

Date : 2024-09-12

CERTIFICATE OF ANALYSIS - GC PROFILING

SAMPLE IDENTIFICATION

**Internal code** : 24H28-PTH01

**Customer Identification** : Frankincense Serrata - India - F40113R

**Type** : Essential Oil

**Source** : *Boswellia serrata*

**Customer** : Plant Therapy

Checked and approved by:

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Sylvain Mercier, M. Sc., Chimiste 2014-005

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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 :** 2024-09-12

## PHYSICOCHEMICAL DATA

**Refractive index :**  $1.4603 \pm 0.0003$  (20 °C)

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

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

**Date :** 2024-09-03

## 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
(E)-2-Methyl-1,3-pentadiene	tr	Alkene
Unknown	0.02	Unknown
Hashishene	0.14	Monoterpene
Tricyclene	0.01	Monoterpene
$\alpha$ -Thujene	68.23	Monoterpene
$\alpha$ -Pinene	5.62	Monoterpene
Unknown	0.54	Monoterpene
Camphene	0.07	Monoterpene
Thuja-2,4(10)-diene	0.01	Monoterpene
3,7,7-Trimethylcyclohepta-1,3,5-triene	0.02	Monoterpene
$\beta$ -Pinene	0.37	Monoterpene
Sabinene	5.73	Monoterpene
Myrcene	1.22	Monoterpene
$\alpha$ -Phellandrene	2.42	Monoterpene
$\Delta^3$ -Carene	1.65	Monoterpene
$\alpha$ -Terpinene	0.38	Monoterpene
<i>meta</i> -Cymene	0.11	Monoterpene
<i>para</i> -Cymene	2.35	Monoterpene
Unknown	tr	Unknown
$\beta$ -Phellandrene	0.54	Monoterpene
Limonene	1.45	Monoterpene
(Z)- $\beta$ -Ocimene	0.26	Monoterpene
Unknown	0.07	Unknown
(E)- $\beta$ -Ocimene	0.16	Monoterpene
Unknown	0.05	Unknown
$\gamma$ -Terpinene	0.81	Monoterpene
<i>cis</i> -Sabinene hydrate	0.04	Monoterpenic alcohol
Unknown	0.02	Oxygenated monoterpene
<i>para</i> -Cymenene	0.02	Monoterpene
Terpinolene	0.24	Monoterpene
<i>trans</i> -Sabinene hydrate	0.04	Monoterpenic alcohol
Linalool	0.12	Monoterpenic alcohol
Unknown	0.26	Oxygenated monoterpene
$\beta$ -Thujone	0.02	Monoterpenic ketone
<i>cis-para</i> -Menth-2-en-1-ol	0.08	Monoterpenic alcohol
$\alpha$ -Campholenal	0.02	Monoterpenic aldehyde
Unknown	0.02	Unknown
<i>trans</i> -Pinocarveol	0.02	Monoterpenic alcohol
<i>trans</i> -Sabinol	0.09	Monoterpenic alcohol
<i>trans</i> -Verbenol	0.03	Monoterpenic alcohol

Unknown	0.02	Unknown
Unknown	0.02	Oxygenated monoterpene
Borneol	0.04	Monoterpenic alcohol
<i>cis</i> -Sabinol	0.11	Monoterpenic alcohol
Terpinen-4-ol	0.85	Monoterpenic alcohol
<i>meta</i> -Cymen-8-ol	0.03	Monoterpenic alcohol
Cryptone	0.02	Normonoterpenic ketone
<i>para</i> -Cymen-8-ol	0.06	Monoterpenic alcohol
$\alpha$ -Terpineol	0.10	Monoterpenic alcohol
Methylchavicol	1.96	Phenylpropanoid
<i>cis</i> - $\alpha$ -Phellandrene epoxide (iPr vs Me)	0.06	Monoterpenic ether
Verbenone	0.02	Monoterpenic ketone
<i>trans</i> -Piperitol	0.02	Monoterpenic alcohol
Piperitone	0.05	Monoterpenic ketone
Linalyl acetate	0.04	Monoterpenic ester
Unknown	0.04	Oxygenated monoterpene
Bornyl acetate	0.04	Monoterpenic ester
Carvacrol	0.03	Monoterpenic alcohol
<i>para</i> -Menth-5-en-1,2-diol isomer III	0.05	Monoterpenic alcohol
$\alpha$ -Terpinyl acetate	0.06	Monoterpenic ester
$\alpha$ -Ylangene	0.04	Sesquiterpene
$\alpha$ -Copaene	0.12	Sesquiterpene
$\beta$ -Bourbonene	0.59	Sesquiterpene
1,5-diepi- $\beta$ -Bourbonene	0.04	Sesquiterpene
$\beta$ -Elemene	0.10	Sesquiterpene
Methyleugenol	0.12	Phenylpropanoid
$\beta$ -Ylangene	0.08	Sesquiterpene
$\beta$ -Copaene	0.07	Sesquiterpene
<i>trans</i> - $\alpha$ -Bergamotene	0.05	Sesquiterpene
Isogermaacrene D	0.05	Sesquiterpene
<i>cis</i> -Muuroala-4(15),5-diene	0.05	Sesquiterpene
Germaacrene D	0.07	Sesquiterpene
$\gamma$ -Muurolene	0.06	Sesquiterpene
Unknown	0.14	Sesquiterpene
Bicyclogermaacrene	0.03	Sesquiterpene
$\alpha$ -Muurolene	0.02	Sesquiterpene
$\gamma$ -Cadinene	0.04	Sesquiterpene
$\delta$ -Cadinene	0.33	Sesquiterpene
Elemicin	0.03	Phenylpropanoid
Guaiol	0.02	Sesquiterpenic alcohol
$\alpha$ -Phellandrene dimer II	0.06	Diterpene
$\alpha$ -Phellandrene dimer III	0.01	Diterpene
(3E)-Cembrene A	0.04	Diterpene
Cembrenol	0.02	Diterpenic alcohol
Serratol	0.09	Diterpenic alcohol

<b>Consolidated total</b>	<b>99.12</b>	
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tr: The compound has been detected below 0.005% of the total signal

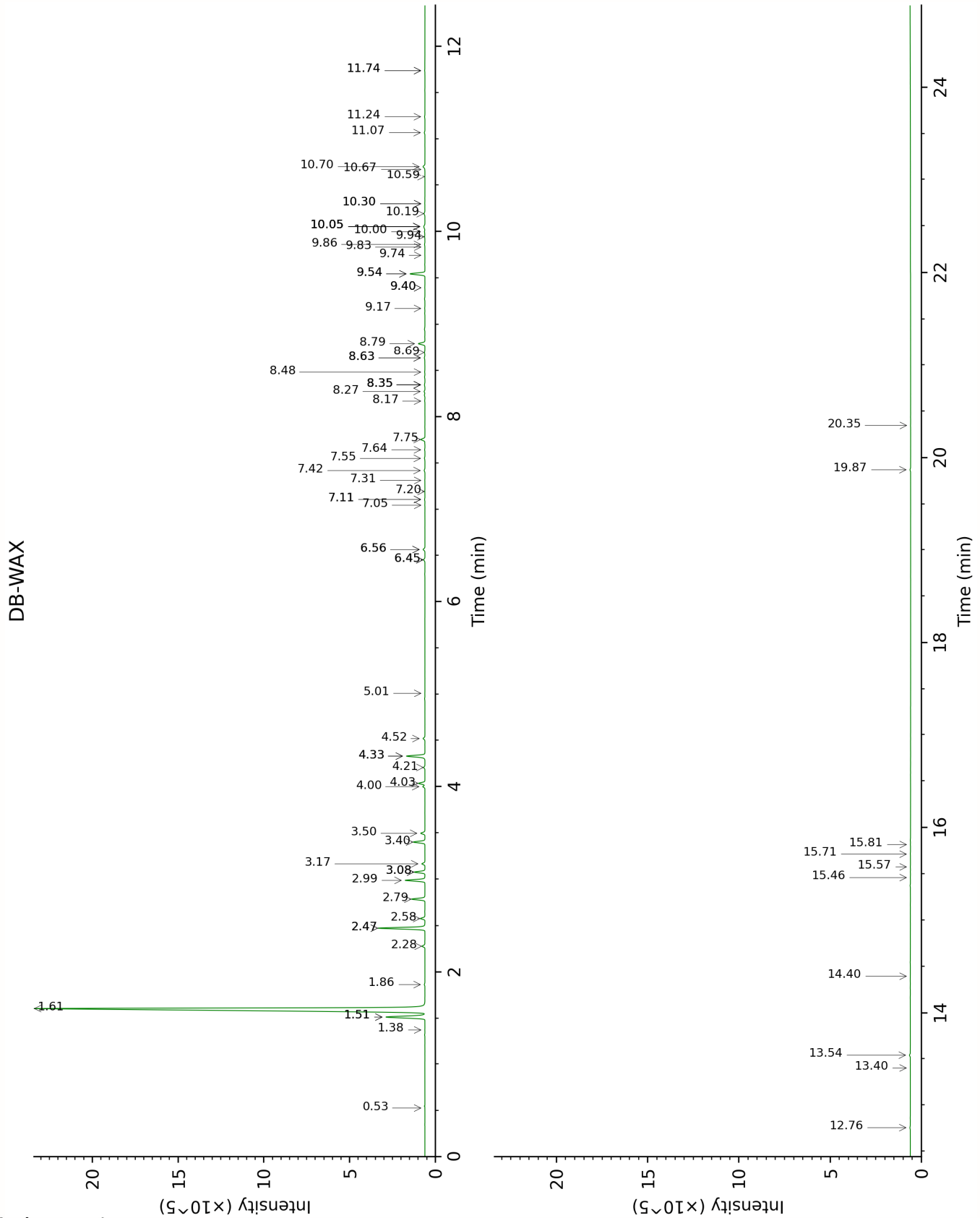
Note: no correction factor was applied

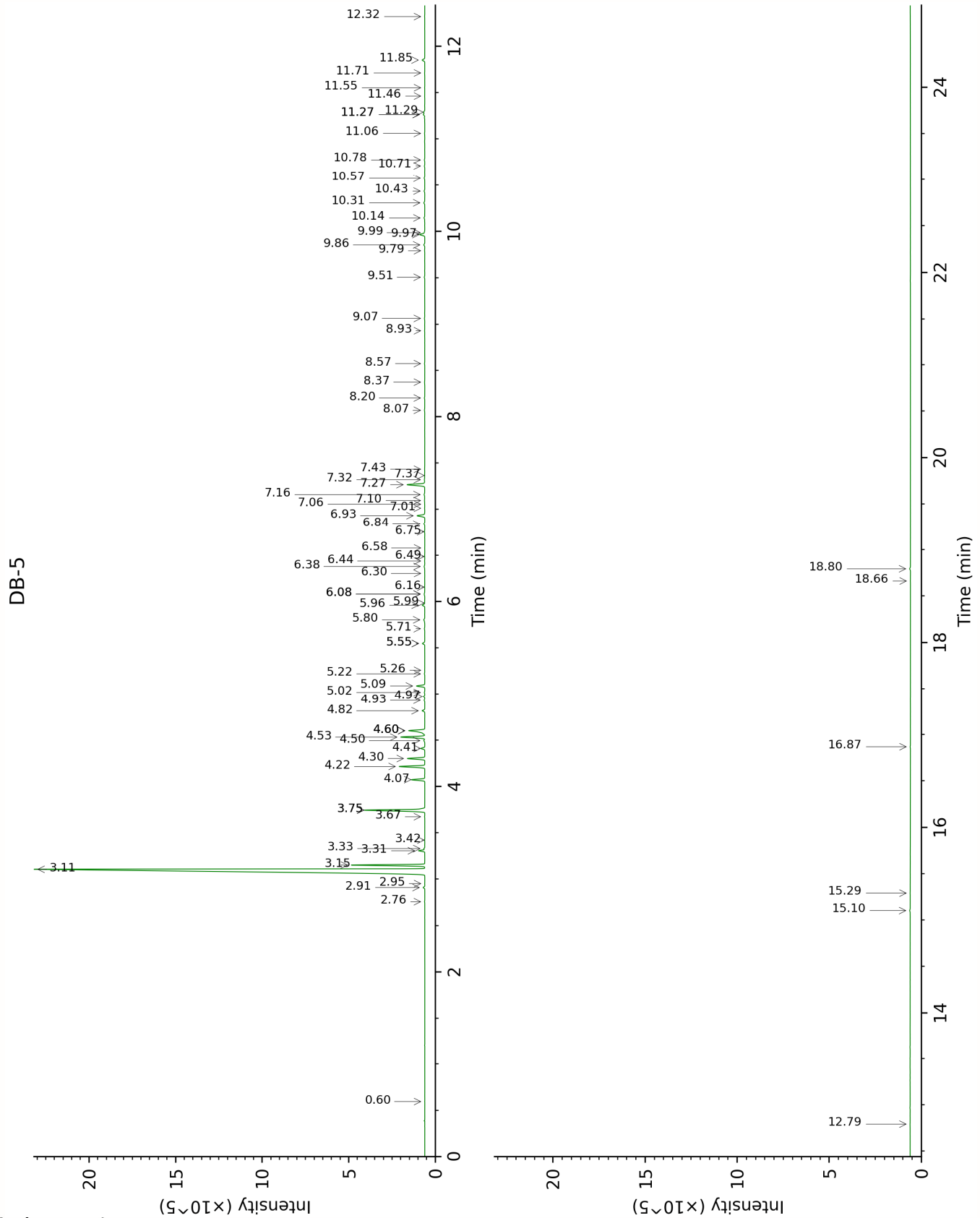
**About "consolidated" data:** The table above presents the breakdown of the sample volatile constituents after applying an algorithm to collapse data acquired from the multi-columns system of PhytoChemia into a single set of consolidated contents. In case of discrepancies between columns, the algorithm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

(E)-2-Methyl-1,3-pentadiene	Column DB-WAX			Column DB-5		
	0.53	756.6	tr	0.60	628.7	tr
Unknown BOFR II [m/z 93, 91 (72), 121 (58), 77 (49), 79 (41), 43 (22), 105 (20), 107 (20), 41 (18), 136 (17), 92 (17)]				2.76	905.5	0.02
Hashishene	1.52*	995.8	[5.67]	2.91	915.6	0.14
Tricyclene	1.38	974.4	0.01	2.95	918.4	0.01
$\alpha$ -Thujene	1.61	1004.9	67.95	3.11	928.6	68.23
$\alpha$ -Pinene	1.52*	995.8	[5.67]	3.15	931.6	5.62
Unknown SAOF I [m/z 91, 92 (47), 65 (11)... 134 (1)]	2.58	1097.2	0.53	3.31	941.8	0.54
Camphene	1.86	1029.6	0.07	3.33	943.4	0.07
Thuja-2,4(10)-diene	2.47*	1087.5	[5.72]	3.42	949.4	0.01
3,7,7-Trimethylcyclohepta-1,3,5-triene	3.08*	1135.1	[1.25]	3.67	966.1	0.02
$\beta$ -Pinene	2.28	1069.0	0.37	3.74*	970.8	[6.09]
Sabinene	2.47*	1087.5	[5.72]	3.74*	970.8	[6.09]
Myrcene	3.08*	1135.1	[1.25]	4.07	992.5	1.22
$\alpha$ -Phellandrene	2.99	1128.4	2.41	4.22	1001.9	2.42
$\Delta^3$ -Carene	2.79	1113.0	1.63	4.30	1007.4	1.65
$\alpha$ -Terpinene	3.17	1141.9	0.37	4.41	1014.2	0.38
<i>meta</i> -Cymene	4.33*	1227.0	[2.45]	4.50	1019.5	0.11
<i>para</i> -Cymene	4.33*	1227.0	[2.45]	4.53	1021.8	2.35
Unknown BODA IV [m/z 109, 43 (58), 95 (26)... 137 (15)...]	6.45*	1379.7	[0.20]	4.60*	1026.2	[2.16]
$\beta$ -Phellandrene	3.50	1166.7	0.54	4.60*	1026.2	[2.16]
Limonene	3.40	1159.5	1.45	4.60*	1026.2	[2.16]
(Z)- $\beta$ -Ocimene	4.00	1203.9	0.25	4.82	1039.7	0.26
Unknown BOFR III [m/z 109, 43 (57), 91 (28), 67 (25), 93 (24), 95 (22), 77 (21), 137 (21), 41 (17), 79 (14)...]	7.55	1460.7	0.07	4.93	1046.9	0.07
(E)- $\beta$ -Ocimene	4.20	1218.4	0.16	4.97	1049.5	0.16
Unknown BOFR IV [m/z 109, 45 (67), 41 (40), 67 (39), 81 (33),	7.11*	1427.9	[0.05]	5.02	1052.4	0.05

79 (27), 95 (24), 91 (23), 82 (21), 55 (21), 93 (20)...						
$\gamma$ -Terpinene	4.03	1206.4	0.82	5.09	1056.8	0.81
<i>cis</i> -Sabinene hydrate	7.11*	1427.9	[0.05]	5.22	1065.1	0.04
Unknown PIMA I [m/z 79, 93 (60), 43 (40), 94 (35), 137 (33), 77 (26), 91 (20), 152 (18)]	5.01	1274.8	0.02	5.26	1067.5	0.02
<i>para</i> -Cymenene	6.56*	1387.7	[0.25]	5.55*	1085.6	[0.25]
Terpinolene	4.52	1240.2	0.24	5.55*	1085.6	[0.25]
<i>trans</i> -Sabinene hydrate	8.17	1506.9	0.04	5.71	1095.6	0.04
Linalool	8.27	1514.9	0.11	5.80	1101.6	0.12
Unknown BOSE I [m/z 109, 81 (54), 91 (32), 79 (22)...	6.45*	1379.7	[0.20]	5.96	1111.6	0.26
$\beta$ -Thujone	6.56*	1387.7	[0.25]	5.99	1113.1	0.02
<i>cis-para</i> -Menth-2-en-1-ol	8.34*	1520.5	[0.08]	6.08*	1119.3	[0.10]
$\alpha$ -Campholenal	7.20	1434.3	0.02	6.08*	1119.3	[0.10]
Unknown BOSE III [m/z 111, 43 (22), 55 (14), 41 (12), 110 (11)...				6.16	1124.1	0.02
<i>trans</i> -Pinocarveol	9.40*	1602.0	[0.02]	6.30	1133.5	0.02
<i>trans</i> -Sabinol	10.05*	1655.1	[0.24]	6.38	1138.3	0.09
<i>trans</i> -Verbenol	9.74	1630.2	0.02	6.44	1142.0	0.03
Unknown MEAL II [m/z 109, 124 (45), 119 (41), 43 (35), 91 (28), 95 (25)...	7.05	1423.3	0.02	6.49	1145.1	0.02
Unknown BOSE IV [m/z 109, 81 (39), 41 (38), 95 (24)... 152 (1)]				6.58	1151.0	0.02
Borneol	10.05*	1655.1	[0.24]	6.75	1162.2	0.04
<i>cis</i> -Sabinol	11.07	1739.3	0.10	6.84	1167.8	0.11
Terpinen-4-ol	8.80	1555.3	0.87	6.93	1173.7	0.85
<i>meta</i> -Cymen-8-ol	11.74*	1795.9	[0.03]	7.01	1178.8	0.03
Cryptone	9.40*	1602.0	[0.02]	7.06	1181.6	0.02
<i>para</i> -Cymen-8-ol	11.74*	1795.9	[0.03]	7.10	1184.1	0.06
$\alpha$ -Terpineol	10.05*	1655.1	[0.24]	7.16	1188.3	0.10
Methylchavicol	9.54*	1614.1	[1.98]	7.27	1195.1	1.96
<i>cis</i> - $\alpha$ -Phellandrene	11.24	1753.8	0.07	7.32	1198.5	0.06

epoxide (iPr vs Me)						
Verbenone	9.83	1637.3	0.02	7.37	1201.4	0.02
<i>trans</i> -Piperitol	10.59	1698.6	0.03	7.44	1205.8	0.02
Piperitone	10.05*	1655.1	[0.24]	8.07	1248.3	0.05
Linalyl acetate	8.34*	1520.5	[0.08]	8.20	1257.2	0.04
Unknown BOSE VI [m/z 109, 41 (22), 81 (14), 43 (11)... 152 (4)]				8.37	1268.6	0.04
Bornyl acetate	8.48	1531.0	0.04	8.57	1282.0	0.04
Carvacrol	15.57	2153.9	0.03	8.93	1306.3	0.03
<i>para</i> -Menth-5-en- 1,2-diol isomer III	15.46	2142.5	0.05	9.07	1315.7	0.05
$\alpha$ -Terpinyl acetate	9.94	1646.3	0.05	9.51	1346.8	0.06
$\alpha$ -Ylangene	7.31	1443.1	0.02	9.79	1367.0	0.04
$\alpha$ -Copaene	7.42	1451.0	0.12	9.86	1371.4	0.12
$\beta$ -Bourbonene	7.76	1475.7	0.58	9.97	1379.2	0.59
1,5-diepi- $\beta$ - Bourbonene	7.64	1467.5	0.05	9.99	1380.6	0.04
$\beta$ -Elemene	8.64*	1542.9	[0.10]	10.14	1391.8	0.10
Methyleugenol	13.54	1957.5	0.13	10.31	1403.2	0.12
$\beta$ -Ylangene	8.34*	1520.5	[0.08]	10.43	1412.7	0.08
$\beta$ -Copaene	8.64*	1542.9	[0.10]	10.57	1423.0	0.07
<i>trans</i> - $\alpha$ - Bergamotene	8.69	1547.4	0.07	10.71	1433.2	0.05
Isogermacrene D	9.17	1584.5	0.04	10.78	1438.1	0.05
<i>cis</i> -Muurolo-4(15),5- diene	9.54*	1614.1	[1.98]	11.06	1459.4	0.05
Germacrene D	10.00	1650.6	0.07	11.27*	1474.6	[0.19]
$\gamma$ -Muurolole	9.86	1639.6	0.06	11.27*	1474.6	[0.19]
Unknown BOSE VII [m/z 91, 93 (92), 105 (71), 77 (69), 79 (68), 133 (63)... 204 (32)]	10.19	1666.3	0.15	11.29	1476.4	0.14
Bicyclogermacrene	10.30*	1674.9	[0.03]	11.46	1489.3	0.03
$\alpha$ -Muurolole	10.30*	1674.9	[0.03]	11.55	1496.0	0.02
$\gamma$ -Cadinene	10.67	1705.8	0.02	11.71	1508.2	0.04
$\delta$ -Cadinene	10.70	1708.3	0.31	11.85	1519.1	0.33
Elemicin	15.71	2167.7	0.05	12.32	1555.9	0.03
Guaiol	14.40	2038.5	0.03	12.79	1592.9	0.02
$\alpha$ -Phellandrene dimer II	12.76	1885.7	0.06	15.10	1787.3	0.06
$\alpha$ -Phellandrene dimer III	13.40	1944.7	0.02	15.29	1803.7	0.01
(3 <i>E</i> )-Cembrene A	15.82	2178.0	0.03	16.87	1949.0	0.04
Cembrenol	20.35	2680.3	0.01	18.66	2125.8	0.02

Serratol	19.87	2623.4	0.09	18.80	2139.5	0.09
Total reported	98.30%			99.35%		

\*: 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