Date : August 03, 2020

Certificate of Analysis – GC Profiling

Sample identification

Internal code : 20G24-PTH04
Customer identification : Palmarosa Organic - India - PK010397R
Type : Essential oil
Source : *Cymbopogon martini*
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 : Sylvain Mercier, M. Sc., Chimiste
Analysis date : July 29, 2020

Checked and approved by :

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

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Physicochemical data

Physical aspect: Faintly yellow liquid
Refractive index: 1.4745 ± 0.0003 (20 °C; method PC-MAT-016)

NF T 75-234:2011 - Oil of palmarosa

Compound	Min. %	Max. %	Observed %	Complies?
Geranyl caproate	0.4	0.8	0.4	Yes
(2E,6E)-Farnesol	0.2	1.5	0.5	Yes
Nerol	0.2	0.5	0.5	Yes
Geranial	0.2	0.6	0.4	Yes
Neral		0.5	0.2	Yes
β-Caryophyllene	0.7	2.5	1.8	Yes
Geranyl acetate	7	16	9	Yes
Geraniol	72	86	81	Yes
Linalool	1.0	5.5	2.1	Yes
(E)-β-Ocimene	0.5	3.0	0.6	Yes
(Z)-β-Ocimene	0.2	0.6	0.3	Yes
Limonene		1.3	0.1	Yes
Myrcene		0.5	0.1	Yes
Refractive index	1.4700	1.4780	1.4745	Yes

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
2-Methyl-3-buten-2-ol	0.01	Aliphatic alcohol
Isovaleral	tr	Aliphatic aldehyde
2-Methylbutyral	tr	Aliphatic aldehyde
Isoamyl alcohol	0.01	Aliphatic alcohol
α-Pinene	tr	Monoterpene
Camphene	0.01	Monoterpene
Sabinene	tr	Monoterpene
β-Pinene	tr	Monoterpene
6-Methyl-5-hepten-2-one	0.03	Aliphatic ketone
trans-Dehydroxylinalool oxide	0.02	Monoterpenic ether
Myrcene	0.13	Monoterpene
cis-Dehydroxylinalool oxide	0.01	Monoterpenic ether
Limonene	0.14	Monoterpene
(*Z*)-β-Ocimene	0.29	Monoterpene
(*E*)-β-Ocimene	0.62	Monoterpene
cis-Linalool oxide (fur.)	0.02	Monoterpenic alcohol
Octanol	0.01	Aliphatic alcohol
Terpinolene	0.02	Monoterpene
trans-Linalool oxide (fur.)	0.01	Monoterpenic alcohol
Linalool	2.14	Monoterpenic alcohol
Nonanal	0.01	Aliphatic aldehyde
Camphor	0.02	Monoterpenic ketone
Citronellal	0.01	Monoterpenic aldehyde
α-Terpineol	0.02	Monoterpenic alcohol
Nerol	0.47	Monoterpenic alcohol
Citronellol	0.01	Monoterpenic alcohol
2,3-Epoxygeranial?	0.05	Monoterpenic aldehyde
Neral	0.17	Monoterpenic aldehyde
Geraniol	80.81	Monoterpenic alcohol
Geranial	0.39	Monoterpenic aldehyde
Geranyl formate	0.10	Monoterpenic ester
2,3-Epoxygeraniol?	0.04	Oxygenated monoterpene
Neryl acetate	0.06	Monoterpenic ester
Geranic acid	0.01	Aliphatic acid
Unknown	0.05	Unknown
Geranyl acetate	9.10	Monoterpenic ester
β-Elemene	0.07	Sesquiterpene
β-Caryophyllene	1.85	Sesquiterpene
α-Humulene	0.17	Sesquiterpene
Unknown	0.06	Sesquiterpene
β-Selinene	0.03	Sesquiterpene
Valencene	0.05	Sesquiterpene
α-Muurolene	0.03	Sesquiterpene
γ-Cadinene	0.05	Sesquiterpene
δ-Cadinene	0.03	Sesquiterpene

α-Elemol	0.03	Sesquiterpenic alcohol
Unknown	0.01	Unknown
Geranyl butyrate	0.09	Monoterpenic ester
(*E*)-Nerolidol	0.11	Sesquiterpenic alcohol
Caryophyllene oxide	0.14	Sesquiterpenic ether
Caryophyllene oxide isomer	0.02	Sesquiterpenic ether
Humulene epoxide II	0.01	Sesquiterpenic ether
(3*Z*)-Caryophylla-3,8(13)-dien-5β-ol	0.01	Sesquiterpenic alcohol
(2*E*,6*E*)-Farnesol	0.54	Sesquiterpenic alcohol
Geranyl caproate	0.40	Monoterpenic ester
(2*E*,6*E*)-Farnesyl acetate	0.05	Sesquiterpenic ester
Phytone	0.01	Terpenic ketone
Unknown	0.06	Unknown
Unknown	0.04	Unknown
Unknown	0.02	Monoterpenic ester
Unknown	0.03	Unknown
Unknown	0.03	Unknown
Consolidated total	**98.72%**	

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.

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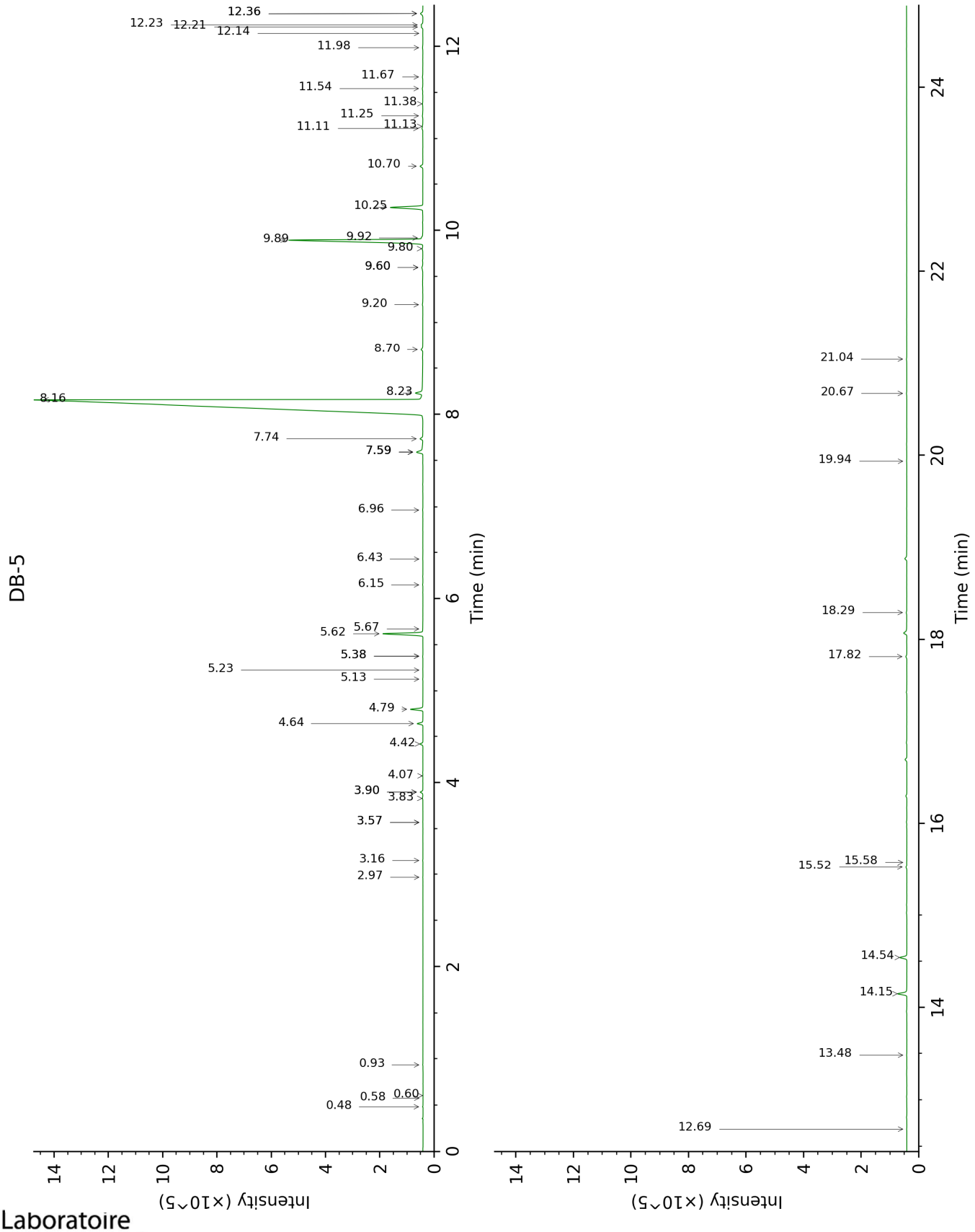
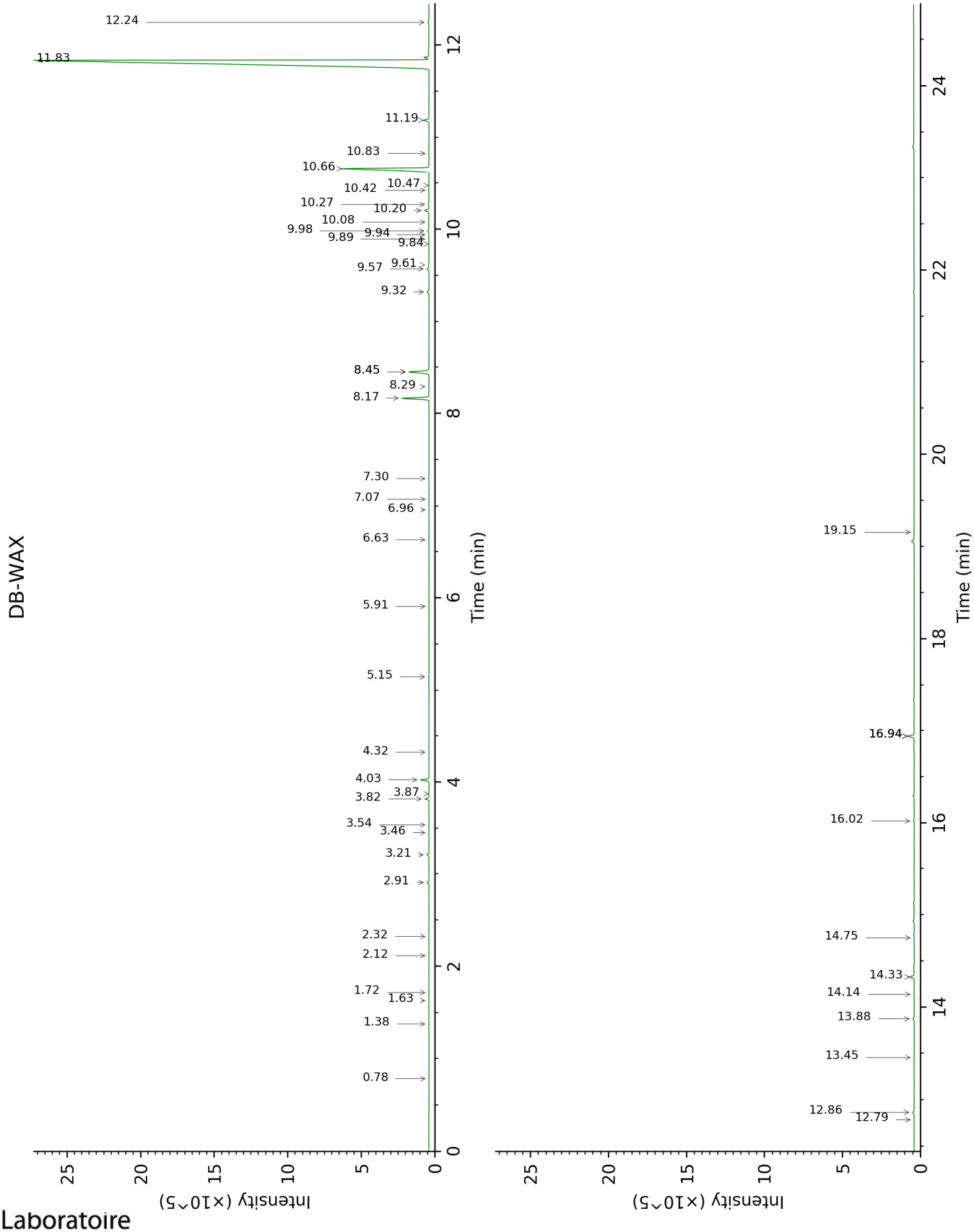

DB-5
12.36
12.23
12.21
12.14
11.98
11.67
11.54
11.38
11.25
11.11
11.13
10.70
10.25
9.89
9.92
9.80
9.60
9.20
8.70
8.23
8.16
7.74
7.59
6.96
6.43
6.15
5.62
5.67
5.38
5.23
5.13
4.79
4.64
4.42
4.07
3.90
3.83
3.57
3.16
2.97
0.93
0.58
0.60
0.48
Time (min)
Intensity (×10^5)
21.04
20.67
19.94
18.29
17.82
15.52
15.58
14.54
14.15
13.48
12.69
Time (min)
Intensity (×10^5)


DB-WAX
12.24
11.83
11.19
10.83
10.66
10.42
10.47
10.27
10.20
9.98
10.08
9.89
9.94
9.84
9.57
9.61
9.32
8.45
8.29
8.17
7.30
7.07
6.96
6.63
5.91
5.15
4.32
4.03
3.82
3.87
3.54
3.46
3.21
2.91
2.32
2.12
1.72
1.63
1.38
0.78
Time (min)
Intensity (×10^5)
19.15
16.94
16.02
14.75
14.33
14.14
13.88
13.45
12.86
12.79
Time (min)
Intensity (×10^5)

FULL ANALYSIS DATA

Identification	Column DB-5			Column DB-WAX		
	R.T	R.I	%	R.T	R.I	%
2-Methyl-3-buten-2-ol	0.48	605	0.01	1.63	1016	tr
Isovaleral	0.58	642	tr	0.78	887	tr
2-Methylbutyral	0.60	653	tr			
Isoamyl alcohol	0.93	734	0.01	3.54	1182	0.02
α-Pinene	2.97	929	tr	1.38	989	0.01
Camphene	3.16	942	0.01	1.72	1024	0.01
Sabinene	3.57*	970	0.01	2.32	1085	tr
β-Pinene	3.57*	970	[0.01]	2.12	1064	tr
6-Methyl-5-hepten-2-one	3.83	987	0.03	5.15	1298	0.04
trans-Dehydroxylinalool oxide	3.90*	992	0.15	3.46	1175	0.02
Myrcene	3.90*	992	[0.15]	2.91	1132	0.13
cis-Dehydroxylinalool oxide	4.07	1004	0.01	3.87	1206	0.01
Limonene	4.42	1025	0.14	3.22	1156	0.15
(*Z*)-β-Ocimene	4.64	1039	0.29	3.82	1202	0.29
(*E*)-β-Ocimene	4.80	1049	0.62	4.03	1217	0.62
cis-Linalool oxide (fur.)	5.13	1070	0.02	6.63	1404	0.01
Octanol	5.23	1076	0.01	8.29	1529	0.02
Terpinolene	5.38*	1086	0.02	4.32	1239	0.02
trans-Linalool oxide (fur.)	5.38*	1086	[0.02]	6.96	1428	0.01
Linalool	5.62	1102	2.14	8.17	1519	2.18
Nonanal	5.67	1105	0.01	5.91	1352	0.01
Camphor	6.15	1136	0.02	7.30	1453	0.02
Citronellal	6.43	1154	0.01	7.07	1436	0.01
α-Terpineol	6.96	1189	0.02	9.84	1650	0.02
Nerol	7.59*	1229	0.53	11.19	1761	0.47
Citronellol	7.59*	1229	[0.53]	10.83	1731	0.01
2,3-Epoxygeranial?	7.59*	1229	[0.53]			
Neral	7.74	1238	0.17	9.57	1629	0.18
Geraniol	8.16†	1266	81.57	11.83	1816	80.81
Geranial	8.23†	1271	[81.57]	10.20	1679	0.39
Geranyl formate	8.70	1303	0.10	9.98	1662	0.11
2,3-Epoxygeraniol?	9.20	1338	0.04			
Neryl acetate	9.60*	1366	0.10	10.27	1684	0.06
Geranic acid	9.60*	1366	[0.10]	16.94*	2304	0.56
Unknown [m/z 43, 41 (25), 67 (24), 109 (23), 93 (20), 69 (19)...]	9.80	1380	0.05			

Geranyl acetate	9.90	1387	9.10	10.66	1717	9.10
β-Elemene	9.92	1388	0.07	8.45*	1541	1.91
β-Caryophyllene	10.25	1412	1.85	8.45*	1541	[1.91]
α-Humulene	10.70	1446	0.17	9.32	1609	0.16
Unknown [m/z 189, 133 (75), 91 (71), 105 (69), 93 (44)... 204 (33)]	11.11	1476	0.06	9.61	1632	0.05
β-Selinene	11.13	1478	0.03	9.94	1658	0.02
Valencene	11.25	1487	0.05	9.89	1654	0.05
α-Muurolene	11.38	1496	0.03	10.08	1669	0.03
γ-Cadinene	11.54	1509	0.05	10.42	1697	0.03
δ-Cadinene	11.67	1519	0.03	10.47	1701	0.02
α-Elemol	11.98	1544	0.03	14.14	2025	0.04
Unknown [m/z 59, 68 (63), 43 (31), 67 (27), 81 (27), 94 (25), 69 (23), 41 (22), 84 (20)...]	12.14	1556	0.01			
Geranyl butyrate	12.21	1561	0.09	12.24	1852	0.10
(*E*)-Nerolidol	12.23	1563	0.11	13.88	2000	0.10
Caryophyllene oxide	12.36*	1573	0.17	12.86	1907	0.14
Caryophyllene oxide isomer	12.36*	1573	[0.17]	12.78	1900	0.02
Humulene epoxide II	12.68	1598	0.01	13.45	1961	0.01
(3*Z*)-Caryophylla-3,8(13)-dien-5β-ol	13.48	1664	0.01	16.94*	2304	[0.56]
(2*E*,6*E*)-Farnesol	14.15	1720	0.54	16.94*	2304	[0.56]
Geranyl caproate	14.54	1754	0.40	14.33	2043	0.40
(2*E*,6*E*)-Farnesyl acetate	15.52	1841	0.05	16.02	2210	0.06
Phytone	15.58	1846	0.01	14.75	2083	0.01
Unknown [m/z 69, 41 (49), 81 (47), 93 (21), 95 (30), 43 (26)...]	17.82	2058	0.06			
Unknown [m/z 69, 41 (37), 81 (23), 95 (19), 109 (18)...]	18.29	2106	0.04	19.15	2547	0.01
Unknown [m/z 69, 81 (47), 109 (33), 41 (26), 95 (19), 137 (18)...]	19.94	2280	0.02			
Unknown [m/z 69, 81 (70), 93 (37), 95 (31), 41 (24)...]	20.67	2361	0.03			
Unknown [m/z 69, 81 (54), 95 (26), 41 (20), 82 (16), 123 (16)...]	21.04	2403	0.03			

Total identified	**98.85%**	**98.38%**
Total reported	**99.14%**	**98.44%**

*: 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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