

Date : July 03, 2020

CERTIFICATE OF ANALYSIS – GC PROFILING

SAMPLE IDENTIFICATION

Internal code : 20F29-PTH08


Customer identification : Lemongrass - India - L8010798R

Type : Essential oil

Source : *Cymbopogon flexuosus*

Customer : Plant Therapy

ANALYSIS

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

Analyst : Fanny Charlier, B. Sc., chimiste à l'entraînement

Analysis date : June 30, 2020

Checked and approved by :

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

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PHYSICOCHEMICAL DATA

Physical aspect: Yellow liquid

Refractive index: 1.4853 ± 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	0.01	Aliphatic aldehyde
2-Methylbutyral	tr	Aliphatic aldehyde
Hexanal	tr	Aliphatic aldehyde
4-Heptanone	0.01	Aliphatic ketone
Tricyclene	0.09	Monoterpene
α -Pinene	0.13	Monoterpene
Camphene	0.69	Monoterpene
β -Pinene	0.01	Monoterpene
Sabinene	0.01	Monoterpene
6-Methyl-5-hepten-2-one	1.14	Aliphatic ketone
Dehydro-1,8-cineole	0.03	Monoterpenic ether
Myrcene	0.05	Monoterpene
6-Methyl-5-hepten-2-ol	0.05	Aliphatic alcohol
α -Phellandrene	tr	Monoterpene
Octanal	0.06	Aliphatic aldehyde
α -Terpinene	0.01	Monoterpene
para-Cymene	0.01	Monoterpene
Limonene	0.18	Monoterpene
β -Phellandrene	0.01	Monoterpene
1,8-Cineole	tr	Monoterpenic ether
Benzeneacetaldehyde	0.01	Simple phenolic
(Z)- β -Ocimene	0.17	Monoterpene
(E)- β -Ocimene	0.11	Monoterpene
2,6-Dimethyl-5-heptenal (melonal)	0.02	Aliphatic aldehyde
γ -Terpinene	0.01	Monoterpene
cis-Linalool oxide (fur.)	0.02	Monoterpenic alcohol
4-Nonanone	0.68	Aliphatic ketone
Terpinolene	0.05	Monoterpene
4-Nonanol	0.02	Aliphatic alcohol
Rosefuran	0.20	Monoterpenic ether
Linalool	0.94	Monoterpenic alcohol
Perillene	0.09	Monoterpenic ether
cis-Chrysanthemal?	0.05	Monoterpenic aldehyde
trans-para-Mentha-2,8-dien-1-ol	0.03	Monoterpenic alcohol
Unknown	0.12	Unknown
Unknown	0.01	Unknown
trans-Chrysanthemal	0.23	Monoterpenic aldehyde
exo-Isocitral	0.06	Monoterpenic aldehyde
Citronellal	0.28	Monoterpenic aldehyde
Borneol	0.18	Monoterpenic alcohol
Isoneral	0.50	Monoterpenic aldehyde
Rosefuran oxide	0.03	Monoterpenic ether
Terpinen-4-ol	0.09	Monoterpenic alcohol
Unknown	0.03	Oxygenated monoterpene
Unknown	0.03	Unknown

Isogeranial	0.89	Monoterpenic aldehyde
α -Terpineol	0.13	Monoterpenic alcohol
Myrtenal	0.10	Monoterpenic aldehyde
<i>trans</i> -Isopiperitenol	0.03	Monoterpenic alcohol
Unknown	0.05	Oxygenated monoterpene
Decanal	0.13	Aliphatic aldehyde
<i>cis</i> -Isopiperitenol	0.02	Monoterpenic alcohol
2,3-Epoxyneral?	0.04	Monoterpenic aldehyde
Nerol	0.18	Monoterpenic alcohol
Citronellol	0.12	Monoterpenic alcohol
Neral	30.53	Monoterpenic aldehyde
Piperitone	0.09	Monoterpenic ketone
Geraniol	6.23	Monoterpenic alcohol
Geranial	39.95	Monoterpenic aldehyde
Unknown	0.10	Oxygenated monoterpene
Bornyl acetate	0.08	Monoterpenic ester
Geranyl formate	0.07	Monoterpenic ester
Unknown	0.14	Unknown
α -Cubebene	0.03	Sesquiterpene
Citronellyl acetate	0.08	Monoterpenic ester
Cyclosativene I	0.13	Sesquiterpene
Cyclosativene II	0.14	Sesquiterpene
Geranic acid	0.53	Aliphatic acid
α -Copaene	tr	Sesquiterpene
β -Bourbonene	0.03	Sesquiterpene
Geranyl acetate	3.58	Monoterpenic ester
β -Cubebene	0.01	Sesquiterpene
β -Elemene	0.13	Sesquiterpene
β -Longipinene	0.03	Sesquiterpene
β -Caryophyllene	1.94	Sesquiterpene
<i>trans</i> - α -Bergamotene	0.02	Sesquiterpene
α -Humulene	0.33	Sesquiterpene
(<i>E</i>)-Isoeugenol	0.25	Phenylpropanoid
<i>cis</i> -Muurolo-4(15),5-diene	0.01	Sesquiterpene
Unknown	0.03	Unknown
Germacrene D	0.20	Sesquiterpene
γ -Amorphene	0.03	Sesquiterpene
epi-Cubebol	0.21	Sesquiterpenic alcohol
α -Selinene	0.06	Sesquiterpene
α -Muurolole	0.12	Sesquiterpene
γ -Cadinene	1.15	Sesquiterpene
Cubebol	0.50	Sesquiterpenic alcohol
δ -Cadinene	0.42	Sesquiterpene
10-epi-Cubebol?	0.05	Sesquiterpenic alcohol
(<i>E</i>)- γ -Bisabolene	0.09	Sesquiterpene
α -Cadinene	0.07	Sesquiterpene
α -Elemol	0.12	Sesquiterpenic alcohol
Germacrene B	0.05	Sesquiterpene
Geranyl butyrate	0.04	Monoterpenic ester
Caryophyllene oxide isomer	0.07	Sesquiterpenic ether
Caryophyllene oxide	0.80	Sesquiterpenic ether
Humulene epoxide II	0.09	Sesquiterpenic ether

Selin-6-en-4 α -ol isomer	0.01	Sesquiterpenic alcohol
1-epi-Cubenol	0.07	Sesquiterpenic alcohol
Cubenol	0.05	Sesquiterpenic alcohol
β -Eudesmol	0.02	Sesquiterpenic alcohol
Farnesal isomer	0.05	Sesquiterpenic aldehyde
(2E,6E)-Farnesal	0.03	Sesquiterpenic aldehyde
meta-Camphorene	0.01	Diterpene
Unknown	0.05	Unknown
Dicitral	0.06	Diterpenic aldehyde
Unknown	0.03	Unknown
Unknown	0.03	Unknown
Consolidated total	97.08%	

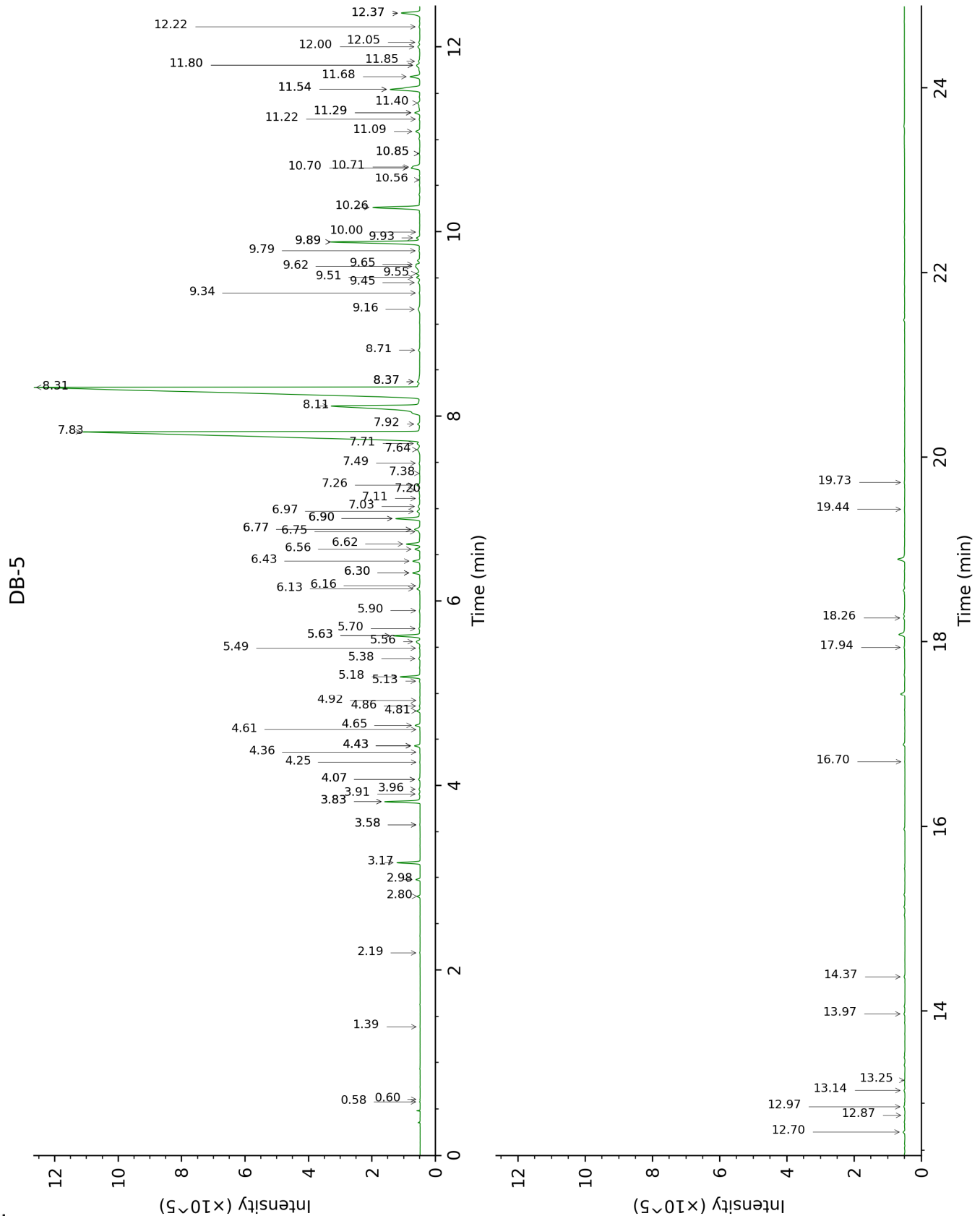
tr: The compound has been detected below 0.005% of total signal.

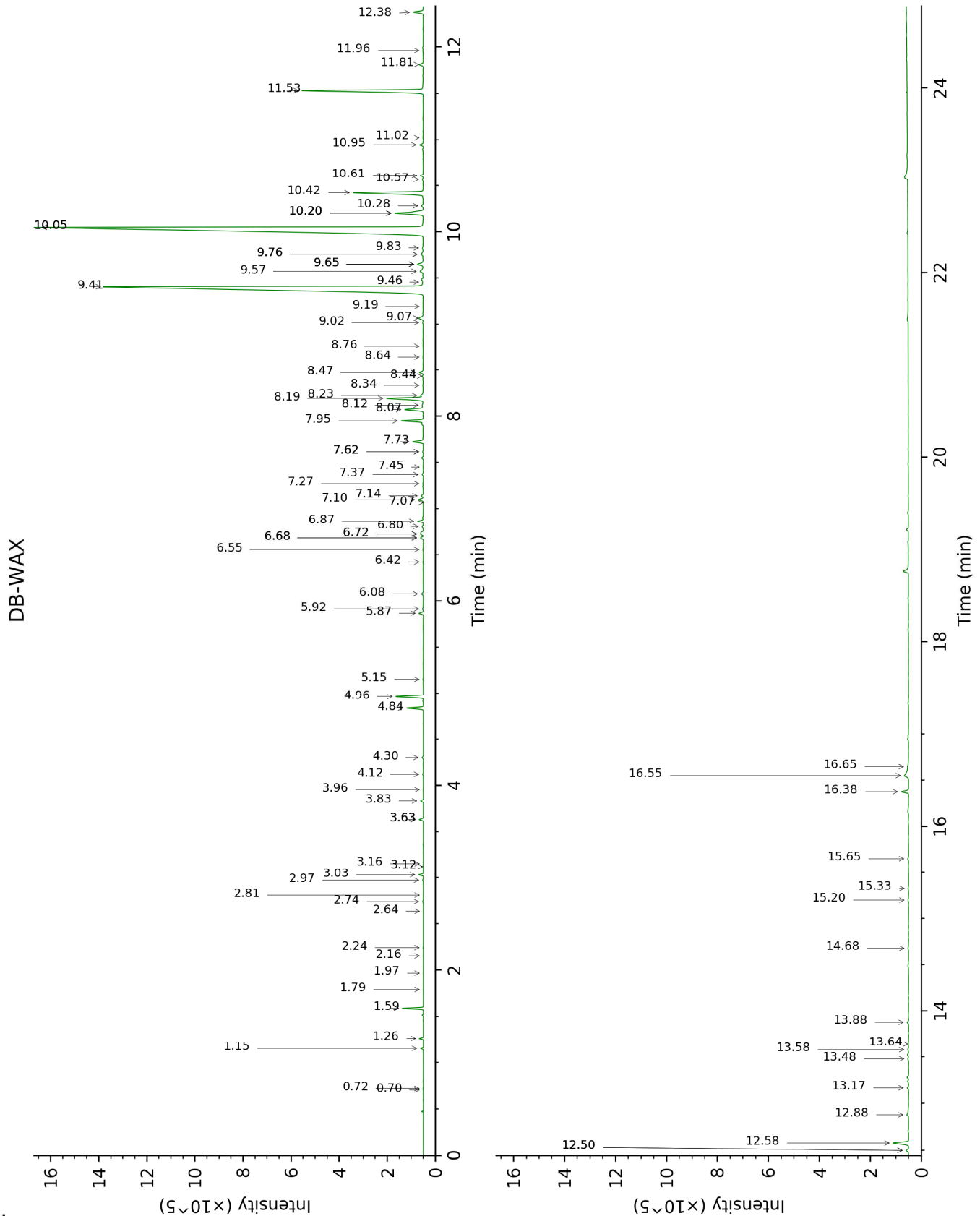
Note: no correction factor was applied

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	0.58	639	0.01	0.72	887	0.01
2-Methylbutyral	0.60	651	tr	0.70	880	0.01
Hexanal	1.39	804	tr	1.79	1044	0.01
4-Heptanone	2.19	871	0.01	2.24	1091	0.02
Tricyclene	2.80	918	0.09	1.15	966	0.08
α -Pinene	2.98	930	0.13	1.26	987	0.12
Camphene	3.17	943	0.69	1.59	1023	0.69
β -Pinene	3.58*	970	0.01	1.97	1063	0.01
Sabinene	3.58*	970	[0.01]	2.16	1082	0.01
6-Methyl-5-hepten-2-one	3.83*	986	1.12	4.96	1297	1.14
Dehydro-1,8-cineole	3.83*	986	[1.12]	2.97	1150	0.03
Myrcene	3.91	992	0.05	2.74	1131	0.03
6-Methyl-5-hepten-2-ol	3.96	995	0.05	6.80	1432	0.07
α -Phellandrene	4.07*	1002	0.06	2.64	1123	tr
Octanal	4.07*	1002	[0.06]	4.30	1249	0.06
α -Terpinene	4.25	1014	0.01	2.81	1137	tr
para-Cymene	4.36	1020	0.01	3.96	1224	0.01
Limonene	4.43*	1025	0.19	3.03	1154	0.18
β -Phellandrene	4.43*	1025	[0.19]	3.12	1162	0.01
1,8-Cineole	4.43*	1025	[0.19]	3.16	1164	tr
Benzeneacetaldehyde	4.60	1036	0.01	8.64	1571	0.03
(Z)- β -Ocimene	4.65	1038	0.17	3.63*	1201	0.18
(E)- β -Ocimene	4.81	1048	0.11	3.84	1215	0.11
2,6-Dimethyl-5-heptenal (melonal)	4.86	1052	0.02	5.15	1311	0.02
γ -Terpinene	4.92	1055	0.01	3.63*	1201	[0.18]
cis-Linalool oxide (fur.)	5.14	1069	0.02	6.42	1403	0.02
4-Nonanone	5.18	1072	0.68	4.84	1287	0.70
Terpinolene	5.38	1084	0.05	4.12	1236	0.04
4-Nonanol	5.49	1091	0.02			
Rosefuran	5.56	1096	0.20	5.87	1363	0.19
Linalool	5.63*	1100	0.99	7.95	1518	0.94
Perillene	5.63*	1100	[0.99]	6.08	1378	0.09
cis-Chrysanthemal?	5.70	1105	0.05	5.92	1366	0.04
trans-para-Mentha-2,8-dien-1-ol	5.90	1117	0.03	8.76	1581	0.03
Unknown [m/z 81, 70 (98), 67 (63), 82 (53), 41 (46), 69 (46), 109 (43)...]	6.13	1132	0.12	6.68*	1422	0.14
Unknown [m/z 95, 67 (86), 41 (68), 82 (64), 123 (62)...]	6.16	1135	0.01	7.45	1480	0.02
trans-Chrysanthemal	6.30*	1144	0.28	7.10	1454	0.23
exo-Isocitral	6.30*	1144	[0.28]	7.37	1474	0.06

Citronellal	6.43	1152	0.28	6.87	1436	0.26
Borneol	6.56	1160	0.18	9.65*	1652	0.33
Isoneal	6.62	1164	0.50	7.73	1501	0.52
Rosefuran oxide	6.75	1172	0.03	8.44	1556	0.04
Terpinen-4-ol	6.77*	1174	0.27	8.48*	1559	0.19
Unknown [m/z 84, 83 (74), 137 (56), 41 (47), 93 (43), 108 (40)... 152 (2)]	6.77*	1174	[0.27]	9.46	1637	0.03
Unknown [m/z 69, 41 (65), 109 (36), 67 (16), 84 (11), 43 (10), 55 (9)...]	6.90*	1182	0.92			
Isogeranial	6.90*	1182	[0.92]	8.07	1528	0.89
α-Terpineol	6.98	1187	0.13	9.57	1646	0.22
Myrtenal	7.03	1191	0.10	8.48*	1559	[0.19]
trans-Isopiperitenol	7.11	1196	0.03	10.20*	1697	1.67
Unknown [m/z 84, 41 (83), 83 (79), 91 (76), 93 (67), 119 (64), 137 (63), 109 (54), 108 (54)... 152 (4)]	7.20	1202	0.05			
Decanal	7.26	1206	0.13	7.14	1457	0.10
cis-Isopiperitenol	7.38	1214	0.02	10.20*	1697	[1.67]
2,3-Epoxyneral?	7.49	1222	0.04			
Nerol	7.64	1232	0.18	10.95	1760	0.15
Citronellol	7.71	1237	0.12	10.61	1732	0.13
Neral	7.83	1245	30.53	9.41	1633	30.68
Piperitone	7.92	1251	0.09	9.76*	1661	0.14
Geraniol	8.11	1264	6.23	11.53	1811	6.26
Geranial	8.31	1278	39.95	10.05*	1685	40.10
Unknown [m/z 43, 69 (77), 41 (70), 109 (54)... 152 (6)]	8.37*†	1282	0.20	12.88	1932	0.10
Bornyl acetate	8.37*†	1282	[0.20]	8.12	1531	0.08
Geranyl formate	8.71	1306	0.07	9.76*	1661	[0.14]
Unknown [m/z 82, 59 (44), 41 (43), 95 (31), 43 (29), 81 (24)...]	9.16	1333	0.14	12.50*	1897	0.14
α-Cubebene	9.34	1346	0.03	6.56	1413	0.02
Citronellyl acetate	9.45	1354	0.08	6.72*	1426	0.25
Cyclosativene I	9.51	1358	0.13	6.68*	1422	[0.14]
Cyclosativene II	9.55	1360	0.14	6.72*	1426	[0.25]
Geranic acid	9.62†	1366	0.43	16.55	2293	0.53
α-Copaene	9.65†	1368	[0.43]	7.07	1451	tr
β-Bourbonene	9.79	1378	0.03	7.27	1467	0.02
Geranyl acetate	9.89*	1385	3.61	10.42	1716	3.58
β-Cubebene	9.89*	1385	[3.61]	7.62*	1492	0.03
β-Elemene	9.93	1388	0.13	8.23	1539	0.16
β-Longipinene	10.00	1392	0.03	7.62*	1492	[0.03]
β-Caryophyllene	10.26	1412	1.94	8.19	1537	1.90
trans-α-Bergamotene	10.56	1434	0.02	8.34	1548	0.04

α-Humulene	10.70	1444	0.33	9.07	1605	0.28
(E)-Isoeugenol	10.71	1445	0.25	16.38	2275	0.34
cis-Muurolo-4(15),5-diene	10.85*	1456	0.03	9.19	1616	0.01
Unknown coelution I	10.85*	1456	[0.03]	9.02	1602	0.03
Germacrene D	11.09	1473	0.20	9.65*	1652	[0.33]
γ-Amorphene	11.22	1483	0.03	9.65*	1652	[0.33]
epi-Cubebol	11.29*	1488	0.21	11.81	1836	0.21
α-Selinene	11.29*	1488	[0.21]	9.83	1667	0.06
α-Muurolole	11.40	1496	0.12	10.05*	1685	[40.10]
γ-Cadinene	11.54*	1508	1.65	10.20*	1697	[1.67]
Cubebol	11.54*	1508	[1.65]	12.38	1886	0.50
δ-Cadinene	11.68	1518	0.42	10.20*	1697	[1.67]
10-epi-Cubebol?	11.80*	1528	0.21	13.58	1997	0.05
(E)-γ-Bisabolene	11.80*	1528	[0.21]	10.28	1704	0.09
α-Cadinene	11.85	1531	0.07	10.57	1728	0.05
α-Elemol	12.00	1544	0.12	13.88	2025	0.07
Germacrene B	12.05	1548	0.05	11.02	1767	0.03
Geranyl butyrate	12.22	1561	0.04	11.96	1849	0.03
Caryophyllene oxide isomer	12.37*	1572	0.86	12.50*	1897	[0.14]
Caryophyllene oxide	12.37*	1572	[0.86]	12.58	1904	0.80
Humulene epoxide II	12.70	1598	0.09	13.17	1958	0.07
Selin-6-en-4α-ol isomer	12.87	1613	0.01	14.68	2103	0.04
1-epi-Cubebol	12.97	1620	0.07	13.64	2002	0.04
Cubebol	13.14	1635	0.05	13.48	1987	0.05
β-Eudesmol	13.25	1644	0.02	15.33	2167	0.03
Farnesal isomer	13.97	1703	0.05			
(2E,6E)-Farnesal	14.37	1738	0.03	15.65	2200	0.05
meta-Camphorene	16.70	1949	0.01	15.20	2154	0.04
Unknown [m/z 93, 69 (95), 135 (76), 107 (53), 41 (53), 109 (50)... 235 (10)...]	17.94	2070	0.05			
Dicitral	18.26	2101	0.06	16.65	2304	0.11
Unknown [m/z 94, 43 (56), 123 (55), 69 (53), 95 (42), 79 (39)...]	19.44	2224	0.03			
Unknown [m/z 123, 94 (100), 43 (86), 69 (75), 95 (47), 41 (47), 93 (45)...]	19.73	2255	0.03			
Total identified		96.63%			96.68%	
Total reported		97.05%			96.86%	

*: 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