

Date : June 01, 2022

CERTIFICATE OF ANALYSIS – GC PROFILING

SAMPLE IDENTIFICATION

Internal code : 21J05-PTH04

Customer identification : Clary Sage Organic - Spain - CC4104216R

Type : Essential oil

Source : *Salvia sclarea*

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 : Pamela Lavoie, M.Sc., Chimiste

Analysis date : October 13, 2021

Checked and approved by :

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

Notes: This report may not be published, including online, without the written consent from Laboratoire PhytoChemia. This report is digitally signed, it is only considered valid if the digital signature is intact. The results only describe the samples that were submitted to the assays.

This report is an update of the version first issued on October 19, 2021 to correct a mistake in the lot number.

PHYSICOCHEMICAL DATA

Physical aspect: Clear liquid

Refractive index: 1.4599 ± 0.0003 (20 °C; method PC-MAT-016)

NFT 75-255:1992 - CLARY SAGE OIL - FRESHLY CRUSHED

Compound	Min. %	Max. %	Observed %	Complies?
Linalool	13	24	21	Yes
Linalyl acetate	56.0	70.5	57.9	Yes
α-Terpineol	1	5	3	Yes
Germacrene D	1.2	7.5	2.9	Yes
Sclareol	0.4	2.6	1.4	Yes
Refractive index	1.456	1.466	1.460	Yes

CONCLUSION

No adulterant, contaminant or diluent has been detected using this method. The oil complies with the AFNOR standard for freshly crushed clary sage oil.

ANALYSIS SUMMARY – CONSOLIDATED CONTENTS

New readers of similar reports are encouraged to read table footnotes at least once.

Identification	%	Class
Isovaleral	0.01	Aliphatic aldehyde
2-Methylbutyral	0.01	Aliphatic aldehyde
2-Ethylfuran	tr	Furan
Isoamyl alcohol	0.01	Aliphatic alcohol
2-Methylbutanol	0.01	Aliphatic alcohol
(2E)-Hexenal	0.05	Aliphatic aldehyde
(3Z)-Hexenol	0.11	Aliphatic alcohol
(2E)-Hexenol	0.14	Aliphatic alcohol
Hexanol	0.08	Aliphatic alcohol
α-Pinene	0.24	Monoterpene
Camphene	0.04	Monoterpene
β-Pinene	0.18	Monoterpene
Sabinene	0.08	Monoterpene
Octen-3-ol	0.05	Aliphatic alcohol
Octan-3-one	0.02	Aliphatic ketone
Myrcene	0.86	Monoterpene
<i>trans</i> -Dehydroxylinalool oxide	0.02	Monoterpenic ether
<i>cis</i> -Dehydroxylinalool oxide	0.04	Monoterpenic ether
α-Terpinene	0.01	Monoterpene
para-Cymene	0.05	Monoterpene
β-Phellandrene	0.02*	Monoterpene
1,8-Cineole	[0.02]*	Monoterpenic ether
Limonene	0.40	Monoterpene
(Z)-β-Ocimene	0.34	Monoterpene
(E)-β-Ocimene	0.55	Monoterpene
γ-Terpinene	0.03	Monoterpene
<i>cis</i> -Linalool oxide (fur.)	0.02	Monoterpenic alcohol
Octanol	0.01	Aliphatic alcohol
Terpinolene	0.13	Monoterpene
<i>trans</i> -Linalool oxide (fur.)	0.02	Monoterpenic alcohol
Hotrienol	0.02	Monoterpenic alcohol
Linalool	20.79	Monoterpenic alcohol
Dehydrosabinaketone	0.01	Normonoterpenic ketone
Nerol oxide	0.02	Aliphatic ether
Borneol	0.05	Monoterpenic alcohol
Terpinen-4-ol	0.05	Monoterpenic alcohol
para-Cymen-8-ol	0.01	Monoterpenic alcohol
α-Terpineol	2.97	Monoterpenic alcohol
Hodiendiol	0.02	Monoterpenic alcohol
Unknown	0.01	Unknown
Linalyl formate	0.23	Monoterpenic ester
Nerol	0.54	Monoterpenic alcohol
Neral	0.02	Monoterpenic aldehyde
Linalyl acetate	57.85	Monoterpenic ester
Geraniol	1.44	Monoterpenic alcohol

Geranial	0.06	Monoterpenic aldehyde
Unknown	0.02	Unknown
Neryl formate	0.04	Monoterpenic ester
Bornyl acetate	0.03	Monoterpenic ester
Thymol	0.01	Monoterpenic alcohol
Geranyl formate	0.09	Monoterpenic ester
δ -Elemene isomer	tr	Sesquiterpene
δ -Elemene	0.01	Sesquiterpene
Hodiendiol derivative	0.05	Oxygenated monoterpene
α -Terpinyl acetate	0.08	Monoterpenic ester
Unknown	0.04	Monoterpenic ester
Unknown	0.04	Oxygenated monoterpene
Neryl acetate	0.74	Monoterpenic ester
α -Copaene	0.43	Sesquiterpene
1,5-diepi- β -Bourbonene	0.01	Sesquiterpene
(Z)-8-Hydroxylinalool?	0.02	Monoterpenic alcohol
β -Bourbonene	0.09	Sesquiterpene
β -Cubebene	0.13	Sesquiterpene
Geranyl acetate	1.40	Monoterpenic ester
β -Elemene	0.10	Sesquiterpene
γ -4-Dimethylbenzenebutyral	0.02	Simple phenolic
Isocaryophyllene	0.02	Sesquiterpene
β -Caryophyllene	1.16	Sesquiterpene
β -Copaene	0.03	Sesquiterpene
<i>trans</i> - α -Bergamotene	0.01	Sesquiterpene
α -Humulene	0.06	Sesquiterpene
9-epi- β -Caryophyllene	0.05	Sesquiterpene
Germacrene D	2.94	Sesquiterpene
β -Selinene	0.04	Sesquiterpene
Hodiendiol derivative IV	0.20	Oxygenated monoterpene
Bicyclgermacrene	0.36	Sesquiterpene
(Z)- α -Bisabolene	0.04	Sesquiterpene
β -Bisabolene	0.06	Sesquiterpene
γ -Cadinene	0.09	Sesquiterpene
δ -Cadinene	0.12	Sesquiterpene
<i>trans</i> -Cadina-1,4-diene	0.01	Sesquiterpene
α -Elemol	0.02	Sesquiterpenic alcohol
1,5-Epoxyalvial-4(14)-ene	0.02	Sesquiterpenic ether
Spathulenol	0.14	Sesquiterpenic alcohol
Caryophyllene oxide	0.21	Sesquiterpenic ether
Salvial-4(14)-en-1-one	0.02	Aliphatic alcohol
Unknown	0.10	Oxygenated sesquiterpene
Torilenol?	0.03	Oxygenated sesquiterpene
Unknown	0.12	Unknown
Unknown	0.02	Unknown
β -Eudesmol	0.06	Sesquiterpenic alcohol
α -Eudesmol	0.04	Sesquiterpenic alcohol
α -Cadinol	0.01	Sesquiterpenic alcohol
Bulnesol	0.05	Sesquiterpenic alcohol
Unknown	0.01	Unknown
Cyclocolorenone	0.02	Sesquiterpenic ketone
Unknown	0.02	Unknown

Phytone	0.01	Terpenic ketone
Unknown	0.06	Unknown
Manool	0.03	Diterpenic alcohol
Sclareol	1.41	Diterpenic alcohol
Consolidated total	98.57%	

*: Individual compounds concentration could not be found due to overlapping coelutions on columns considered [xx]: Duplicate percentage due to coelutions, not taken into account in the consolidated total

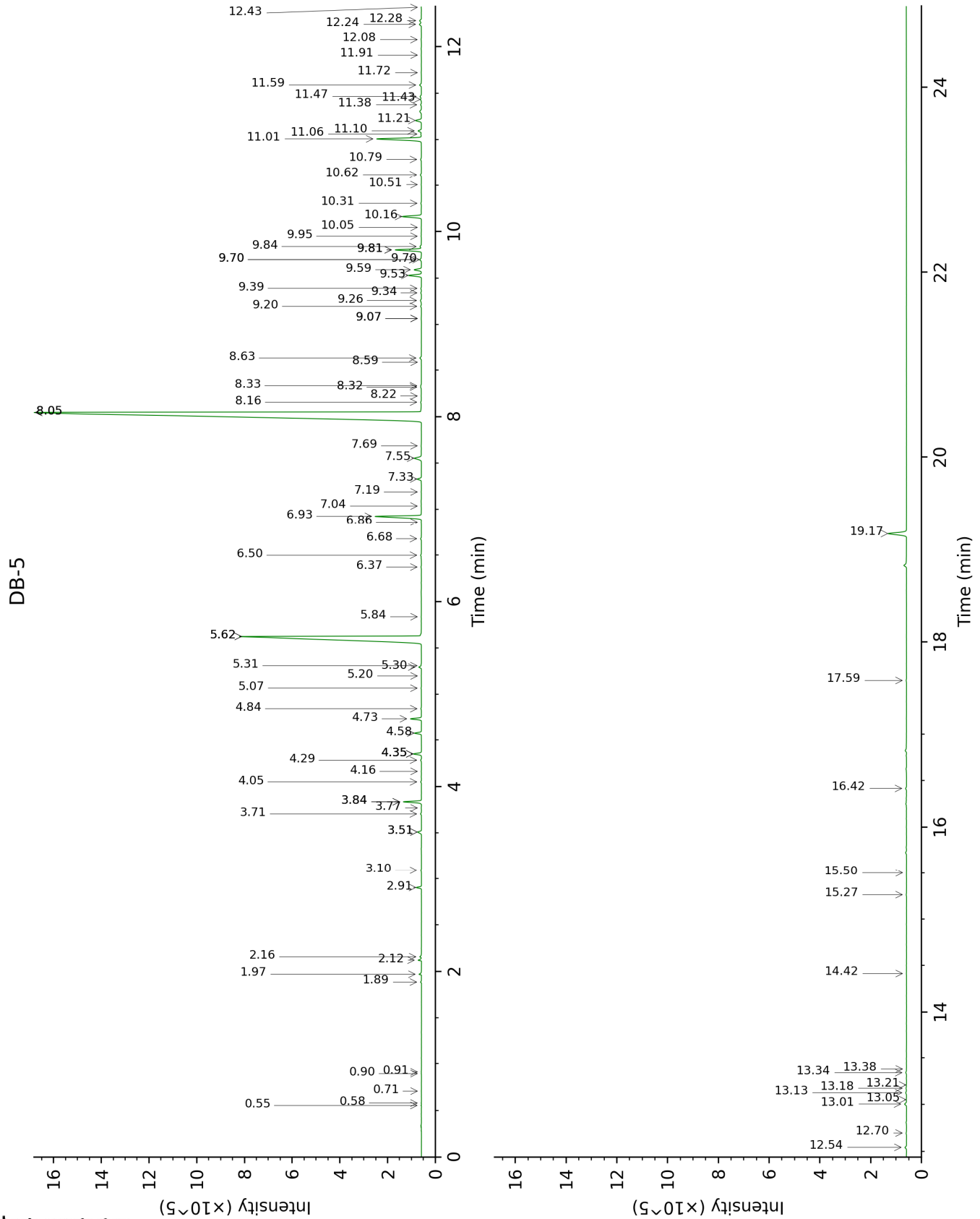
tr: The compound has been detected below 0.005% of total signal.

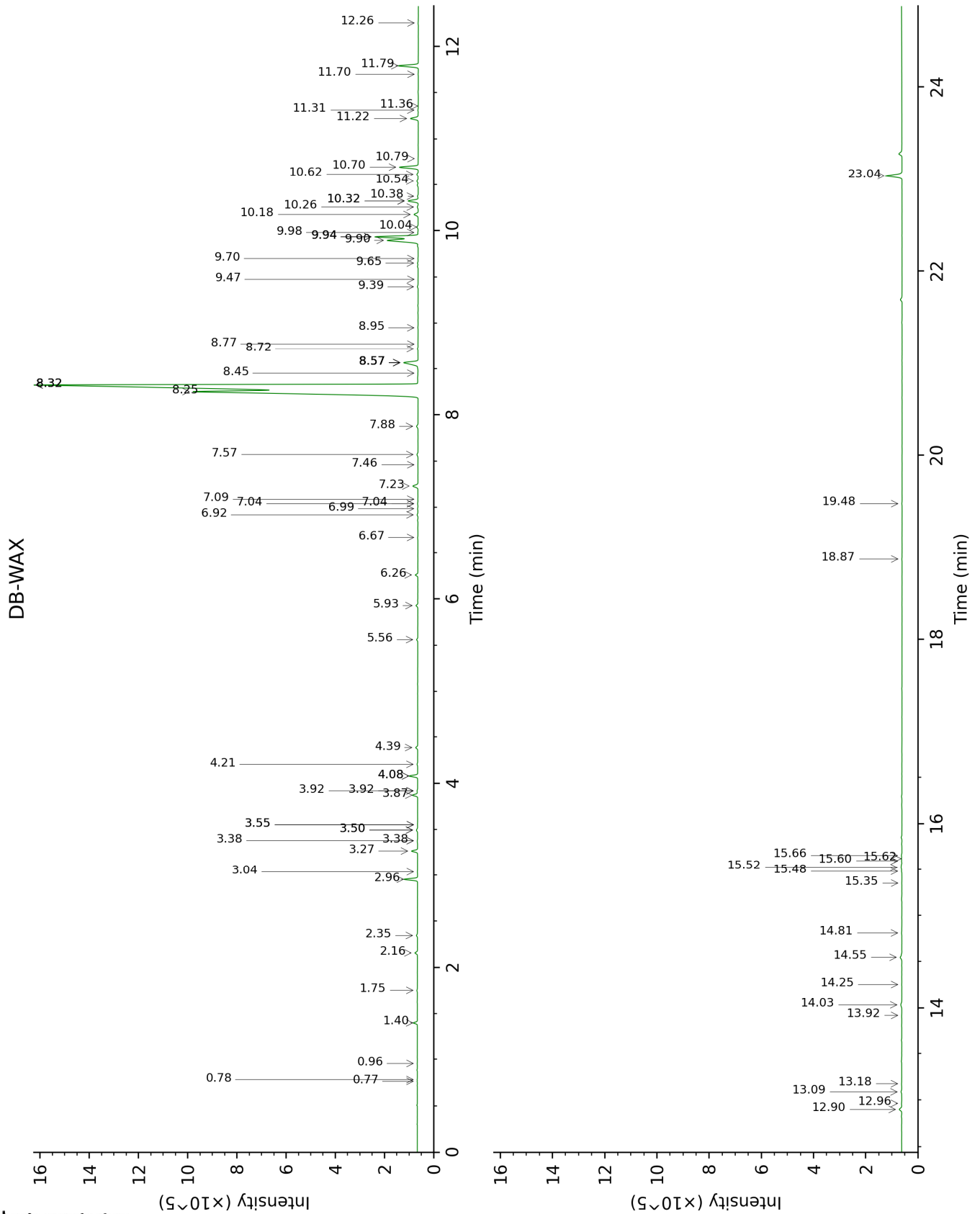
Note: no correction factor was applied

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	%
Isovaleral	0.55	641	0.01	0.78	886	0.01
2-Methylbutyral	0.58	651	0.01	0.76	879	0.01
2-Ethylfuran	0.71	700	tr	0.96	916	0.01
Isoamyl alcohol	0.90	731	0.01	3.55*	1179	0.02
2-Methylbutanol	0.91	734	0.01	3.55*	1179	[0.02]
(2E)-Hexenal	1.89	849	0.05	3.50*	1174	0.10
(3Z)-Hexenol	1.97	856	0.11	5.93	1348	0.13
(2E)-Hexenol	2.12	869	0.14	6.26	1372	0.17
Hexanol	2.16	872	0.08	5.56	1322	0.08
α-Pinene	2.91	930	0.24	1.40	988	0.24
Camphene	3.10	942	0.04	1.75	1023	0.04
β-Pinene	3.51*	970	0.24	2.16	1063	0.18
Sabinene	3.51*	970	[0.24]	2.35	1082	0.08
Octen-3-ol	3.71	984	0.05	6.92	1420	0.06
Octan-3-one	3.77	988	0.02	4.08*	1219	0.56
Myrcene	3.84*	992	0.88	2.96	1132	0.86
<i>trans</i> -Dehydroxylinalool oxide	3.84*	992	[0.88]	3.50*	1174	[0.10]
<i>cis</i> -Dehydroxylinalool oxide	4.05	1006	0.04	3.92*	1207	0.05
α-Terpinene	4.16	1014	0.01	3.04	1138	0.02
para-Cymene	4.28	1021	0.05	4.21	1228	0.05
β-Phellandrene	4.35*	1026	0.42	3.38*	1165	0.04
1,8-Cineole	4.35*	1026	[0.42]	3.38*	1165	[0.04]
Limonene	4.35*	1026	[0.42]	3.27	1156	0.40
(Z)-β-Ocimene	4.58	1040	0.34	3.87	1203	0.35
(E)-β-Ocimene	4.73	1049	0.55	4.08*	1219	[0.56]
γ-Terpinene	4.84	1056	0.03	3.92*	1207	[0.05]
<i>cis</i> -Linalool oxide (fur.)	5.07	1071	0.02	6.67	1401	0.02
Octanol	5.20	1079	0.01	8.32*†	1525	[78.67]
Terpinolene	5.30	1085	0.13	4.39	1241	0.14
<i>trans</i> -Linalool oxide (fur.)	5.31	1086	0.02	7.04*	1429	0.03
Hotrienol	5.62*	1106	21.06	8.95	1573	0.02
Linalool	5.62*	1106	[21.06]	8.25†	1520	78.67
Dehydrosabinaketone	5.84	1119	0.01	8.77	1560	0.01
Nerol oxide	6.37	1154	0.02	6.99	1425	0.03
Borneol	6.50	1162	0.05	9.94*†	1651	[6.07]
Terpinen-4-ol	6.68	1173	0.05	8.72	1555	0.05
para-Cymen-8-ol	6.86	1185	0.01	11.70	1798	0.02
α-Terpineol	6.93	1189	2.97	9.94*†	1651	[6.07]
Hodiendiol	7.04	1196	0.02	12.96	1910	0.02
Unknown [m/z 43, 71 (66), 59 (52), 41 (47), 68 (46)...]	7.19	1206	0.01	11.36	1769	0.02
Linalyl formate	7.33	1215	0.23	8.57*	1544	1.45
Nerol	7.55	1230	0.54	11.22	1758	0.59
Neral	7.69	1239	0.02	9.70	1632	0.02
Linalyl acetate	8.05*	1263	59.29	8.32*†	1525	[78.67]

Geraniol	8.05*	1263	[59.29]	11.79	1806	1.44
Geranial	8.16	1271	0.06	10.26	1677	0.08
Unknown [m/z 121, 43 (75), 95 (57), 41 (34), 93 (33), 69 (28)...]	8.22	1275	0.02			
Neryl formate	8.32	1281	0.04	9.65	1629	0.05
Bornyl acetate	8.33	1282	0.03	8.45	1535	0.02
Thymol	8.59	1299	0.01	15.35	2135	0.02
Geranyl formate	8.63	1302	0.09	10.04	1660	0.11
δ-Elemene isomer	9.07*	1333	0.02	7.04*	1429	[0.03]
δ-Elemene	9.07*	1333	[0.02]	7.09	1432	0.01
Hodiendiol derivative	9.20	1342	0.05	13.09	1921	0.06
α-Terpinyl acetate	9.26	1346	0.08	9.90†	1648	6.07
Unknown [m/z 43, 121 (52), 93 (48), 79 (33), 41 (30), 136 (26), 81 (25)...]	9.34	1352	0.04			
Unknown [m/z 43, 79 (46), 71 (30), 94 (25), 41 (23), 81 (21)... 197 (0)]	9.39	1356	0.04	11.31	1765	0.04
Neryl acetate	9.53	1366	0.74	10.32*	1682	0.75
α-Copaene	9.59	1370	0.43	7.23	1443	0.43
1,5-diepi-β-Bourbonene	9.70*	1378	0.12	7.46	1460	0.01
(Z)-8-Hydroxylinalool?	9.70*	1378	[0.12]	13.92	1997	0.02
β-Bourbonene	9.70*	1378	[0.12]	7.57	1468	0.09
β-Cubebene	9.81*	1385	1.49	7.88	1491	0.13
Geranyl acetate	9.81*	1385	[1.49]	10.70	1714	1.40
β-Elemene	9.84	1388	0.10	8.57*	1544	[1.45]
γ-4-Dimethylbenzenebutyral	9.95	1395	0.02			
Isocaryophyllene	10.05	1402	0.02	8.32*†	1525	[78.67]
β-Caryophyllene	10.16	1411	1.16	8.57*	1544	[1.45]
β-Copaene	10.31	1421	0.03	8.57*	1544	[1.45]
trans-α-Bergamotene	10.51	1436	0.01	8.57*	1544	[1.45]
α-Humulene	10.62	1445	0.06	9.40	1608	0.06
9-epi-β-Caryophyllene	10.79	1457	0.05	9.48	1614	0.01
Germacrene D	11.01	1474	2.94	9.94*†	1651	[6.07]
β-Selinene	11.06	1477	0.04	9.98	1655	0.03
Hodiendiol derivative IV	11.10	1480	0.20			
Bicyclogermacrene	11.21	1488	0.36	10.18	1671	0.35
(Z)-α-Bisabolene	11.38	1501	0.04	10.38	1687	0.05
β-Bisabolene	11.43	1505	0.06	10.32*	1682	[0.75]
γ-Cadinene	11.47	1508	0.09	10.62	1707	0.13
δ-Cadinene	11.59	1517	0.12	10.54	1700	0.12
trans-Cadina-1,4-diene	11.72	1528	0.01	10.79	1721	0.01
α-Elemol	11.91	1543	0.02	14.25	2029	0.01
1,5-Epoxy-salvial-4(14)-ene	12.08	1556	0.02	12.26	1847	0.03
Spathulenol	12.24†	1569	0.26	14.55	2057	0.14
Caryophyllene oxide	12.28†	1572	[0.26]	12.90	1904	0.21
Salvial-4(14)-en-1-one	12.43	1583	0.02	13.18	1929	0.02
Unknown [m/z 91, 119 (91), 79 (86), 93 (85), 41	12.54	1592	0.10			

(74), 107 (68), 105 (67), 134 (65)... 220 (1)]						
Torilenol?	12.70	1604	0.03	15.62	2161	0.03
Unknown [m/z 43, 93 (89), 91 (88), 79 (87), 123 (76), 81 (75)...]	13.01	1630	0.12	14.03	2008	0.12
Unknown [m/z 135, 93 (29), 79 (29), 41 (26), 107 (22), 67 (21), 69 (20)...]	13.05	1634	0.02			
β-Eudesmol	13.13	1640	0.06	15.60	2159	0.02
α-Eudesmol	13.18	1644	0.04	15.52	2152	0.12
α-Cadinol	13.21	1647	0.01	15.66	2165	0.04
Bulnesol	13.34	1658	0.05	15.48	2148	0.03
Unknown [m/z 81, 41 (46), 79 (46), 93 (39), 91 (33), 107 (33)... 206 (8)]	13.38	1661	0.01			
Cyclocolorenone	14.42	1748	0.02			
Unknown [m/z 123, 191 (88), 81 (86), 41 (86), 151 (80), 91 (76)...]	15.27	1823	0.02	18.87	2506	0.03
Phytone	15.50	1844	0.01	14.81	2082	0.03
Unknown [m/z 109, 132 (88), 157 (76), 119 (66), 91 (57), 105 (55)...]	16.42	1929	0.06			
Manool	17.59	2042	0.03	19.48	2575	0.03
Sclareol	19.17	2203	1.41	23.04	3015	1.51
Total identified		98.23%			98.20%	
Total reported		98.66%			98.40%	

*: 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