

Date : September 27, 2022

CERTIFICATE OF ANALYSIS – GC PROFILING

SAMPLE IDENTIFICATION

Internal code : 22I21-PTH02


Customer identification : Juniper Berry ORGANIC - Bulgaria - J50106R

Type : Essential oil

Source : *Juniperus communis*

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 : Amélie Simard, Analyste

Analysis date : September 23, 2022

Checked and approved by :

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

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PHYSICOCHEMICAL DATA

Physical aspect: Clear liquid

Refractive index: 1.4741 ± 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
2-Methylfuran	tr	Furan
Isovaleral	tr	Aliphatic aldehyde
2-Methylbutyral	tr	Aliphatic aldehyde
2-Ethylfuran	tr	Furan
Toluene	0.01	Simple phenolic
Hexanal	0.01	Aliphatic aldehyde
Unknown	tr	Alkene
(2E)-Hexenal	0.02	Aliphatic aldehyde
Bornylene	0.01	Monoterpene
Tricyclene	0.12	Monoterpene
α -Thujene	2.07	Monoterpene
α -Pinene	41.38	Monoterpene
α -Fenchene	0.06	Monoterpene
Camphene	0.29	Monoterpene
Thuja-2,4(10)-diene	0.01	Monoterpene
3,7,7-Trimethylcyclohepta-1,3,5-triene	0.03	Monoterpene
Sabinene	7.97	Monoterpene
β -Pinene	2.21	Monoterpene
Octen-3-ol	0.02	Aliphatic alcohol
6-Methyl-5-hepten-2-one	0.01	Aliphatic ketone
Myrcene	7.06	Monoterpene
2-Carene	0.13	Monoterpene
α -Phellandrene	0.70	Monoterpene
Menthatriene isomer I	0.02	Monoterpene
Δ^3 -Carene	0.26	Monoterpene
α -Terpinene	1.98	Monoterpene
meta-Cymene	0.01	Monoterpene
para-Cymene	1.04	Monoterpene
Limonene	5.43	Monoterpene
1,8-Cineole	1.92	Monoterpenic ether
(Z)- β -Ocimene	0.02	Monoterpene
(E)- β -Ocimene	0.22	Monoterpene
γ -Terpinene	3.37	Monoterpene
cis-Sabinene hydrate	0.05	Monoterpenic alcohol
Unknown	0.03	Oxygenated monoterpene
cis-Linalool oxide (fur.)	0.01	Monoterpenic alcohol
meta-Cymenene	0.01	Monoterpene
Fenchone	0.01	Monoterpenic ketone
Terpinolene	1.77	Monoterpene
trans-Linalool oxide (fur.)	0.01	Monoterpenic alcohol
para-Cymenene	0.13	Monoterpene
6,7-Epoxymyrcene	0.01	Monoterpenic ether
trans-Sabinene hydrate	0.05	Monoterpenic alcohol
Perillene	0.01	Monoterpenic ether
Linalool	0.09	Monoterpenic alcohol

Nonanal	0.02	Aliphatic aldehyde
Verbenol analog?	0.02	Monoterpenic alcohol
endo-Fenchol	0.08	Monoterpenic alcohol
<i>cis</i> -para-Menth-2-en-1-ol	0.11	Monoterpenic alcohol
α -Campholenal	0.05	Monoterpenic aldehyde
<i>cis</i> -Limonene oxide	0.01	Monoterpenic ether
<i>trans</i> -Pinocarveol	0.06	Monoterpenic alcohol
Camphor	0.01	Monoterpenic ketone
<i>cis</i> -Verbenol	0.08	Monoterpenic alcohol
<i>trans</i> -Verbenol	0.05	Monoterpenic alcohol
meta-Mentha-4,6-dien-8-ol	0.05	Monoterpenic alcohol
Pinocamphone	0.07	Monoterpenic ketone
Borneol	0.06	Monoterpenic alcohol
α -Phellandren-8-ol	0.03	Monoterpenic alcohol
Isopinocamphone	0.04	Monoterpenic ketone
Terpinen-4-ol	3.77	Monoterpenic alcohol
Nonanol	0.01	Aliphatic alcohol
para-Cymen-8-ol	0.05	Monoterpenic alcohol
α -Terpineol	0.24	Monoterpenic alcohol
Myrtenal	0.17	Monoterpenic aldehyde
Myrtenol	0.08	Monoterpenic alcohol
<i>trans</i> -Isopiperitenol	0.02	Monoterpenic alcohol
Verbenone	0.07	Monoterpenic ketone
Decanal	0.04	Aliphatic aldehyde
endo-Fenchyl acetate	0.01	Monoterpenic ester
<i>trans</i> -Carveol	0.03	Monoterpenic alcohol
<i>cis</i> -Carveol	0.02	Monoterpenic alcohol
Citronellol	0.06	Monoterpenic alcohol
Thymol methyl ether	0.07	Monoterpenic ether
Carvone	0.03	Monoterpenic ketone
Carvacrol methyl ether	0.04	Monoterpenic ether
Piperitone	0.04	Monoterpenic ketone
Geraniol	0.01	Monoterpenic alcohol
Methyl citronellate	0.05	Monoterpenic ester
<i>trans</i> -Ascaridole glycol	0.02	Monoterpenic alcohol
Geranial	0.05	Monoterpenic aldehyde
Decanol	0.03	Aliphatic alcohol
Bornyl acetate	0.24	Monoterpenic ester
2-Undecanone	0.06	Aliphatic ketone
Thymol	0.01	Monoterpenic alcohol
δ -Terpinyl acetate	0.02	Monoterpenic ester
Myrtenyl acetate	0.03	Monoterpenic ester
Terpinyl acetate analog	0.02	Monoterpenic ester
α -Terpinyl acetate	0.09	Monoterpenic ester
α -Cubebene	0.20	Sesquiterpene
Citronellyl acetate	0.02	Monoterpenic ester
α -Ylangene	0.04	Sesquiterpene
α -Copaene	0.34	Sesquiterpene
<i>trans</i> -Myrtanyl acetate	0.04	Monoterpenic ester
<i>cis</i> - β -Elemene	0.04	Sesquiterpene
Geranyl acetate	0.01	Monoterpenic ester
β -Cubebene	0.04	Sesquiterpene

β-Elemene	0.80	Sesquiterpene
Longifolene	0.03	Sesquiterpene
Sibirene	0.23	Sesquiterpene
α-Gurjunene	0.02	Sesquiterpene
β-Caryophyllene	2.65	Sesquiterpene
β-Copaene	0.19	Sesquiterpene
cis-Thujopsene	0.03	Sesquiterpene
γ-Elemene	0.24	Sesquiterpene
Aromadendrene	0.05	Sesquiterpene
α-Himachalene	0.03	Sesquiterpene
trans-Muuro-la-3,5-diene	0.05	Sesquiterpene
α-Humulene	1.80	Sesquiterpene
allo-Aromadendrene	0.02	Sesquiterpene
β-Acoradiene	0.07	Sesquiterpene
(E)-β-Farnesene	0.25	Sesquiterpene
trans-Cadina-1(6),4-diene	0.14	Sesquiterpene
γ-Muuro-lene	0.36	Sesquiterpene
Germacrene D	1.19	Sesquiterpene
β-Selinene	0.14	Sesquiterpene
ar-Curcumene	0.14	Sesquiterpene
γ-Amorphene	0.08	Sesquiterpene
α-Selinene	0.24	Sesquiterpene
Bicyclogermacrene	0.04	Sesquiterpene
α-Muuro-lene	0.38	Sesquiterpene
Germacrene A	0.07	Sesquiterpene
γ-Cadinene	0.43	Sesquiterpene
Cubebol	0.01	Sesquiterpenic alcohol
trans-Calamenene	0.03	Sesquiterpene
δ-Cadinene	1.30	Sesquiterpene
Selina-4(15),7(11)-diene	0.16	Sesquiterpene
α-Cadinene	0.12	Sesquiterpene
Selina-3,7(11)-diene	0.12	Sesquiterpene
α-Elemol	0.03	Sesquiterpenic alcohol
Germacrene B	0.74	Sesquiterpene
(E)-Nerolidol	0.08	Sesquiterpenic alcohol
Spathulenol	0.06	Sesquiterpenic alcohol
Caryophyllene oxide isomer	0.01	Sesquiterpenic ether
Caryophyllene oxide	0.13	Sesquiterpenic ether
Unknown	0.02	Oxygenated sesquiterpene
Humulene epoxide II	0.09	Sesquiterpenic ether
10-epi-Cubebol	0.02	Sesquiterpenic alcohol
Junenol	0.02	Sesquiterpenic alcohol
β-Acorenol	0.02	Sesquiterpenic alcohol
Unknown	0.02	Unknown
τ-Cadinol	0.04	Sesquiterpenic alcohol
τ-Muuro-lol	0.05	Sesquiterpenic alcohol
α-Muuro-lol	0.04	Sesquiterpenic alcohol
α-Eudesmol	0.03	Sesquiterpenic alcohol
α-Cadinol	0.08	Sesquiterpenic alcohol
Cedrenol analog	0.01	Sesquiterpenic alcohol
(3Z)-Caryophylla-3,8(13)-dien-5β-ol	0.01	Sesquiterpenic alcohol
Germacra-4(15),5,10(14)-trien-1-ol isomer	0.01	Sesquiterpenic alcohol

Juniper camphor	0.01	Sesquiterpenic alcohol
(2E,6E)-Farnesol	0.01	Sesquiterpenic alcohol
meta-Camphorene	0.03	Diterpene
para-Camphorene	0.03	Diterpene
18-Norabieta-8,11,13-triene?	0.01	Norditerpene
ar-Abietatriene	0.01	Diterpene
7,13-Abietadiene	0.01	Diterpene
Unknown	0.01	Unknown
Consolidated total	98.49%	

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

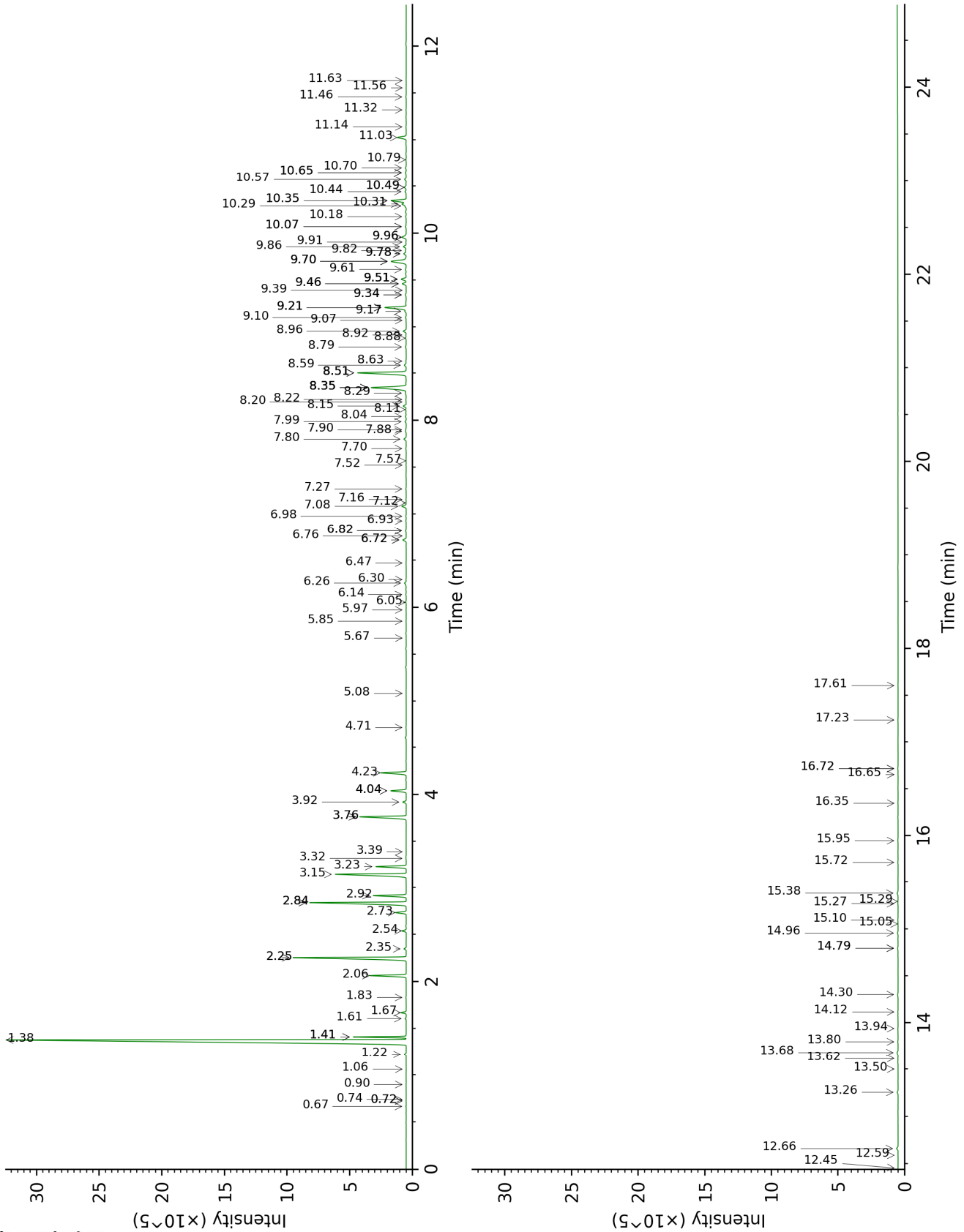
Note: no correction factor was applied

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-WAX



FULL ANALYSIS DATA

Identification	Column DB-5			Column DB-WAX		
	R.T	R.I	%	R.T	R.I	%
2-Methylfuran	0.53	603	tr	0.67	859	0.01
Isovaleral	0.66	642	tr	0.74	888	tr
2-Methylbutyral	0.69	652	tr	0.72*	882	tr
2-Ethylfuran	0.84	700	tr	0.90	919	tr
Toluene	1.27	758	0.01	1.41*	1002	2.10
Hexanal	1.57	799	0.01	1.83	1044	0.01
Unknown [m/z 109, 67 (32), 81 (14), 41 (12), 124 (10)]	1.95	832	tr	0.72*	882	[tr]
(2E)-Hexenal	2.16	848	0.02	3.39	1178	0.01
Bornylene	2.84	904	0.01	1.06	947	tr
Tricyclene	3.07	919	0.12	1.22	974	0.11
α-Thujene	3.19	927	2.07	1.41*	1002	[2.10]
α-Pinene	3.31	935	41.38	1.38	998	41.64
α-Fenchene	3.45†	944	0.37	1.61	1022	0.06
Camphene	3.46†	945	[0.37]	1.67	1028	0.29
Thuja-2,4(10)-diene	3.49	947	0.01	2.25*	1087	8.13
3,7,7-Trimethylcyclohepta-1,3,5-triene	3.77	965	0.03	2.84*	1135	7.14
Sabinene	3.89†	973	10.18	2.25*	1087	[8.13]
β-Pinene	3.90†	974	[10.18]	2.06	1068	2.21
Octen-3-ol	4.05	984	0.02	6.72*	1422	0.28
6-Methyl-5-hepten-2-one	4.12	988	0.01	5.08	1302	0.01
Myrcene	4.22	995	7.06	2.84*	1135	[7.14]
2-Carene	4.30	1000	0.13	2.35	1096	0.13
α-Phellandrene	4.35	1003	0.70	2.74	1127	0.69
Menthatriene isomer I	4.38	1005	0.02	3.32	1173	0.02
Δ3-Carene	4.44	1009	0.26	2.54	1111	0.25
α-Terpinene	4.56	1016	1.98	2.92	1141	1.99
meta-Cymene	4.64	1021	0.01	4.04*	1227	1.03
para-Cymene	4.67	1024	1.04	4.04*	1227	[1.03]
Limonene	4.76*	1029	7.28	3.15	1159	5.43
1,8-Cineole	4.76*	1029	[7.28]	3.23	1166	1.92
(Z)-β-Ocimene	4.96	1041	0.02	3.76*	1206	3.39
(E)-β-Ocimene	5.12	1051	0.22	3.92	1218	0.23
γ-Terpinene	5.25	1059	3.37	3.76*	1206	[3.39]
cis-Sabinene hydrate	5.36	1066	0.05	6.82*	1429	0.06
Unknown [m/z 79, 93 (60), 43 (40), 94 (35), 137 (33), 77 (26), 91 (20), 152 (18)]	5.41	1069	0.03	4.71	1276	0.03
cis-Linalool oxide (fur.)	5.45	1072	0.01	6.47	1403	0.03
meta-Cymenene	5.52	1077	0.01	6.14	1379	0.04
Fenchone	5.64	1084	0.01	5.67	1345	0.01

Terpinolene	5.70*	1088	1.88	4.23	1240	1.77
<i>trans</i> -Linalool oxide (fur.)	5.70*	1088	[1.88]	6.82*	1429	[0.06]
para-Cymenene	5.70*	1088	[1.88]	6.26	1387	0.13
6,7-Epoxymyrcene	5.80	1094	0.01	5.97	1367	0.02
<i>trans</i> -Sabinene hydrate	5.84	1097	0.05	7.88	1509	0.05
Perillene	5.88	1099	0.01	6.05	1373	0.04
Linalool	5.94*	1103	0.13	7.99	1517	0.09
Nonanal	5.94*	1103	[0.13]	5.85	1358	0.02
Verbenol analog?	6.00	1106	0.02	8.20	1533	0.02
endo-Fenchol	6.04	1109	0.08	8.29	1540	0.10
<i>cis</i> -para-Menth-2-en-1-ol	6.21	1120	0.11	8.04	1521	0.07
α-Campholenal	6.26	1123	0.05	6.93	1437	0.04
<i>cis</i> -Limonene oxide	6.37	1130	0.01	6.30	1390	0.02
<i>trans</i> -Pinocarveol	6.45*	1135	0.07	9.10	1604	0.06
Camphor	6.45*	1135	[0.07]	7.12	1452	0.01
<i>cis</i> -Verbenol	6.51	1139	0.08	9.21*	1613	1.78
<i>trans</i> -Verbenol	6.59	1144	0.05	9.46*	1633	0.30
meta-Mentha-4,6-dien-8-ol	6.63	1147	0.05	9.21*	1613	[1.78]
Pinocamphone	6.72	1152	0.07	7.16	1454	0.02
Borneol	6.90	1164	0.06	9.70*	1653	1.66
α-Phellandren-8-ol	6.95	1167	0.03	10.07*	1683	0.08
Isopinocamphone	6.97	1168	0.04	7.52	1481	0.02
Terpinen-4-ol	7.10*	1177	3.83	8.50*	1557	3.92
Nonanol	7.10*	1177	[3.83]	9.34*	1624	0.09
para-Cymen-8-ol	7.23	1185	0.05	11.46	1800	0.04
α-Terpineol	7.31*	1190	0.41	9.70*	1653	[1.66]
Myrtenal	7.31*	1190	[0.41]	8.59	1564	0.17
Myrtenol	7.39	1195	0.08	10.79	1743	0.03
<i>trans</i> -Isopiperitenol	7.46	1199	0.02	10.31†	1703	1.62
Verbenone	7.52	1203	0.07	9.51*	1637	0.43
Decanal	7.58	1208	0.04	7.27	1462	0.03
endo-Fenchyl acetate	7.72	1217	0.01	6.76	1425	0.01
<i>trans</i> -Carveol	7.75	1219	0.03	11.32	1788	0.02
<i>cis</i> -Carveol	7.93	1231	0.02	11.63	1816	0.01
Citronellol	7.96	1233	0.06	10.65*	1732	0.08
Thymol methyl ether	8.00	1236	0.07	8.35*	1545	3.40
Carvone	8.07	1240	0.03	9.91	1669	0.02
Carvacrol methyl ether	8.14	1245	0.04	8.50*	1557	[3.92]
Piperitone	8.22	1250	0.04	9.82†	1662	[0.29]
Geraniol	8.39	1262	0.01	11.56	1809	0.01
Methyl citronellate	8.43	1264	0.05	8.11	1527	0.05
<i>trans</i> -Ascaridole glycol	8.49	1268	0.02	14.12	2043	0.02
Geranial	8.52	1270	0.05	10.07*	1683	[0.08]
Decanol	8.65	1279	0.03	10.65*	1732	[0.08]
Bornyl acetate	8.73	1284	0.24	8.15	1530	0.23

2-Undecanone	8.91	1296	0.06	8.50*	1557	[3.92]
Thymol	9.00	1302	0.01	15.05	2134	0.01
δ-Terpinyl acetate	9.20	1314	0.02	9.07	1602	0.02
Myrtenyl acetate	9.32	1322	0.03	9.51*	1637	[0.43]
Terpinyl acetate analog	9.47	1333	0.02	9.51*	1637	[0.43]
α-Terpinyl acetate	9.68*	1348	0.28	9.61	1646	0.09
α-Cubebene	9.68*	1348	[0.28]	6.72*	1422	[0.28]
Citronellyl acetate	9.81	1357	0.02	9.39	1628	0.01
α-Ylangene	9.97	1368	0.04	6.98	1441	0.04
α-Copaene	10.03	1373	0.34	7.08	1449	0.34
<i>trans</i> -Myrtanyl acetate	10.14	1381	0.04	10.18	1691	0.06
<i>cis</i> -β-Elemene	10.17	1383	0.04	8.22	1535	0.04
Geranyl acetate	10.20	1385	0.01	10.49*	1718	0.17
β-Cubebene	10.24	1388	0.04	7.70	1495	0.05
β-Elemene	10.28	1390	0.80	8.35*	1545	[3.40]
Longifolene	10.32	1393	0.03	7.90	1510	0.05
Sibirene	10.39	1398	0.23	7.80	1502	0.20
α-Gurjunene	10.50	1406	0.02	7.57	1485	0.02
β-Caryophyllene	10.62	1415	2.65	8.35*	1545	[3.40]
β-Copaene	10.75*	1425	0.23	8.35*	1545	[3.40]
<i>cis</i> -Thujopsene	10.75*	1425	[0.23]	8.63	1567	0.03
γ-Elemene	10.84	1432	0.24	8.96	1592	0.24
Aromadendrene	10.88	1434	0.05	8.50*	1557	[3.92]
α-Himachalene	11.00	1443	0.03	8.88	1586	0.07
<i>trans</i> -Muurolo-3,5-diene	11.04	1446	0.05	8.79	1579	0.08
α-Humulene	11.08	1449	1.80	9.21*	1613	[1.78]
allo-Aromadendrene	11.16	1455	0.02	8.92	1589	0.03
β-Acoradiene	11.21*	1459	0.33	9.34*	1624	[0.09]
(<i>E</i>)-β-Farnesene	11.21*	1459	[0.33]	9.46*	1633	[0.30]
<i>trans</i> -Cadina-1(6),4-diene	11.37	1471	0.14	9.17	1609	0.10
γ-Muurolole	11.41	1474	0.36	9.51*	1637	[0.43]
Germacrene D	11.45	1477	1.19	9.70*	1653	[1.66]
β-Selinene	11.51*	1481	0.28	9.78*†	1659	0.29
ar-Curcumene	11.51*	1481	[0.28]	10.57	1725	0.14
γ-Amorphene	11.58	1487	0.08	9.78*†	1659	[0.29]
α-Selinene	11.64*	1491	0.41	9.86	1665	0.24
Bicyclogermacrene	11.64*	1491	[0.41]	9.96*	1673	0.42
α-Muurolole	11.73	1498	0.38	9.96*	1673	[0.42]
Germacrene A	11.76	1500	0.07	10.29	1701	0.07
γ-Cadinene	11.90*	1510	0.44	10.35*†	1706	[1.62]
Cubebol	11.90*	1510	[0.44]	12.45	1888	0.01
<i>trans</i> -Calamenene	12.04*	1522	1.33	11.14	1773	0.03
δ-Cadinene	12.04*	1522	[1.33]	10.35*†	1706	[1.62]
Selina-4(15),7(11)-diene	12.14	1530	0.16	10.49*	1718	[0.17]
α-Cadinene	12.20	1534	0.12	10.70	1736	0.07
Selina-3,7(11)-diene	12.23	1537	0.12	10.44	1714	0.11
α-Elemol	12.35	1546	0.03	13.94	2026	0.03

Germacrene B	12.42	1551	0.74	11.03	1763	0.74
(E)-Nerolidol	12.58	1564	0.08	13.68	2002	0.12
Spathulenol	12.68	1572	0.06	14.30	2060	0.06
Caryophyllene oxide isomer	12.73*	1575	0.15	12.59	1902	0.01
Caryophyllene oxide	12.73*	1575	[0.15]	12.66	1909	0.13
Unknown [m/z 159, 83 (88), 55 (53), 93 (50), 121 (48)... 220 (9)]	12.81	1582	0.02			
Humulene epoxide II	13.06	1601	0.09	13.26	1963	0.08
10-epi-Cubenol	13.13	1607	0.02	13.62	1996	0.02
Junenol	13.16	1610	0.02	13.50	1985	0.01
β-Acorenol	13.36	1626	0.02	14.80*	2108	0.06
Unknown [m/z 43, 93 (89), 91 (88), 79 (87), 123 (76), 81 (75)...]	13.44	1633	0.02	13.80	2013	0.03
τ-Cadinol	13.50*	1638	0.11	14.80*	2108	[0.06]
τ-Muurolol	13.50*	1638	[0.11]	14.96	2124	0.05
α-Muurolol	13.55	1642	0.04	15.10	2138	0.03
α-Eudesmol	13.62	1648	0.03	15.27	2155	0.02
α-Cadinol	13.65	1650	0.08	15.38	2166	0.10
Cedrenol analog	13.68	1653	0.01	16.35	2265	0.01
(3Z)-Caryophylla-3,8(13)-dien-5β-ol	13.85	1667	0.01	16.72*	2304	0.03
Germacra-4(15),5,10(14)-trien-1-ol isomer	14.01	1679	0.01	16.65	2297	0.01
Juniper camphor	14.12	1688	0.01	15.95	2224	0.03
(2E,6E)-Farnesol	14.50	1721	0.01	16.72*	2304	[0.03]
meta-Camphorene	17.06	1951	0.03	15.29	2158	0.01
para-Camphorene	17.42	1984	0.03	15.72	2200	0.02
18-Norabieta-8,11,13-triene?	17.61	2002	0.01			
ar-Abietatriene	18.02	2043	0.01	17.61	2400	0.01
7,13-Abietadiene	18.26	2067	0.01	17.23	2359	0.02
Unknown [m/z 93, 81 (88), 79 (69), 107 (65), 95 (61)...]	18.80	2120	0.01			
Total identified		98.54%			98.33%	
Total reported		98.63%			98.39%	

*: 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