

**Date :** January 22, 2021

**CERTIFICATE OF ANALYSIS – GC PROFILING**

*SAMPLE IDENTIFICATION*

**Internal code :** 21A18-PTH08


**Customer identification :** Carrot Seed - Europe - C40107208R

**Type :** Essential oil

**Source :** *Daucus carota* ct. Carotol

**Customer :** Plant Therapy

*ANALYSIS*

**Method:** PC-MAT-014  - Analysis of the composition of an essential oil or other volatile liquid by FAST GC-FID (in French); identifications validated by GC-MS.

**Analyst :** Alexis St-Gelais, M. Sc., chimiste

**Analysis date :** January 21, 2021

Checked and approved by :

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Alexis St-Gelais, M. Sc., chimiste 2013-174

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*PHYSICOCHEMICAL DATA*

**Physical aspect:** Light orange liquid

**Refractive index:**  $1.4969 \pm 0.0003$  (20 °C; method PC-MAT-016)

*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	tr	Aliphatic aldehyde
2-Methylbutyral	tr	Aliphatic aldehyde
Heptanal	0.01	Aliphatic aldehyde
Hashishene	0.01	Monoterpene
Tricyclene	0.01	Monoterpene
$\alpha$ -Thujene	0.01	Monoterpene
$\alpha$ -Pinene	2.03	Monoterpene
Camphene	0.04	Monoterpene
Thuja-2,4(10)-diene	0.02	Monoterpene
(2E)-Heptenal	0.01	Aliphatic aldehyde
Unknown	0.01	Monoterpene
Sabinene	0.02	Monoterpene
$\beta$ -Pinene	1.08	Monoterpene
Pseudolimonene isomer	0.02	Monoterpene
Myrcene	0.75	Monoterpene
6-Methyl-5-hepten-2-ol	0.01	Aliphatic alcohol
$\alpha$ -Phellandrene	0.04	Monoterpene
Octanal	0.01	Aliphatic aldehyde
$\Delta^3$ -Carene	0.02	Monoterpene
$\alpha$ -Terpinene	0.01	Monoterpene
para-Cymene	0.50	Monoterpene
Limonene	1.14	Monoterpene
$\beta$ -Phellandrene	0.03	Monoterpene
$\gamma$ -Terpinene	0.03	Monoterpene
Unknown	0.01	Oxygenated monoterpene
<i>cis</i> -Linalool oxide (fur.)	0.01	Monoterpenic alcohol
Terpinolene	0.02	Monoterpene
para-Cymenene	0.03	Monoterpene
$\alpha$ -Pinene oxide	0.01	Monoterpenic ether
Linalool	0.02	Monoterpenic alcohol
Nonanal	0.04	Aliphatic aldehyde
Nopinone	0.01	Normonoterpenic ketone
<i>trans</i> -Pinocarveol	0.06	Monoterpenic alcohol
<i>cis</i> -Verbenol	0.01	Monoterpenic alcohol
<i>trans</i> -Verbenol	0.02	Monoterpenic alcohol
Pinocarvone	0.01	Monoterpenic ketone
(2E)-Nonenal	0.03	Aliphatic aldehyde
Terpinen-4-ol	0.03	Monoterpenic alcohol
para-Cymen-8-ol	0.01	Monoterpenic alcohol
$\alpha$ -Terpineol	0.06	Monoterpenic alcohol
Myrtenol	0.05	Monoterpenic alcohol
Verbenone	0.02	Monoterpenic ketone
<i>trans</i> -Carveol	0.03	Monoterpenic alcohol
Nerol	0.01	Monoterpenic alcohol
Neral	0.05	Monoterpenic aldehyde

Unknown	0.01	Oxygenated monoterpene
Geraniol	0.01	Monoterpenic alcohol
Phellandral	0.02	Monoterpenic aldehyde
Geranial	0.03	Monoterpenic aldehyde
Bornyl acetate	0.02	Monoterpenic ester
Cuminol	0.02	Monoterpenic alcohol
Perilla alcohol	0.02	Monoterpenic alcohol
Unknown	0.02	Oxygenated monoterpene
Carvacrol	0.01	Monoterpenic alcohol
$\alpha$ -Cubebene	0.06	Sesquiterpene
$\alpha$ -Terpinyl acetate	0.05	Monoterpenic ester
Neryl acetate	0.01	Monoterpenic ester
$\alpha$ -Copaene	0.02	Sesquiterpene
Unknown	0.18	Oxygenated sesquiterpene
Daucene	1.47	Sesquiterpene
Unknown	0.12	Sesquiterpene
Geranyl acetate	0.03	Monoterpenic ester
$\beta$ -Elemene	0.05	Sesquiterpene
Isocaryophyllene	0.04	Sesquiterpene
Methyleugenol	0.04	Phenylpropanoid
$\beta$ -Caryophyllene	2.01	Sesquiterpene
<i>cis</i> - $\alpha$ -Bergamotene	0.05	Sesquiterpene
$\beta$ -Copaene	0.23	Sesquiterpene
Isosativene	0.01	Sesquiterpene
<i>trans</i> - $\alpha$ -Bergamotene	0.33	Sesquiterpene
Sesquisabinene A	0.23	Sesquiterpene
$\alpha$ -Himachalene	0.04	Sesquiterpene
$\alpha$ -Humulene	0.05	Sesquiterpene
Unknown	0.25	Sesquiterpene
Unknown	0.27	Sesquiterpene
( <i>E</i> )- $\beta$ -Farnesene	0.59	Sesquiterpene
Unknown	0.24	Sesquiterpene
Dauca-5,8-diene?	0.19	Sesquiterpene
$\gamma$ -Murolene	0.02	Sesquiterpene
Germacrene D	0.04	Sesquiterpene
$\beta$ -Selinene	0.05	Sesquiterpene
<i>ar</i> -Curcumene	0.05	Sesquiterpene
Isodaucene	0.54	Sesquiterpene
$\alpha$ -Zingiberene	0.25	Sesquiterpene
Methyl ( <i>E</i> )-isoeugenol	0.41	Phenylpropanoid
$\beta$ -Bisabolene	1.21	Sesquiterpene
$\gamma$ -Cadinene	0.15	Sesquiterpene
$\delta$ -Cadinene	0.03	Sesquiterpene
$\beta$ -Sesquiphellandrene	0.17	Sesquiterpene
Dauca-4(11),8-diene	0.02	Sesquiterpene
( <i>E</i> )- $\alpha$ -Bisabolene	0.07	Sesquiterpene
Isocaryophyllene epoxide B	0.05	Sesquiterpenic ether
Unknown	2.28	Oxygenated sesquiterpene
Caryophyllene oxide	0.39	Sesquiterpenic ether
Caryophyllene oxide isomer	0.05	Sesquiterpenic ether
<i>trans</i> -Dauc-8-en-4 $\beta$ -ol	1.42	Sesquiterpenic alcohol
Carotol	66.63	Sesquiterpenic alcohol

Humulene epoxide II	0.13	Sesquiterpenic ether
Unknown	0.04	Oxygenated sesquiterpene
Unknown	0.33	Oxygenated sesquiterpene
Unknown	0.12	Oxygenated sesquiterpene
Muurolo-4,10(14)-dien-1 $\beta$ -ol?	0.76	Sesquiterpenic alcohol
Caryophylladienol I	0.11	Sesquiterpenic alcohol
Caryophylladienol II	0.15	Sesquiterpenic alcohol
Daucol	3.79	Sesquiterpenic alcohol
$\alpha$ -Muurolo	0.07	Sesquiterpenic alcohol
$\alpha$ -Cadinol	0.11	Sesquiterpenic alcohol
Unknown	0.39	Oxygenated sesquiterpene
Unknown	0.33	Unknown
(3Z)-Caryophylla-3,8(13)-dien-5 $\beta$ -ol	0.08	Sesquiterpenic alcohol
$\alpha$ -Asarone	0.03	Phenylpropanoid
Apiole	0.08	Phenylpropanoid
Shyobunol	0.02	Sesquiterpenic alcohol
$\alpha$ -Bisabolol	0.04	Sesquiterpenic alcohol
Juniper camphor	0.04	Sesquiterpenic alcohol
(2Z,6E)-Farnesol	0.03	Sesquiterpenic alcohol
(2E,6E)-Farnesol	0.05	Sesquiterpenic alcohol
Drimenol	0.06	Sesquiterpenic alcohol
Unknown	0.05	Oxygenated sesquiterpene
Unknown	0.09	Oxygenated sesquiterpene
Phytone	0.07	Terpenic ketone
para-Camphorene	0.04	Diterpene
6-Methyl-5-hepten-2-one	0.02	Aliphatic ketone
<b>Consolidated total</b>	<b>93.90%</b>	

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

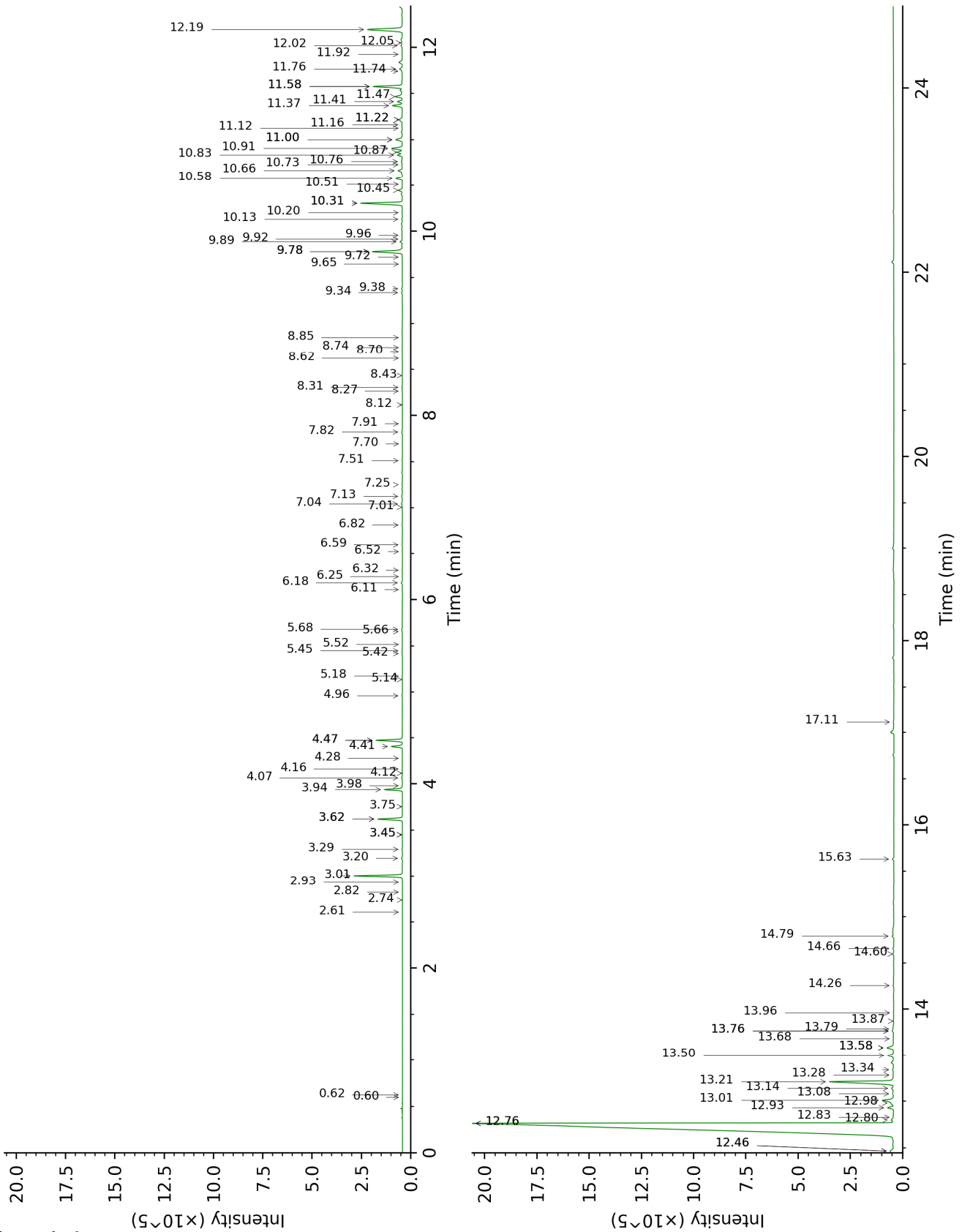
Note: no correction factor was applied

**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.

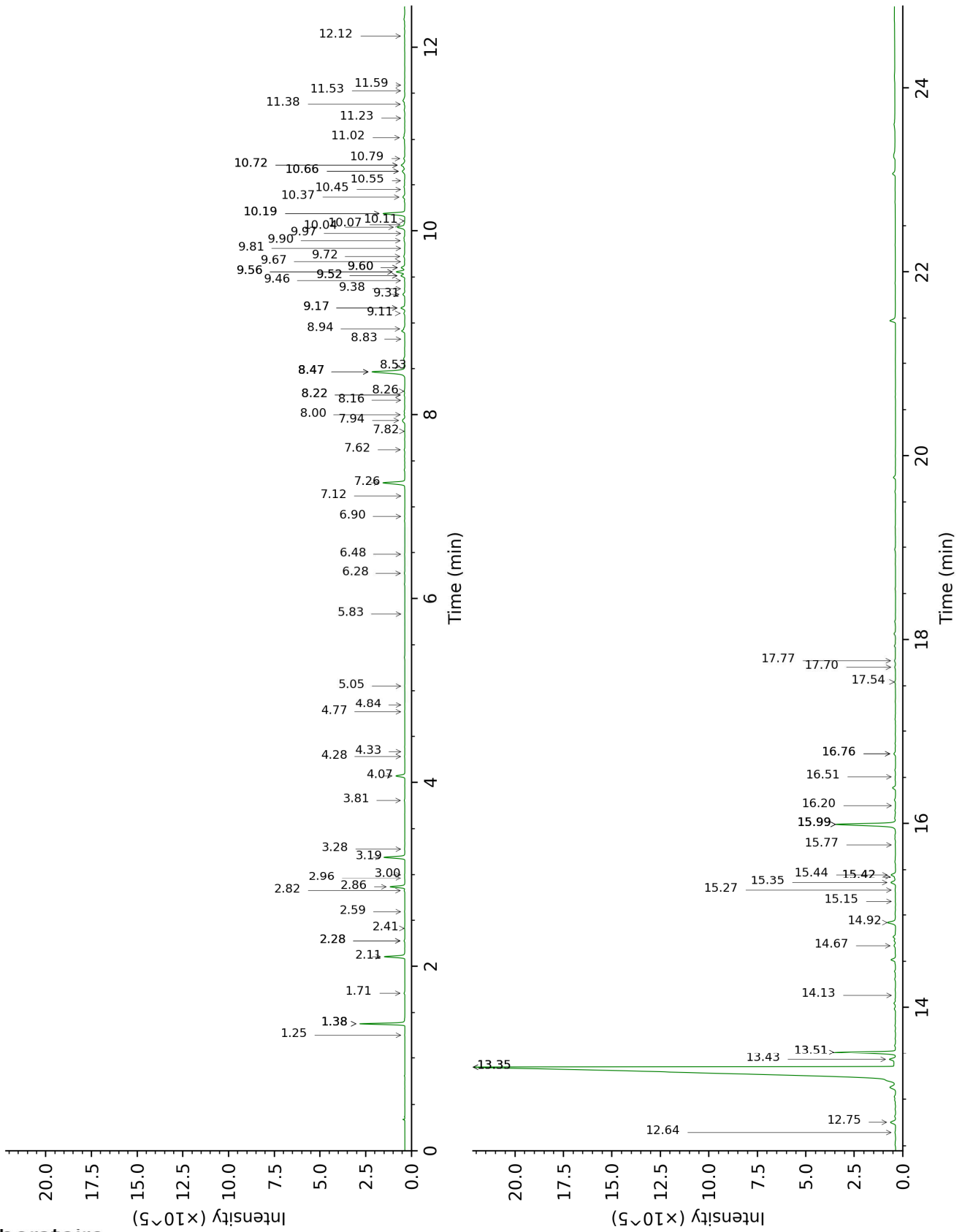
**Unknowns:** Unknown compounds' mass spectral data is presented in the "Full analysis data" table. The occurrence of unknown compounds is to be expected in many samples, and does not denote particular problems unless noted otherwise in the conclusion.

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

DB-5



DB-WAX





FULL ANALYSIS DATA

Identification	Column DB-5			Column DB-WAX		
	R.T	R.I	%	R.T	R.I	%
Isovaleral	0.60	640	tr			
2-Methylbutyral	0.62	651	tr			
Heptanal	2.61	903	0.01	3.00	1145	0.02
Hashishene	2.74	912	0.01	1.38*	997	1.98
Tricyclene	2.82	917	0.01	1.26	977	0.01
α-Thujene	2.93	924	0.01	1.38*	997	[1.98]
α-Pinene	3.01	929	2.03	1.38*	997	[1.98]
Camphene	3.20	942	0.04	1.71	1030	0.05
Thuja-2,4(10)-diene	3.29	948	0.02	2.28*	1086	0.04
(2E)-Heptenal	3.45*	959	0.02	4.84	1286	0.01
Unknown [m/z 121, 93 (86), 79 (71), 67 (62), 55 (49)... 136 (24)]	3.45*	959	[0.02]			
Sabinene	3.62*	970	1.11	2.28*	1086	[0.04]
β-Pinene	3.62*	970	[1.11]	2.11	1069	1.08
Pseudolimonene isomer	3.76	979	0.02	2.41	1099	0.02
Myrcene	3.94	992	0.75	2.86	1134	0.76
6-Methyl-5-hepten-2-ol	3.98	994	0.01	6.90	1432	0.02
α-Phellandrene	4.07	1000	0.04	2.82	1131	0.04
Octanal	4.12	1003	0.01	4.34	1248	0.01
Δ3-Carene	4.16	1006	0.02	2.59	1113	0.02
α-Terpinene	4.28	1013	0.01	2.96	1142	0.02
para-Cymene	4.41	1021	0.50	4.07	1228	0.51
Limonene	4.47*	1026	1.16	3.19	1160	1.14
β-Phellandrene	4.47*	1026	[1.16]	3.28	1168	0.03
γ-Terpinene	4.96	1057	0.03	3.81	1209	0.04
Unknown [m/z 79, 93 (60), 43 (40), 94 (35), 137 (33), 77 (26), 91 (20), 152 (18)]	5.14	1068	0.01	4.77	1280	0.02
cis-Linalool oxide (fur.)	5.18	1070	0.01	6.48	1401	0.02
Terpinolene	5.42	1086	0.02	4.28	1244	0.02
para-Cymenene	5.45	1088	0.03	6.28	1386	0.03
α-Pinene oxide	5.52	1092	0.01			
Linalool	5.66	1101	0.02	8.00	1514	0.04
Nonanal	5.68	1103	0.04	5.83	1355	0.01
Nopinone	6.11	1131	0.01	8.16	1527	0.02
trans-Pinocarveol	6.18	1136	0.06	9.11	1600	0.07
cis-Verbenol	6.25	1140	0.01	9.17*	1605	0.26
trans-Verbenol	6.32	1144	0.02	9.46	1629	0.02
Pinocarvone	6.52	1156	0.01	7.82	1501	0.01
(2E)-Nonenal	6.60	1160	0.03	7.62	1486	0.04
Terpinen-4-ol	6.82	1175	0.03	8.53	1555	0.08

para-Cymen-8-ol	7.01	1187	0.01	11.53	1802	0.02
α-Terpineol	7.04	1189	0.06	9.72	1650	0.10
Myrtenol	7.13	1194	0.05	10.79	1739	0.08
Verbenone	7.25	1202	0.02	9.56*	1637	0.53
<i>trans</i> -Carveol	7.51	1220	0.03	11.38	1789	0.03
Nerol	7.70	1232	0.01	11.02	1758	0.11
Neral	7.82	1240	0.05	9.52*	1633	0.26
Unknown [m/z 109, 119 (84), 91 (81), 134 (55)... 137 (27)...]	7.91	1246	0.01	11.23	1776	0.02
Geraniol	8.12	1260	0.01	11.59	1807	0.01
Phellandral	8.26	1270	0.02	9.97	1670	0.02
Geranial	8.31	1272	0.03	10.07	1678	0.04
Bornyl acetate	8.43	1281	0.02	8.22*	1531	0.04
Cuminol	8.62	1294	0.02	14.13	2041	0.02
Perilla alcohol	8.70	1299	0.02			
Unknown [m/z 109, 43 (84), 134 (43), 41 (28), 151 (26), 91 (24)...]	8.74	1302	0.02	9.38	1622	0.03
Carvacrol	8.85	1309	0.01	15.27	2154	0.06
α-Cubebene	9.34	1344	0.06			
α-Terpinyl acetate	9.38	1346	0.05	9.67	1646	0.03
Neryl acetate	9.65	1365	0.01	10.11	1682	0.02
α-Copaene	9.72	1370	0.02	7.12	1449	0.01
Unknown [m/z 159, 177 (67), 93 (64), 107 (55), 91 (39), 81 (38)...220(5)]	9.78*	1375	1.65			
Daucene	9.78*	1375	[1.65]	7.26	1459	1.47
Unknown [m/z 161, 91 (40), 105 (38), 79 (31), 93 (29), 119 (29)... 204 (1)]	9.89	1382	0.12	7.94	1510	0.24
Geranyl acetate	9.92	1384	0.03	10.55	1718	0.03
β-Elemene	9.96	1387	0.05	8.47*	1550	2.62
Isocaryophyllene	10.13	1399	0.04	8.22*	1531	[0.04]
Methyleugenol	10.20	1404	0.04	13.35*	1966	66.80
β-Caryophyllene	10.31*	1412	2.15	8.47*	1550	[2.62]
<i>cis</i> -α-Bergamotene	10.31*	1412	[2.15]	8.26	1534	0.05
β-Copaene	10.45	1422	0.23	8.47*	1550	[2.62]
Isosativene	10.51	1427	0.01	8.83	1578	0.01
<i>trans</i> -α-Bergamotene	10.58	1432	0.33	8.47*	1550	[2.62]
Sesquisabinene A	10.66	1438	0.23	9.17*	1605	[0.26]
α-Himachalene	10.73	1443	0.04	8.94	1587	0.06
α-Humulene	10.76	1446	0.05	9.31	1617	0.14
Unknown [m/z 159, 145 (33), 160 (33), 187 (22), 91 (19), 131 (18)... 202 (6)]	10.83	1451	0.25	9.52*	1633	[0.26]

Unknown [m/z 109, 124 (27), 79 (10), 91 (10), 145 (10)... 204? (1)]	10.87	1453	0.27	10.72*	1733	0.30
(E)-β-Farnesene	10.91	1456	0.59	9.56*	1637	[0.53]
Unknown [m/z 161, 91 (57), 120 (46), 105 (42), 133 (25), 119 (22), 41 (21), 204 (21)]	11.00*	1463	0.43	9.60*	1640	0.26
Dauca-5,8-diene?	11.00*	1463	[0.43]			
γ-Murolene	11.12	1473	0.02	9.60*	1640	[0.26]
Germacrene D	11.16	1475	0.04	9.81	1657	0.02
β-Selinene	11.22*	1479	0.24	9.90	1664	0.05
ar-Curcumene	11.22*	1479	[0.24]	10.66*	1727	0.22
Isodaucene	11.37	1491	0.54	10.04	1676	0.55
α-Zingiberene	11.41	1494	0.25	10.19*	1688	1.46
Methyl (E)-isoeugenol	11.47	1498	0.41	14.92	2119	0.61
β-Bisabolene	11.58*	1506	1.50	10.19*	1688	[1.46]
γ-Cadinene	11.58*	1506	[1.50]	10.37	1703	0.15
δ-Cadinene	11.74	1519	0.03	10.45	1710	0.03
β-Sesquiphellandrene	11.76	1521	0.17	10.66*	1727	[0.22]
Dauca-4(11),8-diene	11.92	1534	0.02			
(E)-α-Bisabolene	12.02	1541	0.07	10.72*	1733	[0.30]
Isocaryophyllene epoxide B	12.05	1543	0.05	12.12	1854	0.05
Unknown [m/z 135, 107 (92), 159 (89), 121 (84), 177 (80), 91 (79)... 220 (16)]	12.19	1554	2.28	13.51*	1982	3.69
Caryophyllene oxide	12.46*	1576	0.43	12.75	1911	0.39
Caryophyllene oxide isomer	12.46*	1576	[0.43]	12.64	1901	0.05
trans-Dauc-8-en-4β-ol	12.76*	1599	70.51	13.51*	1982	[3.69]
Carotol	12.76*	1599	[70.51]	13.35*	1966	[66.80]
Humulene epoxide II	12.80	1602	0.13	13.35*	1966	[66.80]
Unknown [m/z 177, 159 (59), 137 (45), 109 (41), 93 (41)...222(2)]	12.83	1604	0.04			
Unknown [m/z 107, 105 (93), 119 (87), 132 (85), 43 (66), 91 (61)...218(35)]	12.93	1613	0.33			
Unknown [m/z 159, 177 (50), 93 (44), 91	12.98	1617	0.12			

(39), 105 (31), 135 (29)...222(9)]						
Muurola-4,10(14)-dien-1 $\beta$ -ol?	13.01	1619	0.76	13.43	1974	0.50
Caryophylladienol I	13.08	1625	0.11	15.99*	2229	4.01
Caryophylladienol II	13.14	1630	0.15	15.99*	2229	[4.01]
Daucol	13.21	1636	3.79	15.99*	2229	[4.01]
$\alpha$ -Muurolol	13.28	1642	0.07	15.15	2142	0.03
$\alpha$ -Cadinol	13.34	1646	0.11	15.42*	2170	0.08
Unknown [m/z 59, 95 (61), 149 (33), 81 (31), 107 (29), 108 (26)...222(1)]	13.50	1659	0.39	15.35	2163	0.35
Unknown [m/z 122, 41 (59), 79 (58), 123 (54), 107 (53), 121 (47)... 206 (13)]	13.58*	1666	0.49	15.44	2172	0.33
(3Z)-Caryophylla-3,8(13)-dien-5 $\beta$ -ol	13.58*	1666	[0.49]	16.76*	2310	0.13
$\alpha$ -Asarone	13.68	1674	0.03	17.54	2396	0.06
Apiole	13.76*	1681	0.11	17.70	2414	0.08
Shyobunol	13.76*	1681	[0.11]	16.20	2250	0.02
$\alpha$ -Bisabolol	13.79	1683	0.04	15.42*	2170	[0.08]
Juniper camphor	13.87	1690	0.04	15.99*	2229	[4.01]
(2Z,6E)-Farnesol	13.96	1697	0.03	16.51	2283	0.03
(2E,6E)-Farnesol	14.26	1723	0.05	16.76*	2310	[0.13]
Drimenol	14.60	1752	0.06	17.77	2422	0.09
Unknown [m/z 110, 123 (50), 95 (31), 111 (31), 109 (24)... 236 (t)]	14.66	1757	0.05			
Unknown [m/z 139, 159 (31), 43 (20), 82 (15), 97 (13)... 236 (4)]	14.79	1769	0.09			
Phytone	15.63	1844	0.07	14.67	2094	0.13
para-Camphorene	17.11	1981	0.04	15.77	2205	0.04
6-Methyl-5-hepten-2-one				5.05	1302	0.02
<b>Total identified</b>		<b>92.81%</b>			<b>92.05%</b>	
<b>Total reported</b>		<b>96.79%</b>			<b>93.03%</b>	

\*: Two or more compounds are coeluting on this column

[xx]: Duplicate percentage due to coelutions, not 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