CERTIFICATE OF ANALYSIS – GC PROFILING

SAMPLE IDENTIFICATION

Internal code : 20H18-PTH04
Customer identification : Clary Sage - Austria - CF0111202R
Type : Essential oil
Source : *Salvia sclarea*
Customer : Plant Therapy

ANALYSIS

Method: PC-MAT-014 ✴ISO - Analysis of the composition of an essential oil or other volatile liquid by FAST GC-FID (in French); identifications validated by GC-MS.
Analyst : Fanny Charlier, B. Sc., chimiste à l'entraînement
Analysis date : August 19, 2020

Checked and approved by :

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

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MÉTHODE CERTIFIÉE
✴ISO 17025:2017 CERTIFIED METHOD

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PHYSICOCHEMICAL DATA

Physical aspect: Clear liquid
Refractive index: 1.4574 ± 0.0003 (20 °C; method PC-MAT-016)

NF T 75-255:1992 - CLARY SAGE OIL - FRESHLY CRUSHED

Compound	Min. %	Max. %	Observed %	Complies?
Sclareol	0.4	2.6	0.5	Yes
Germacrene D	1.2	7.5	1.8	Yes
α-Terpineol	1	5	3	Yes
Linalyl acetate	56.0	70.5	58.8	Yes
Linalool	13	24	22	Yes
Refractive index	1.456	1.466	1.457	Yes

CONCLUSION

No adulterant, contaminant or diluent has been detected using this method.

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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
2-Ethylfuran	tr	Furan
(2*E*)-Hexenal	0.02	Aliphatic aldehyde
(3*Z*)-Hexenol	0.12	Aliphatic alcohol
(2*E*)-Hexenol	0.06	Aliphatic alcohol
α-Pinene	0.73	Monoterpene
Camphene	0.02	Monoterpene
α-Fenchene	tr	Monoterpene
β-Pinene	0.39	Monoterpene
Sabinene	0.01	Monoterpene
Octen-3-ol	0.02	Aliphatic alcohol
Octan-3-one	0.04	Aliphatic ketone
trans-Dehydroxylinalool oxide	tr	Monoterpenic ether
Myrcene	0.62	Monoterpene
Octan-3-ol	0.01	Aliphatic alcohol
Pseudolimonene	tr	Monoterpene
α-Phellandrene	0.04	Monoterpene
Octanal	0.02	Aliphatic aldehyde
cis-Dehydroxylinalool oxide	0.03	Monoterpenic ether
Δ3-Carene	0.01	Monoterpene
para-Cymene	0.02	Monoterpene
Limonene	0.73	Monoterpene
β-Phellandrene	tr	Monoterpene
1,8-Cineole	tr	Monoterpenic ether
(*Z*)-β-Ocimene	0.15	Monoterpene
(*E*)-β-Ocimene	0.52	Monoterpene
cis-Linalool oxide (fur.)	0.01	Monoterpenic alcohol
trans-Linalool oxide (fur.)	0.06	Monoterpenic alcohol
Linalool	22.21	Monoterpenic alcohol
Dehydrosabinaketone	0.01	Normonoterpenic ketone
allo-Ocimene	0.01	Monoterpene
Nerol oxide	0.01	Aliphatic ether
Borneol	0.01	Monoterpenic alcohol
δ-Terpineol	0.03	Monoterpenic alcohol
α-Terpineol	2.90	Monoterpenic alcohol
Hodiendiol	0.02	Monoterpenic alcohol
Unknown	0.02	Unknown
Linalyl formate	0.09	Monoterpenic ester
Nerol	0.42	Monoterpenic alcohol
Unknown	0.02	Unknown
Neral	0.10	Monoterpenic aldehyde
(*cis*?)-Linalool oxide acetate (fur.)?	0.04	Monoterpenic ester
Geraniol	0.80	Monoterpenic alcohol
Linalyl acetate	58.76	Monoterpenic ester

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Compound	%	Class
(*trans*?)-Linalool oxide acetate (fur.)?	0.06	Monoterpenic ester
Geranial	0.20	Monoterpenic aldehyde
Unknown	0.05	Unknown
Bornyl acetate	0.25	Monoterpenic ester
Unknown	0.02	Unknown
Geranyl formate	0.01	Monoterpenic ester
Carvacrol	0.05	Monoterpenic alcohol
δ-Elemene	0.03	Sesquiterpene
Hodiendiol derivative	0.04	Oxygenated monoterpene
α-Terpinyl acetate	0.09	Monoterpenic ester
Unknown	0.05	Monoterpenic ester
Unknown	0.04	Oxygenated monoterpene
Neryl acetate	0.73	Monoterpenic ester
α-Copaene	0.11	Sesquiterpene
β-Bourbonene	0.02	Sesquiterpene
1,5-diepi-β-Bourbonene	0.03	Sesquiterpene
Geranyl acetate	2.03	Monoterpenic ester
β-Elemene	0.12	Sesquiterpene
β-Caryophyllene	2.25	Sesquiterpene
β-Copaene	0.02	Sesquiterpene
Coumarin	0.03	Coumarin
trans-α-Bergamotene	0.03	Sesquiterpene
α-Humulene	0.06	Sesquiterpene
9-epi-β-Caryophyllene	0.01	Sesquiterpene
Germacrene D	1.83	Sesquiterpene
β-Selinene	0.04	Sesquiterpene
Hodiendiol derivative IV	0.03	Oxygenated monoterpene
Bicyclogermacrene	0.10	Sesquiterpene
α-Muurolene	0.07	Sesquiterpene
γ-Cadinene	0.03	Sesquiterpene
δ-Cadinene	0.05	Sesquiterpene
β-Sesquiphellandrene	0.04	Sesquiterpene
trans-Cadina-1,4-diene	0.01	Sesquiterpene
Isocaryophyllene epoxide B	0.02	Sesquiterpenic ether
Spathulenol	0.03	Sesquiterpenic alcohol
Caryophyllene oxide	0.06	Sesquiterpenic ether
Salvial-4(14)-en-1-one	0.01	Aliphatic alcohol
Guaiol	0.12	Sesquiterpenic alcohol
Unknown	0.01	Oxygenated sesquiterpene
Unknown	0.05	Unknown
τ-Cadinol	0.02	Sesquiterpenic alcohol
β-Eudesmol	0.05	Sesquiterpenic alcohol
α-Eudesmol	0.06	Sesquiterpenic alcohol
α-Cadinol	0.04	Sesquiterpenic alcohol
Bulnesol	0.10	Sesquiterpenic alcohol
Unknown	0.03	Unknown
Cyclocolorenone	0.02	Sesquiterpenic ketone
Phytone	0.01	Terpenic ketone
Manoyl oxide	0.01	Diterpenic ether
Sclareol	0.52	Diterpenic alcohol
Consolidated total	**98.79%**	

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

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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.

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

DB-5

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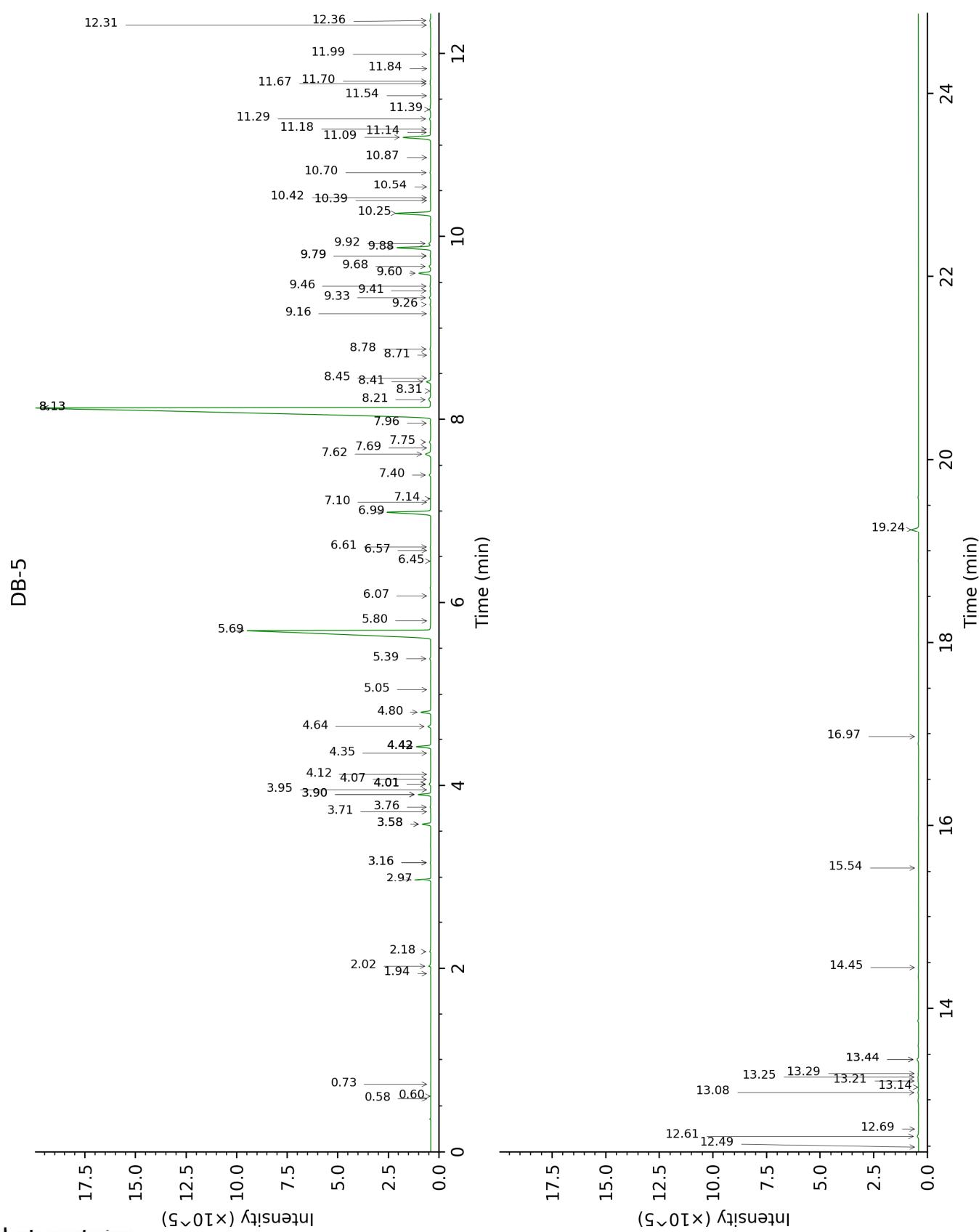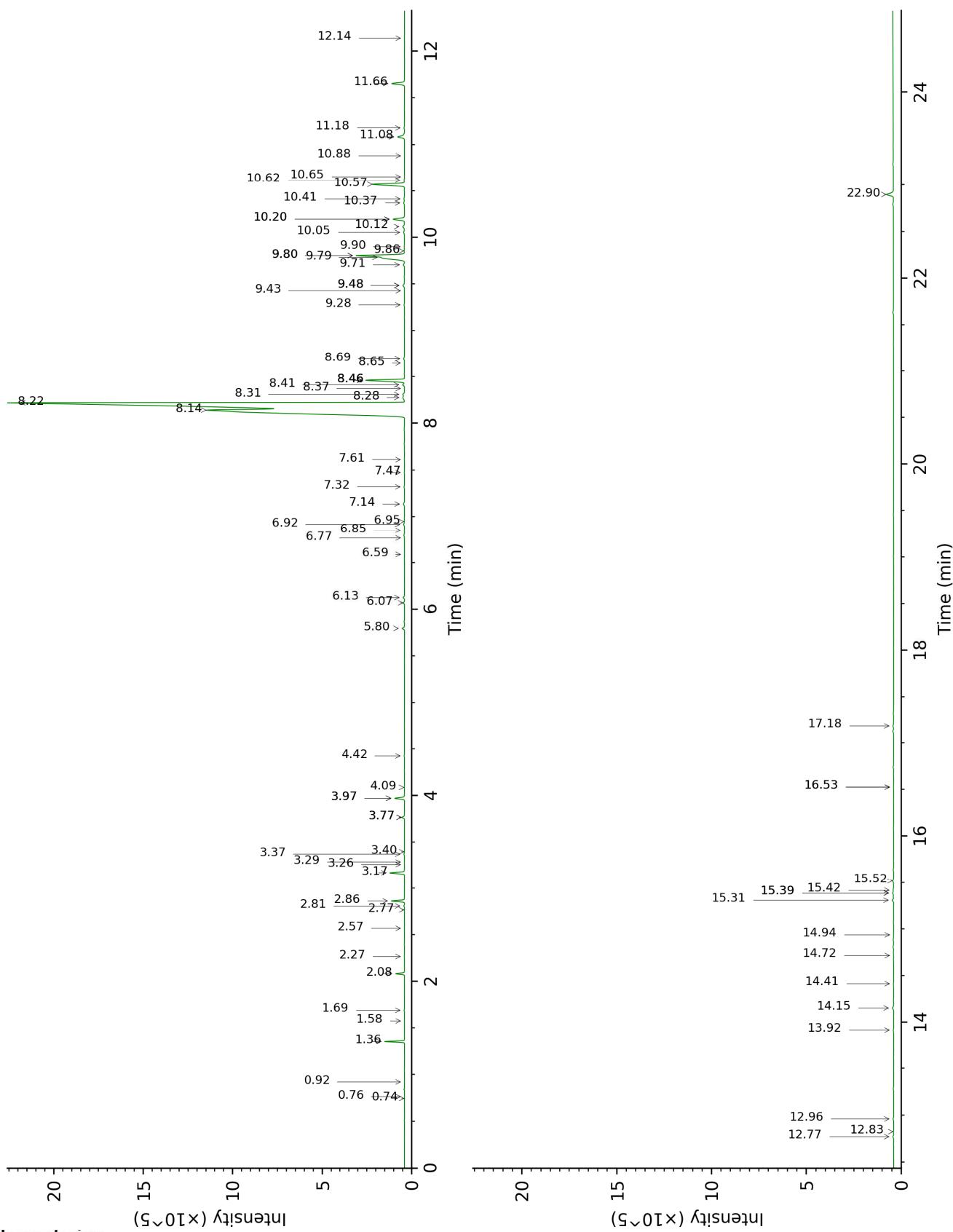
DB-WAX

FULL ANALYSIS DATA

Identification	Column DB-5			Column DB-WAX		
	R.T	R.I	%	R.T	R.I	%
Isovaleral	0.58	642	tr	0.76	886	tr
2-Methylbutyral	0.60	652	tr	0.74	880	tr
2-Ethylfuran	0.73	702	tr	0.92	918	tr
(2*E*)-Hexenal	1.94	850	0.02	3.37	1174	0.03
(3*Z*)-Hexenol	2.02	857	0.12	5.80	1349	0.14
(2*E*)-Hexenol	2.18	870	0.06	6.13	1372	0.08
α-Pinene	2.97	930	0.73	1.36	992	0.71
Camphene	3.16*	943	0.03	1.69	1027	0.02
α-Fenchene	3.16*	943	[0.03]	1.58	1016	tr
β-Pinene	3.58*	971	0.43	2.08	1067	0.39
Sabinene	3.58*	971	[0.43]	2.27	1085	0.01
Octen-3-ol	3.71	980	0.02	6.77	1419	0.01
Octan-3-one	3.76	983	0.04	3.97*	1220	0.53
trans-Dehydroxylinalool oxide	3.90*	992	0.63	3.40	1176	tr
Myrcene	3.90*	992	[0.63]	2.86	1134	0.62
Octan-3-ol	3.95	996	0.01	6.07	1368	0.07
Pseudolimonene	4.01*	1000	0.11	2.77	1127	tr
α-Phellandrene	4.01*	1000	[0.11]	2.81	1130	0.04
Octanal	4.01*	1000	[0.11]	4.42	1252	0.02
cis-Dehydroxylinalool oxide	4.07	1003	0.03	3.77*	1205	0.15
Δ3-Carene	4.12	1007	0.01	2.57	1112	tr
para-Cymene	4.35	1021	0.02	4.09	1228	0.02
Limonene	4.42*	1026	0.76	3.17	1159	0.73
β-Phellandrene	4.42*	1026	[0.76]	3.26	1166	tr
1,8-Cineole	4.42*	1026	[0.76]	3.29	1168	tr
(*Z*)-β-Ocimene	4.64	1040	0.15	3.77*	1205	[0.15]
(*E*)-β-Ocimene	4.80	1050	0.52	3.97*	1220	[0.53]
cis-Linalool oxide (fur.)	5.05	1066	0.01	6.59	1406	0.01
trans-Linalool oxide (fur.)	5.39	1087	0.06	6.92	1430	0.06
Linalool	5.69	1106	22.21	8.14†	1522	81.14
Dehydrosabinaketone	5.80	1113	0.01	8.65	1561	0.02
allo-Ocimene	6.07	1130	0.01			
Nerol oxide	6.45	1155	0.01	6.85	1425	0.01
Borneol	6.57	1162	0.01	9.80*	1653	3.18
δ-Terpineol	6.60	1165	0.03	9.48*	1627	0.13
α-Terpineol	6.99	1190	2.90	9.80*	1653	[3.18]
Hodiendiol	7.10	1196	0.02	12.83	1912	0.02
Unknown [m/z 43, 71 (80), 67 (55), 59 (51), 68 (44), 41 (43)...]	7.14	1199	0.02	10.88	1742	0.01
Linalyl formate	7.40	1216	0.09	8.41	1543	0.11
Nerol	7.62	1231	0.42	11.08	1759	0.50
Unknown [m/z 43, 93	7.69	1236	0.02	7.61	1482	0.02

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(49), 41 (22), 80 (22), 69 (17), 121 (14)...]						
Neral	7.75	1240	0.10	9.48*	1627	[0.13]
(*cis*?)-Linalool oxide acetate (fur.)?	7.96	1254	0.04	8.28†	1532	0.28
Geraniol	8.13*	1265	59.62	11.66	1808	0.80
Linalyl acetate	8.13*	1265	[59.62]	8.22†	1528	[81.14]
(*trans*?)-Linalool oxide acetate (fur.)?	8.13*	1265	[59.62]	8.69	1564	0.06
Geranial	8.22	1271	0.20	10.20*	1684	0.73
Unknown [m/z 121, 43 (75), 95 (57), 41 (34), 93 (33), 69 (28)...]	8.31	1278	0.05			
Bornyl acetate	8.41	1285	0.25	8.31†	1535	[0.28]
Unknown [m/z 43, 121 (74), 93 (42), 95 (38), 107 (29), 41 (29), 136 (28)...]	8.45	1287	0.02			
Geranyl formate	8.71	1305	0.01	9.90	1660	0.03
Carvacrol	8.78	1306	0.05	15.42	2159	0.06
δ-Elemene	9.16	1333	0.03	6.95	1432	0.02
Hodiendiol derivative	9.26	1340	0.04	12.96	1924	0.05
α-Terpinyl acetate	9.33	1346	0.09	9.71	1645	0.08
Unknown [m/z 43, 121 (52), 93 (48), 79 (33), 41 (30), 136 (26), 81 (25)...]	9.41	1351	0.05			
Unknown [m/z 43, 79 (46), 71 (30), 94 (25), 41 (23), 81 (21)... 197 (0)]	9.46	1355	0.04	11.18	1767	0.03
Neryl acetate	9.60	1365	0.73	10.20*	1684	[0.73]
α-Copaene	9.68	1370	0.11	7.14	1446	0.10
β-Bourbonene	9.79*	1378	0.06	7.47	1471	0.02
1,5-diepi-β-Bourbonene	9.79*	1378	[0.06]	7.32	1460	0.03
Geranyl acetate	9.88	1384	2.03	10.57	1715	2.04
β-Elemene	9.92	1388	0.12	8.46*	1547	2.32
β-Caryophyllene	10.25	1411	2.25	8.46*	1547	[2.32]
β-Copaene	10.39	1422	0.02	8.37	1540	0.01
Coumarin	10.42	1424	0.03	17.18	2343	0.07
trans-α-Bergamotene	10.54	1433	0.03	8.46*	1547	[2.32]
α-Humulene	10.70	1445	0.06	9.28	1610	0.04
9-epi-β-Caryophyllene	10.87	1457	0.01	9.43	1622	0.01
Germacrene D	11.09	1474	1.83	9.79	1651	1.56
β-Selinene	11.14	1478	0.04	9.86	1657	0.03
Hodiendiol derivative IV	11.18	1480	0.03			
Bicyclogermacrene	11.29	1489	0.10	10.12	1678	0.13
α-Muurolene	11.39	1496	0.07	10.05	1673	0.07
γ-Cadinene	11.54	1508	0.03	10.41	1702	0.04

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	R.T.	R.I.	%	R.T.	R.I.	%
δ-Cadinene	11.67	1518	0.05	10.37	1698	0.06
β-Sesquiphellandrene	11.70	1520	0.04	10.62	1719	0.03
trans-Cadina-1,4-diene	11.84	1531	0.01	10.66	1723	0.01
Isocaryophyllene epoxide B	11.99	1544	0.02	12.14	1850	0.01
Spathulenol	12.31	1568	0.03	14.41	2060	0.03
Caryophyllene oxide	12.36	1572	0.06	12.77	1907	0.06
Salvial-4(14)-en-1-one	12.49	1583	0.01			
Guaiol	12.61	1592	0.12	14.15	2035	0.09
Unknown [m/z 91, 119 (91), 79 (86), 93 (85), 41 (74), 107 (68), 105 (67), 134 (65)... 220 (1)]	12.69	1598	0.01			
Unknown [m/z 43, 93 (89), 91 (88), 79 (87), 123 (76), 81 (75)...]	13.08	1631	0.05	13.92	2013	0.04
τ-Cadinol	13.14	1635	0.02	14.94	2111	0.02
β-Eudesmol	13.21	1641	0.05	15.39*	2156	0.08
α-Eudesmol	13.25	1644	0.06	15.39*	2156	[0.08]
α-Cadinol	13.29	1648	0.04	15.52	2169	0.09
Bulnesol	13.44*	1660	0.13	15.31	2148	0.10
Unknown [m/z 81, 41 (46), 79 (46), 93 (39), 91 (33), 107 (33)... 206 (8)]	13.44*	1660	[0.13]			
Cyclocolorenone	14.45	1746	0.02	16.53*	2273	0.02
Phytone	15.54	1842	0.01	14.72	2089	0.01
Manoyl oxide	16.97	1976	0.01	16.53*	2273	[0.02]
Sclareol	19.24	2204	0.52	22.90	3033	0.55
Total identified	**98.65%**			**98.49%**		
Total reported	**98.90%**			**98.59%**		

*: 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

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