

Date : August 12, 2019

CERTIFICATE OF ANALYSIS – GC PROFILING

SAMPLE IDENTIFICATION

Internal code : 19H05-PTH13-1-DM

Customer identification : Palmarosa Org- India- PK010296R

Type : Essential oil

Source : *Cymbopogon martini*

Customer : Plant Therapy

ANALYSIS

Method: PC-PA-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 : Alexis St-Gelais, M. Sc., chimiste

Analysis date : August 07, 2019

Checked and approved by :

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

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PHYSICOCHEMICAL DATA

Physical aspect: Light yellow liquid
Refractive index: 1.4734 ± 0.0003 (20 °C)

NFT 75-234:2011 - OIL OF PALMAROSA

Compound	Min. %	Max. %	Observed %	Complies?
Geranyl caproate	0.4	0.8	0.6	Yes
(2E,6E)-Farnesol	0.2	1.5	0.9	Yes
Nerol	0.2	0.5	0.2	Yes
Geranial	0.2	0.6	0.6	Yes
Neral		0.5	0.2	Yes
β-Caryophyllene	0.7	2.5	1.6	Yes
Geranyl acetate	7	16	8	Yes
Geraniol	72	86	78	Yes
Linalool	1.0	5.5	3.7	Yes
(E)-β-Ocimene	0.5	3.0	1.3	Yes
(Z)-β-Ocimene	0.2	0.6	0.4	Yes
Limonene		1.3	0.1	Yes
Myrcene		0.5	0.2	Yes
Refractive index	1.4700	1.4780	1.4734	Yes

CONCLUSION

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

ANALYSIS SUMMARY – CONSOLIDATED CONTENTS

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

Identification	%	Classe
Ethanol	0.02	Aliphatic alcohol
Isovaleral	0.01	Aliphatic aldehyde
2-Methylbutyral	tr	Aliphatic aldehyde
Isoamyl alcohol	0.03	Aliphatic alcohol
2-Methylbutanol	tr	Aliphatic alcohol
(3Z)-Hexenol	0.01	Aliphatic alcohol
Isoamyl acetate	0.01	Aliphatic ester
β-Pinene	0.02	Monoterpene
6-Methyl-5-hepten-2-one	0.06	Aliphatic ketone
<i>trans</i> -Dehydroxylinalool oxide	0.02	Monoterpenic ether
Myrcene	0.16	Monoterpene
<i>cis</i> -Dehydroxylinalool oxide	0.02	Monoterpenic ether
Limonene	0.14	Monoterpene
para-Cymene	0.01	Monoterpene
(Z)-β-Ocimene	0.40	Monoterpene
(E)-β-Ocimene	1.34	Monoterpene
<i>cis</i> -Linalool oxide (fur.)	0.02	Monoterpenic alcohol
Octanol	0.02	Aliphatic alcohol
<i>trans</i> -Linalool oxide (fur.)	0.03	Monoterpenic alcohol
Rosefuran	tr	Monoterpenic ether
Linalool	3.69	Monoterpenic alcohol
neo-allo-Ocimene	0.02	Monoterpene
Camphor	0.01	Monoterpenic ketone
Citronellal	0.06	Monoterpenic aldehyde
Terpinen-4-ol	0.01	Monoterpenic alcohol
Menthol	0.01	Monoterpenic alcohol
Isogeranial	0.02	Monoterpenic aldehyde
α-Terpineol	0.04	Monoterpenic alcohol
Decanal	0.02	Aliphatic aldehyde
Nerol	0.16	Monoterpenic alcohol
Citronellol	0.11	Monoterpenic alcohol
Neral	0.21	Monoterpenic aldehyde
Geraniol	78.31	Monoterpenic alcohol
Geranial	0.61	Monoterpenic aldehyde
Geranyl formate	0.16	Monoterpenic ester
2,3-Epoxygeraniol?	0.04	Oxygenated monoterpene
Neryl acetate	0.04	Monoterpenic ester
Unknown	0.02	Unknown
Geranyl acetate	8.23	Monoterpenic ester
β-Elemene	0.10	Sesquiterpene
β-Caryophyllene	1.57	Sesquiterpene
α-Guaiene	0.04	Sesquiterpene
α-Humulene	0.12	Sesquiterpene
Selina-4,11-diene	0.02	Sesquiterpene
Germacrene D	0.08	Sesquiterpene
Valencene	0.07	Sesquiterpene
α-Murolene	0.03	Sesquiterpene

γ-Cadinene	0.05	Sesquiterpene
7-epi-α-Selinene	0.04	Sesquiterpene
δ-Cadinene	0.04	Sesquiterpene
Unknown	0.05	Unknown
Geranyl butyrate	0.15	Monoterpenic ester
(E)-Nerolidol	0.09	Sesquiterpenic alcohol
Caryophyllene oxide	0.17	Sesquiterpenic ether
Caryophyllene oxide isomer	0.02	Sesquiterpenic ether
Humulene epoxide II	0.03	Sesquiterpenic ether
Caryophylladienol II	0.02	Sesquiterpenic alcohol
(2E,6E)-Farnesol	0.85	Sesquiterpenic alcohol
Geranyl caproate	0.62	Monoterpenic ester
(2E,6E)-Farnesyl acetate	0.08	Sesquiterpenic ester
Geranyl caprylate	0.18	Monoterpenic ester
Unknown	0.01	Monoterpenic ester
Unknown	0.03	Unknown
Consolidated total	98.54%	

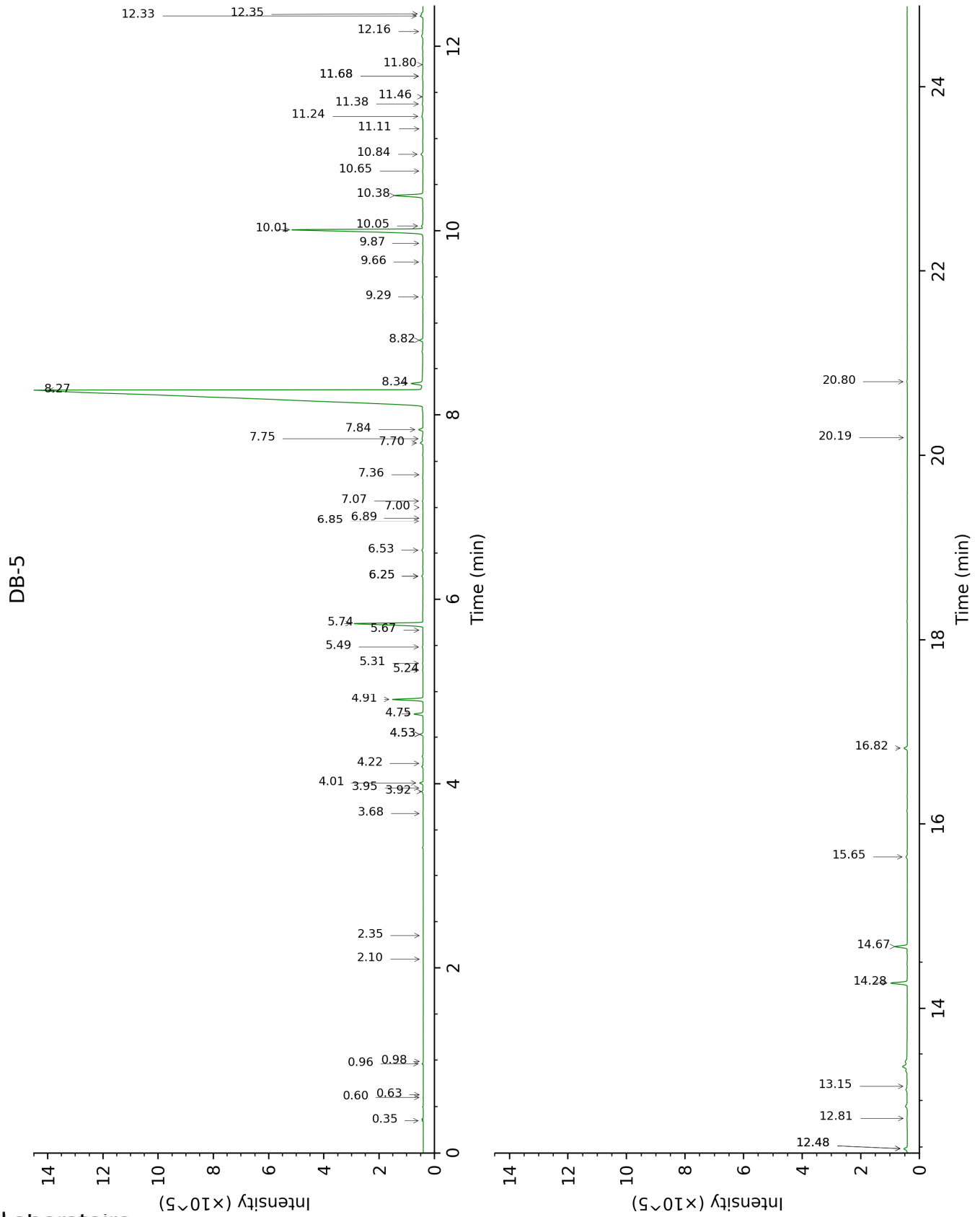
tr: The compound has been detected below 0.005% of total signal.

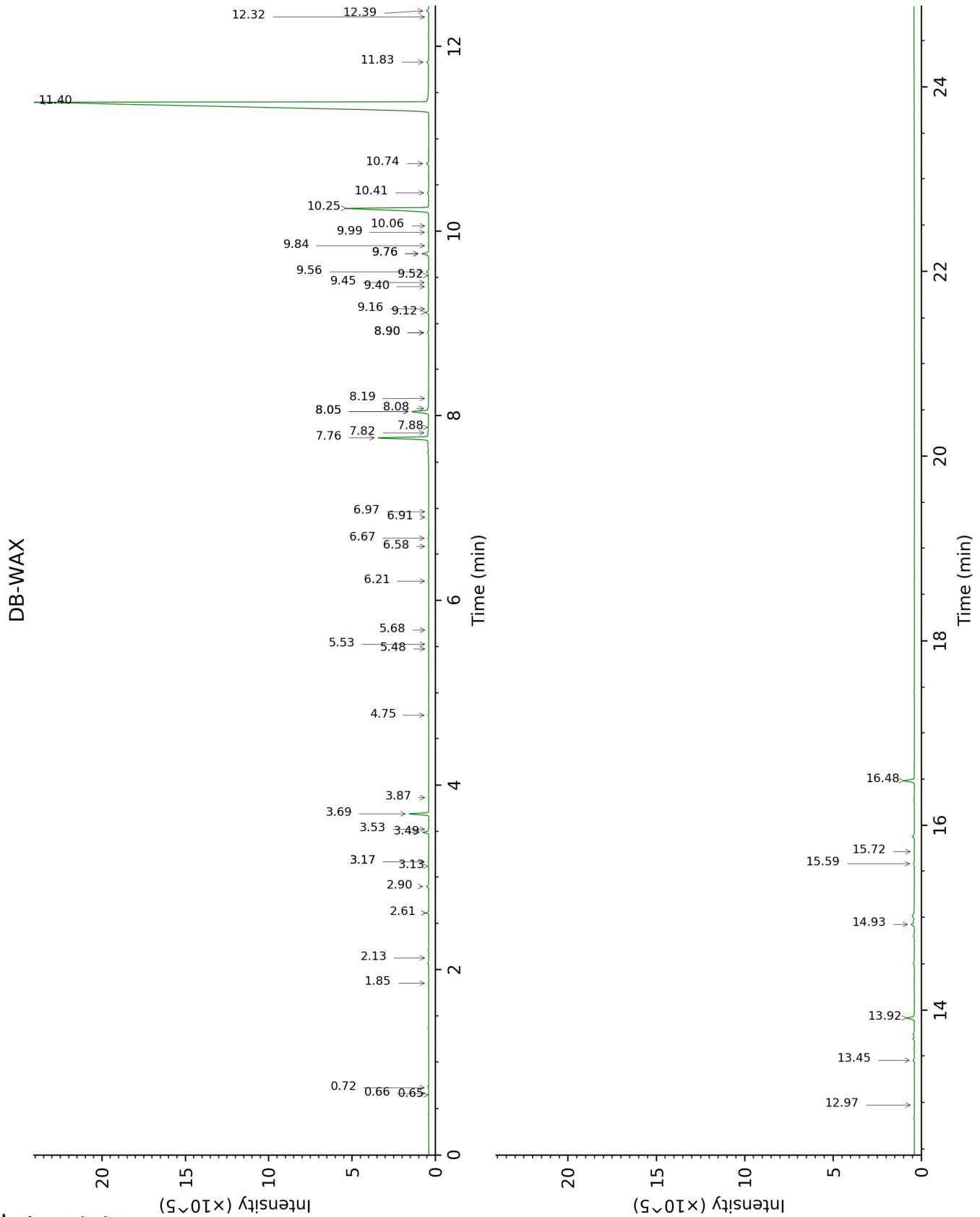
Note: no correction factor was applied

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	%
Ethanol	0.35	517	0.02	0.72	906	0.01
Isovaleral	0.60	639	0.01	0.66	887	tr
2-Methylbutyral	0.63	651	tr	0.65	880	tr
Isoamyl alcohol	0.96	734	0.03	3.17*	1179	0.04
2-Methylbutanol	0.98	737	tr	3.17*	1179	[0.04]
(3Z)-Hexenol	2.10	856	0.01	5.48	1350	0.01
Isoamyl acetate	2.35	877	0.01	2.13	1093	0.01
β-Pinene	3.68	969	0.02	1.86	1064	0.02
6-Methyl-5-hepten-2-one	3.92	985	0.06	4.75	1300	0.06
<i>trans</i> -Dehydroxylinalool oxide	3.95	988	0.02	3.13	1175	0.02
Myrcene	4.01	991	0.16	2.61	1134	0.15
<i>cis</i> -Dehydroxylinalool oxide	4.22	1005	0.02	3.53	1207	0.02
Limonene	4.53*	1025	0.14	2.90	1157	0.14
para-Cymene	4.53*	1025	[0.14]	3.87	1233	0.01
(Z)-β-Ocimene	4.75	1039	0.40	3.49	1205	0.40
(E)-β-Ocimene	4.91	1049	1.34	3.69	1220	1.37
<i>cis</i> -Linalool oxide (fur.)	5.24	1069	0.02	6.21	1403	0.03
Octanol	5.31	1074	0.02	7.88	1528	0.02
<i>trans</i> -Linalool oxide (fur.)	5.49	1085	0.03	6.58	1431	0.03
Rosefuran	5.67	1096	tr	5.68	1365	0.02
Linalool	5.74	1101	3.69	7.76	1520	3.68
neo-allo-Ocimene	6.25*	1134	0.06	5.53	1354	0.02
Camphor	6.25*	1134	[0.06]	6.91	1455	0.01
Citronellal	6.53	1152	0.06	6.67	1438	0.06
Terpinen-4-ol	6.85	1173	0.01	8.19	1553	0.01
Menthol	6.89	1176	0.01	8.90*	1609	0.10
Isogeranial	7.00	1183	0.02	7.82	1524	0.01
α-Terpineol	7.07	1188	0.04	9.40	1649	0.04
Decanal	7.36	1206	0.02	6.97	1459	0.01
Nerol	7.70	1230	0.16	10.74	1761	0.18
Citronellol	7.74	1233	0.11	10.41	1733	0.10
Neral	7.84	1240	0.21	9.12	1627	0.22
Geraniol	8.27	1270	78.31	11.40	1818	77.61
Geranial	8.34	1275	0.61	9.76*	1678	0.52
Geranyl formate	8.82	1308	0.16	9.56	1662	0.17
2,3-Epoxygeraniol?	9.29	1336	0.04			
Neryl acetate	9.66	1362	0.04	9.84	1685	0.03
Unknown [m/z 43, 41 (25), 67 (24), 109 (23), 93 (20),	9.86	1377	0.02			

69 (19)...						
Geranyl acetate	10.01	1387	8.23	10.25	1719	8.09
β-Elemene	10.05	1390	0.10	8.08	1544	0.07
β-Caryophyllene	10.38	1414	1.57	8.05*	1542	1.44
α-Guaiene	10.65	1434	0.04	8.05*	1542	[1.44]
α-Humulene	10.84	1448	0.12	8.90*	1609	[0.10]
Selina-4,11-diene	11.11	1468	0.02	9.16	1630	0.01
Germacrene D	11.24	1478	0.08	9.45	1653	0.05
Valencene	11.38	1488	0.07	9.52	1659	0.03
α-Muurolene	11.46	1494	0.03	9.76*	1678	[0.52]
γ-Cadinene	11.68*	1511	0.08			
7-epi-α-Selinene	11.68*	1511	[0.08]	9.99	1697	0.04
δ-Cadinene	11.80	1521	0.04	10.06	1703	0.01
Unknown [m/z 59, 68 (63), 43 (31), 67 (27), 81 (27), 94 (25), 69 (23), 41 (22), 84 (20)...	12.16	1549	0.05			
Geranyl butyrate	12.33	1562	0.15	11.83	1856	0.14
(E)-Nerolidol	12.35	1564	0.09	13.45	2005	0.10
Caryophyllene oxide	12.48*	1574	0.20	12.39	1906	0.17
Caryophyllene oxide isomer	12.48*	1574	[0.20]	12.32	1900	0.02
Humulene epoxide II	12.81	1600	0.03	12.97	1960	0.02
Caryophylladienol II	13.15	1628	0.02	15.72	2230	0.02
(2E,6E)-Farnesol	14.28	1722	0.85	16.48	2310	0.86
Geranyl caproate	14.67	1756	0.62	13.92	2050	0.61
(2E,6E)-Farnesyl acetate	15.65	1842	0.08	15.59	2216	0.07
Geranyl caprylate	16.82	1951	0.18	14.93	2149	0.29
Unknown [m/z 69, 81 (47), 109 (33), 41 (26), 95 (19), 137 (18)...	20.19	2294	0.01			
Unknown [m/z 69, 81 (70), 93 (37), 95 (31), 41 (24)...	20.80	2361	0.03			
Total identified		98.46%			97.18%	
Total reported		98.57%			97.18%	

*: Two or more compounds are coeluting on this column

[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

R.T.: Retention time (minutes)

R.I.: Retention index