

Date : March 16, 2021

CERTIFICATE OF ANALYSIS – GC PROFILING

SAMPLE IDENTIFICATION

Internal code : 21B23-FEP06


Customer identification : Clary Sage - Moldova - 51262-03

Type : Essential oil

Source : *Salvia sclarea*

Customer : Fern & Petal

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 : Sylvain Mercier, M. Sc., Chimiste

Analysis date : March 15, 2021

Checked and approved by :

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

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PHYSICOCHEMICAL DATA

Physical aspect: Faintly yellow viscous liquid

Refractive index: 1.4589 ± 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
Methoxyacetone	0.08	Aliphatic alcohol
Methacrolein	0.02	Aliphatic aldehyde
Acetic acid	0.04	Aliphatic acid
(2E)-Hexenal	0.02	Aliphatic aldehyde
(3Z)-Hexenol	0.12	Aliphatic alcohol
(2E)-Hexenol	0.07	Aliphatic alcohol
Hexanol	0.01	Aliphatic alcohol
3-Acetyl-3-methylcyclopentene	0.01	Aliphatic ketone
α -Pinene	0.70	Monoterpene
Camphene	0.02	Monoterpene
α -Fenchene	tr	Monoterpene
Benzaldehyde	0.03	Simple phenolic
Sabinene	0.01	Monoterpene
β -Pinene	0.38	Monoterpene
Myrcene	0.48	Monoterpene
<i>trans</i> -Dehydroxylinalool oxide	0.01	Monoterpenic ether
2-Carene	0.02	Monoterpene
Octan-3-ol	0.07	Aliphatic alcohol
α -Phellandrene	0.05	Monoterpene
Δ^3 -Carene	0.02	Monoterpene
α -Terpinene	0.01	Monoterpene
para-Cymene	0.03	Monoterpene
Limonene	0.70	Monoterpene
β -Phellandrene	0.02	Monoterpene
(Z)- β -Ocimene	0.05	Monoterpene
(E)- β -Ocimene	0.08	Monoterpene
<i>cis</i> -Sabinene hydrate	0.01	Monoterpenic alcohol
<i>cis</i> -Linalool oxide (fur.)	0.05	Monoterpenic alcohol
Octanol	0.01	Aliphatic alcohol
Terpinolene	0.02	Monoterpene
<i>trans</i> -Linalool oxide (fur.)	0.11	Monoterpenic alcohol
Linalool	22.06	Monoterpenic alcohol
Dehydrosabinaketone	0.01	Normonoterpenic ketone
Unknown	0.01	Unknown
<i>trans</i> -Pinocarveol	0.01	Monoterpenic alcohol
(E)-Myroxide	0.01	Monoterpenic ether
Nerol oxide	0.01	Aliphatic ether
Borneol	0.06	Monoterpenic alcohol
δ -Terpineol	0.01	Monoterpenic alcohol
Terpinen-4-ol	0.01	Monoterpenic alcohol
para-Cymen-8-ol	0.01	Monoterpenic alcohol
α -Terpineol	2.79	Monoterpenic alcohol
Hodiendiol	0.10	Monoterpenic alcohol
Linalyl formate	0.09	Monoterpenic ester
Nerol	0.36	Monoterpenic alcohol

Unknown	0.02	Unknown
Neral	0.11	Monoterpenic aldehyde
Linalyl acetate	58.61	Monoterpenic ester
Geraniol	0.67	Monoterpenic alcohol
(<i>trans</i> ?) - Linalool oxide acetate (fur.)?	0.07	Monoterpenic ester
Geranial	0.22	Monoterpenic aldehyde
Unknown	0.02	Unknown
Neryl formate	0.03	Monoterpenic ester
Bornyl acetate	0.25	Monoterpenic ester
Unknown	0.01	Unknown
Thymol	0.04	Monoterpenic alcohol
Geranyl formate	0.03	Monoterpenic ester
Carvacrol	0.01	Monoterpenic alcohol
δ -Elemene	0.03	Sesquiterpene
Hodiendiol derivative	0.22	Oxygenated monoterpene
α -Cubebene	0.06	Sesquiterpene
α -Terpinyl acetate	0.08	Monoterpenic ester
Unknown	0.36	Oxygenated monoterpene
Unknown	0.27	Monoterpenic ester
Unknown	0.16	Oxygenated monoterpene
Neryl acetate	0.73	Monoterpenic ester
α -Copaene	0.12	Sesquiterpene
(<i>Z</i>)-8-Hydroxylinalool?	0.02	Monoterpenic alcohol
β -Bourbonene	0.02	Sesquiterpene
1,5-diepi- β -Bourbonene	0.01	Sesquiterpene
Geranyl acetate	2.02	Monoterpenic ester
β -Elemene	0.11	Sesquiterpene
Isocaryophyllene	0.02	Sesquiterpene
β -Caryophyllene	1.59	Sesquiterpene
β -Copaene	0.02	Sesquiterpene
α -Humulene	0.04	Sesquiterpene
α -Amorphene	0.02	Sesquiterpene
Germacrene D	0.41	Sesquiterpene
β -Selinene	0.02	Sesquiterpene
Hodiendiol derivative IV	0.03	Oxygenated monoterpene
Bicyclogermacrene	0.04	Sesquiterpene
α -Muurolene	0.01	Sesquiterpene
Hodiendiol derivative II	0.31	Oxygenated monoterpene
γ -Cadinene	0.03	Sesquiterpene
δ -Cadinene	0.03	Sesquiterpene
<i>trans</i> -Calamenene	0.02	Sesquiterpene
β -Sesquiphellandrene	0.02	Sesquiterpene
α -Calacorene	0.02	Sesquiterpene
α -Elemol	0.01	Sesquiterpenic alcohol
Isocaryophyllene epoxide B	0.04	Sesquiterpenic ether
1,5-Epoxyal-4(14)-ene	0.01	Sesquiterpenic ether
Spathulenol	0.04	Sesquiterpenic alcohol
Caryophyllene oxide isomer	0.13	Sesquiterpenic ether
Caryophyllene oxide	0.19	Sesquiterpenic ether
Salvial-4(14)-en-1-one	0.01	Aliphatic alcohol
Guaiol	0.07	Sesquiterpenic alcohol
Unknown	0.09	Unknown

τ-Cadinol	0.02	Sesquiterpenic alcohol
β-Eudesmol	0.03	Sesquiterpenic alcohol
α-Eudesmol	0.04	Sesquiterpenic alcohol
Bulnesol	0.05	Sesquiterpenic alcohol
Eudesma-4(15),7-dien-1β-ol	0.01	Sesquiterpenic alcohol
Cyclocolorone	0.02	Sesquiterpenic ketone
Unknown	0.06	Unknown
Sclareoloxide	0.03	Terpenic ether
Unknown	0.02	Unknown
Geranyl-para-cymene	0.02	Diterpene
Manoyl oxide	0.01	Diterpenic ether
Sclareol	0.54	Diterpenic alcohol
Consolidated total	97.13%	

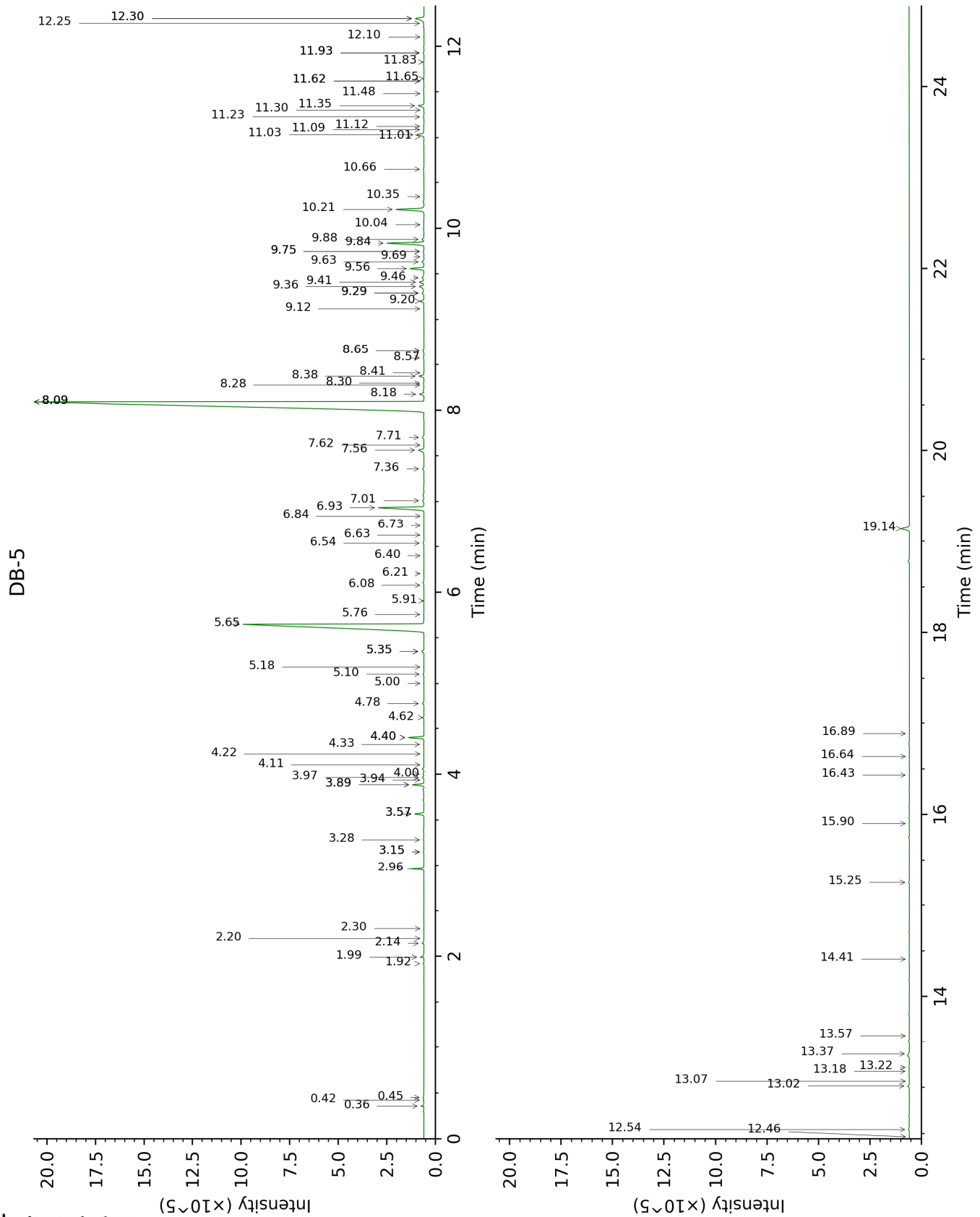
tr: The compound has been detected below 0.005% of total signal.

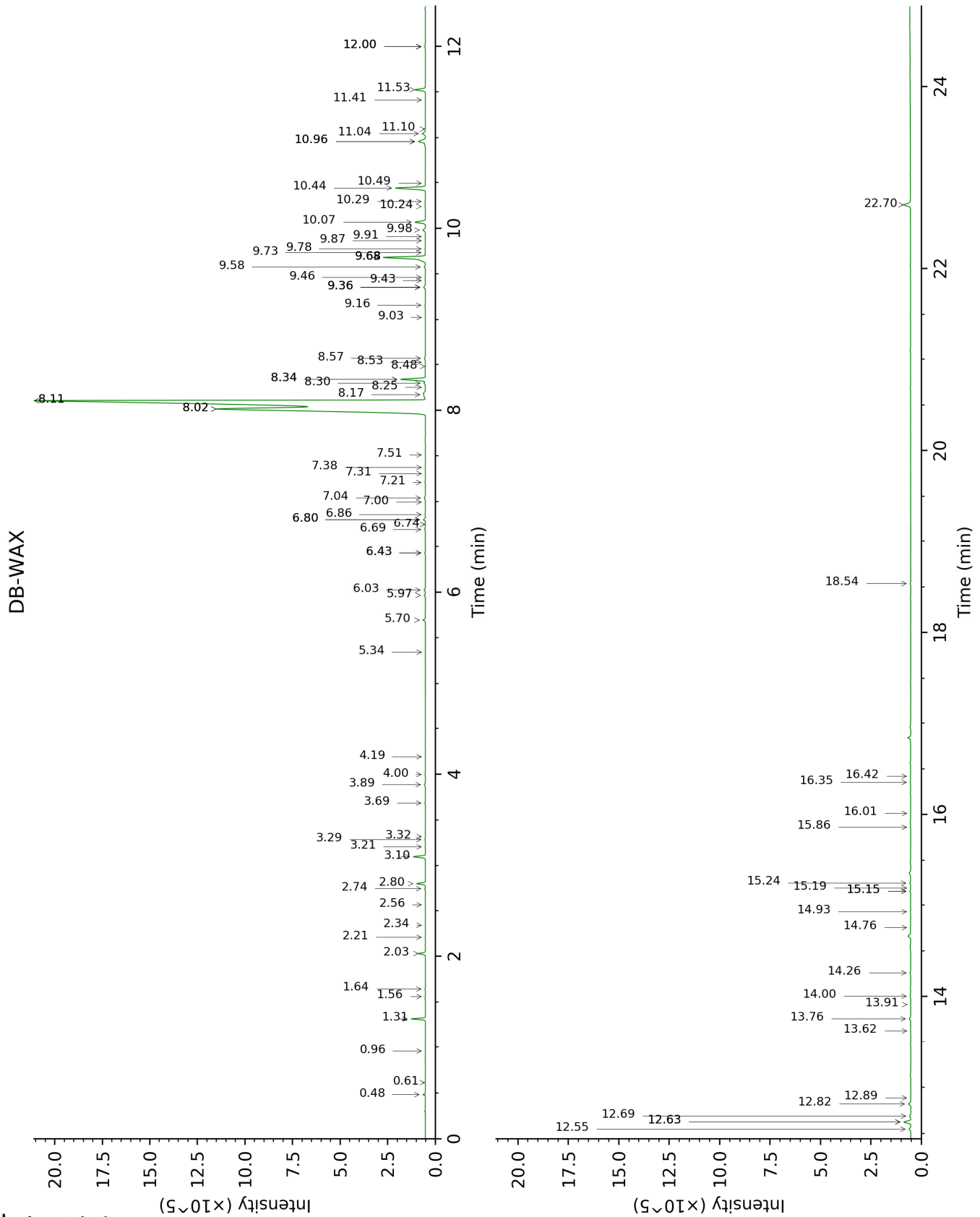
Note: no correction factor was applied

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.





FULL ANALYSIS DATA

Identification	Column DB-5			Column DB-WAX		
	R.T	R.I	%	R.T	R.I	%
Methoxyacetone	0.36	504	0.08	0.48	787	0.08
Methacrolein	0.42	555	0.02	0.61	844	0.02
Acetic acid	0.45	582	0.04	6.43*	1402	0.05
(2E)-Hexenal	1.92	847	0.02	3.29	1173	0.04
(3Z)-Hexenol	1.99	854	0.12	5.70	1349	0.14
(2E)-Hexenol	2.14	866	0.07	6.03	1373	0.08
Hexanol	2.20	871	0.01	5.34	1324	0.01
3-Acetyl-3-methylcyclopentene	2.30	880	0.01	0.96	932	0.01
α -Pinene	2.96	930	0.70	1.32	992	0.67
Camphene	3.15*	942	0.02	1.64	1027	0.02
α -Fenchene	3.15*	942	[0.02]	1.56	1019	tr
Benzaldehyde	3.28	951	0.03	7.21	1461	0.03
Sabinene	3.57*	970	0.41	2.21	1084	0.01
β -Pinene	3.57*	970	[0.41]	2.03	1066	0.38
Myrcene	3.89*	992	0.51	2.80	1134	0.48
<i>trans</i> -Dehydroxylinalool oxide	3.89*	992	[0.51]	3.32	1176	0.01
2-Carene	3.94	995	0.02	2.34	1097	0.01
Octan-3-ol	3.97	997	0.07	5.97	1369	0.08
α -Phellandrene	4.00	1000	0.05	2.74	1130	0.05
Δ^3 -Carene	4.10	1006	0.02	2.56	1116	0.01
α -Terpinene	4.22	1014	0.01			
para-Cymene	4.33	1020	0.03	4.00	1228	0.03
Limonene	4.40*	1025	0.71	3.10	1158	0.70
β -Phellandrene	4.40*	1025	[0.71]	3.21	1167	0.02
(Z)- β -Ocimene	4.62	1039	0.05	3.69	1205	0.04
(E)- β -Ocimene	4.78	1049	0.08	3.89	1220	0.07
<i>cis</i> -Sabinene hydrate	5.00	1063	0.01	6.80*	1430	0.13
<i>cis</i> -Linalool oxide (fur.)	5.10	1070	0.05	6.43*	1402	[0.05]
Octanol	5.18	1075	0.01	8.11*†	1529	[81.63]
Terpinolene	5.35*	1086	0.13	4.19	1242	0.02
<i>trans</i> -Linalool oxide (fur.)	5.35*	1086	[0.13]	6.80*	1430	[0.13]
Linalool	5.65	1105	22.06	8.02*†	1522	81.63
Dehydrosabinaketone	5.76	1112	0.01	8.53	1562	0.01
Unknown [m/z 82, 81 (72), 43 (64), 54 (32), 41 (20)...]	5.91	1121	0.01	9.43	1634	0.01
<i>trans</i> -Pinocarveol	6.08	1132	0.01	9.03	1601	0.01
(E)-Myroxide	6.21	1141	0.01	7.00	1445	0.02
Nerol oxide	6.40	1154	0.01	6.74	1426	0.01
Borneol	6.54	1162	0.06	9.68*	1654	3.24
δ -Terpineol	6.63	1168	0.01	9.36*	1628	0.14
Terpinen-4-ol	6.73	1175	0.01	8.48	1558	0.01
para-Cymen-8-ol	6.84	1182	0.01	11.41	1800	0.01

α-Terpineol	6.94	1188	2.79	9.68*	1654	[3.24]
Hodiendiol	7.01	1193	0.10	12.69	1914	0.09
Linalyl formate	7.36	1216	0.09	8.30	1544	0.09
Nerol	7.56	1230	0.36	10.96*	1761	0.61
Unknown [m/z 43, 93 (49), 41 (22), 80 (22), 69 (17), 121 (14)...]	7.62	1234	0.02	7.51	1483	0.02
Neral	7.70	1240	0.11	9.36*	1628	[0.14]
Linalyl acetate	8.09*	1267	59.35	8.11*†	1529	[81.63]
Geraniol	8.09*	1267	[59.35]	11.53	1810	0.67
(trans?)-Linalool oxide acetate (fur.)?	8.09*	1267	[59.35]	8.57	1565	0.07
Geranial	8.18	1272	0.22	9.98	1679	0.18
Unknown [m/z 121, 43 (75), 95 (57), 41 (34), 93 (33), 69 (28)...]	8.28	1279	0.02			
Neryl formate	8.30	1281	0.03	9.36*	1628	[0.14]
Bornyl acetate	8.38	1286	0.25	8.17	1534	0.32
Unknown [m/z 43, 121 (74), 93 (42), 95 (38), 107 (29), 41 (29), 136 (28)...]	8.41	1288	0.01			
Thymol	8.58	1300	0.04	14.93	2128	0.04
Geranyl formate	8.66*	1305	0.06	9.78	1662	0.03
Carvacrol	8.66*	1305	[0.06]	15.19	2154	0.01
δ-Elemene	9.12	1335	0.03	6.86	1434	0.03
Hodiendiol derivative	9.20	1341	0.22	12.82	1926	0.17
α-Cubebene	9.29*	1347	0.14	6.69	1422	0.06
α-Terpinyl acetate	9.29*	1347	[0.14]	9.58	1646	0.08
Unknown [m/z 43, 79 (47), 71 (31), 94 (27), 81 (23), 41 (22)... 197 (0)]	9.36	1352	0.36	10.96*	1761	[0.61]
Unknown [m/z 43, 121 (52), 93 (48), 79 (33), 41 (30), 136 (26), 81 (25)...]	9.41	1355	0.27			
Unknown [m/z 43, 79 (46), 71 (30), 94 (25), 41 (23), 81 (21)... 197 (0)]	9.46	1359	0.16	11.04	1768	0.24
Neryl acetate	9.56	1366	0.73	10.07	1686	0.71
α-Copaene	9.63	1371	0.12	7.04	1448	0.09
(Z)-8-Hydroxylinalool?	9.69	1375	0.02	13.62	2001	0.01
β-Bourbonene	9.75*	1379	0.05	7.38	1473	0.02
1,5-diepi-β-Bourbonene	9.75*	1379	[0.05]	7.31	1468	0.01
Geranyl acetate	9.84	1386	2.02	10.44	1717	2.03
β-Elemene	9.88	1388	0.11	8.34*	1547	1.61
Isocaryophyllene	10.04	1400	0.02	8.02*†	1522	[81.63]
β-Caryophyllene	10.21	1412	1.59	8.34*	1547	[1.61]
β-Copaene	10.35	1423	0.02	8.25	1540	0.01

α-Humulene	10.66	1446	0.04	9.16	1611	0.04
α-Amorphene	11.01	1472	0.02	9.46	1636	0.02
Germacrene D	11.03	1474	0.41	9.68*	1654	[3.24]
β-Selinene	11.09	1478	0.02	9.74	1658	0.03
Hodiendiol derivative IV	11.12	1481	0.03			
Bicyclogermacrene	11.23	1488	0.04	9.91	1673	0.02
α-Murolene	11.30	1494	0.01	9.87	1669	0.01
Hodiendiol derivative II	11.35	1498	0.31	12.63*	1908	0.50
γ-Cadinene	11.48	1508	0.03	10.24	1700	0.04
δ-Cadinene	11.62*	1518	0.03	10.29	1704	0.03
<i>trans</i> -Calamenene	11.62*	1518	[0.03]	11.10	1773	0.02
β-Sesquiphellandrene	11.65	1521	0.02	10.49	1721	0.02
α-Calacorene	11.83	1535	0.02	12.00*	1852	0.07
α-Elemol	11.93*	1543	0.06	13.91	2029	0.01
Isocaryophyllene epoxide B	11.93*	1543	[0.06]	12.00*	1852	[0.07]
1,5-Epoxyvalial-4(14)-ene	12.10	1557	0.01	12.00*	1852	[0.07]
Spathulenol	12.25	1568	0.04	14.26	2062	0.08
Caryophyllene oxide isomer	12.30*	1572	0.62	12.55	1901	0.13
Caryophyllene oxide	12.30*	1572	[0.62]	12.63*	1908	[0.50]
Salvial-4(14)-en-1-one	12.46	1585	0.01	12.89	1932	0.02
Guaiol	12.54	1591	0.07	14.00	2038	0.05
Unknown [m/z 43, 93 (89), 91 (88), 79 (87), 123 (76), 81 (75)...]	13.02	1630	0.09	13.76	2014	0.12
τ-Cadinol	13.07	1634	0.02	14.76	2110	0.01
β-Eudesmol	13.18	1643	0.03	15.24	2160	0.09
α-Eudesmol	13.22	1647	0.04	15.15*	2151	0.07
Bulnesol	13.37	1659	0.05	15.15*	2151	[0.07]
Eudesma-4(15),7-dien-1β-ol	13.57	1676	0.01	15.86	2223	0.01
Cyclocolorenone	14.41	1748	0.02	16.35	2274	0.03
Unknown [m/z 123, 191 (88), 81 (86), 41 (86), 151 (80), 91 (76)...]	15.25	1822	0.06	18.54	2515	0.04
Sclareoloxide	15.90	1881	0.03			
Unknown [m/z 109, 132 (88), 157 (76), 119 (66), 91 (57), 105 (55)...]	16.43	1931	0.02			
Geranyl-para-cymene	16.64	1950	0.02	16.01	2239	0.01
Manoyl oxide	16.89	1974	0.01	16.42	2281	0.02
Sclareol	19.14	2202	0.54	22.70	3034	0.57
Total identified		96.50%			97.10%	
Total reported		97.51%			97.52%	

*: 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