\alpha$ -Humulene	9.53	1614.4	0.02	10.98	1449.4	0.02
(E)- $\beta$ -Farnesene	9.76*	1633.2	[32.77]	11.12	1459.8	0.02
Bicyclogermacrene	10.22	1670.5	0.01	11.51	1488.7	0.02
$\delta$ -Cadinene	10.62*	1702.2	[0.06]	11.94	1521.8	0.01
Spathulenol	14.62	2060.8	0.02	12.60	1573.4	0.02
Caryophyllene oxide	13.01	1909.6	0.03	12.64	1576.3	0.03
Total reported	97.81%			98.15%		

\*: 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