

**Date :** May 24, 2019

**CERTIFICATE OF ANALYSIS – GC PROFILING**

**SAMPLE IDENTIFICATION**

**Internal code :** 19E14-PTH07-1-SCC

**Customer identification :** Eucalyptus Dives - Spain - EG010387R

**Type :** Essential oil

**Source :** *Eucalyptus dives*

**Customer :** Plant Therapy

**ANALYSIS**

**Method:** PC-PA-014-17J19 - Analysis of the composition of an essential oil, or other volatile liquid, by FAST GC-FID (in French); identifications validated by GC-MS.

**Analyst :** Lindsay Girard, B. Sc.

**Analysis date :** May 22, 2019

Checked and approved by :

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

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*This report is digitally signed, it is only considered valid if the digital signature is intact.*

*PHYSICOCHEMICAL DATA*

**Physical aspect:** Faintly yellow liquid

**Refractive index:**  $1.4810 \pm 0.0003$  (20 °C)

*CONCLUSION*

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

## ANALYSIS SUMMARY

Identification	DB-5 (%)	DB-WAX (%)	Classe
Toluene	0.02	0.02	Simple phenolic
Isoamyl acetate	0.01	0.01	Aliphatic ester
$\alpha$ -Thujene	2.96	2.82	Monoterpene
$\alpha$ -Pinene	0.38	0.36	Monoterpene
Camphene	0.01		Monoterpene
Sabinene	0.21*	0.15	Monoterpene
$\beta$ -Pinene	[0.21]*	0.06	Monoterpene
3-Methylpentyl acetate	0.01	0.01	Aliphatic ester
Myrcene	1.54	1.50	Monoterpene
$\alpha$ -Phellandrene	18.71	18.16	Monoterpene
$\Delta^3$ -Carene	0.01		Monoterpene
$\alpha$ -Terpinene	1.08	1.04	Monoterpene
Carvomenthene	0.01	0.01	Aliphatic alcohol
para-Cymene	8.00	7.89	Monoterpene
$\beta$ -Phellandrene	3.52*	2.96*	Monoterpene
1,8-Cineole	[3.52]*	[2.96]*	Monoterpenic ether
Limonene	[3.52]*	0.49	Monoterpene
(Z)- $\beta$ -Ocimene	0.06	0.05	Monoterpene
(E)- $\beta$ -Ocimene	0.37	0.37	Monoterpene
$\gamma$ -Terpinene	0.72	0.71	Monoterpene
cis-Sabinene hydrate	0.01	0.01	Monoterpenic alcohol
cis-Linalool oxide (fur.)	0.02	0.02	Monoterpenic alcohol
para-Cymenene	2.04*	0.07	Monoterpene
Terpinolene	[2.04]*	1.92	Monoterpene
Methyl benzoate	0.01	0.02	Phenolic ester
Linalool	1.13	1.13	Monoterpenic alcohol
para-Mentha-1,3,8-triene	0.01	0.02	Monoterpene
cis-para-Menth-2-en-1-ol	0.69	0.70	Monoterpenic alcohol
Cosmene?	0.01		Monoterpene
trans-para-Menth-2-en-1-ol	0.51	0.52	Monoterpenic alcohol
Unknown	0.04	0.04	Oxygenated monoterpene
Unknown	0.06	0.07	Oxygenated monoterpene
Unknown	0.09	0.02	Oxygenated monoterpene
Terpinen-4-ol	5.33	5.35*	Monoterpenic alcohol
Unknown	0.10*		Unknown
Cryptone	[0.10]*	0.02	Normonoterpenic ketone
para-Cymen-8-ol	0.10	0.14*	Monoterpenic alcohol
$\alpha$ -Terpineol	1.42	1.46*	Monoterpenic alcohol
cis-Piperitol	0.16	0.18	Monoterpenic alcohol
$\alpha$ -Phellandrene epoxide	0.06	0.03	Monoterpenic ether
trans-Piperitol	0.09	0.29	Monoterpenic alcohol
Citronellol	0.01	0.01	Monoterpenic alcohol
Benzylacetone	0.04*	[0.14]*	Simple phenolic
Neral	[0.04]*	0.05	Monoterpenic aldehyde
Piperitone	46.61	47.02	Monoterpenic ketone
Geraniol	[46.61]	0.18	Monoterpenic alcohol
Thymol	0.04	0.02	Monoterpenic alcohol
Unknown	0.10	0.16*	Unknown

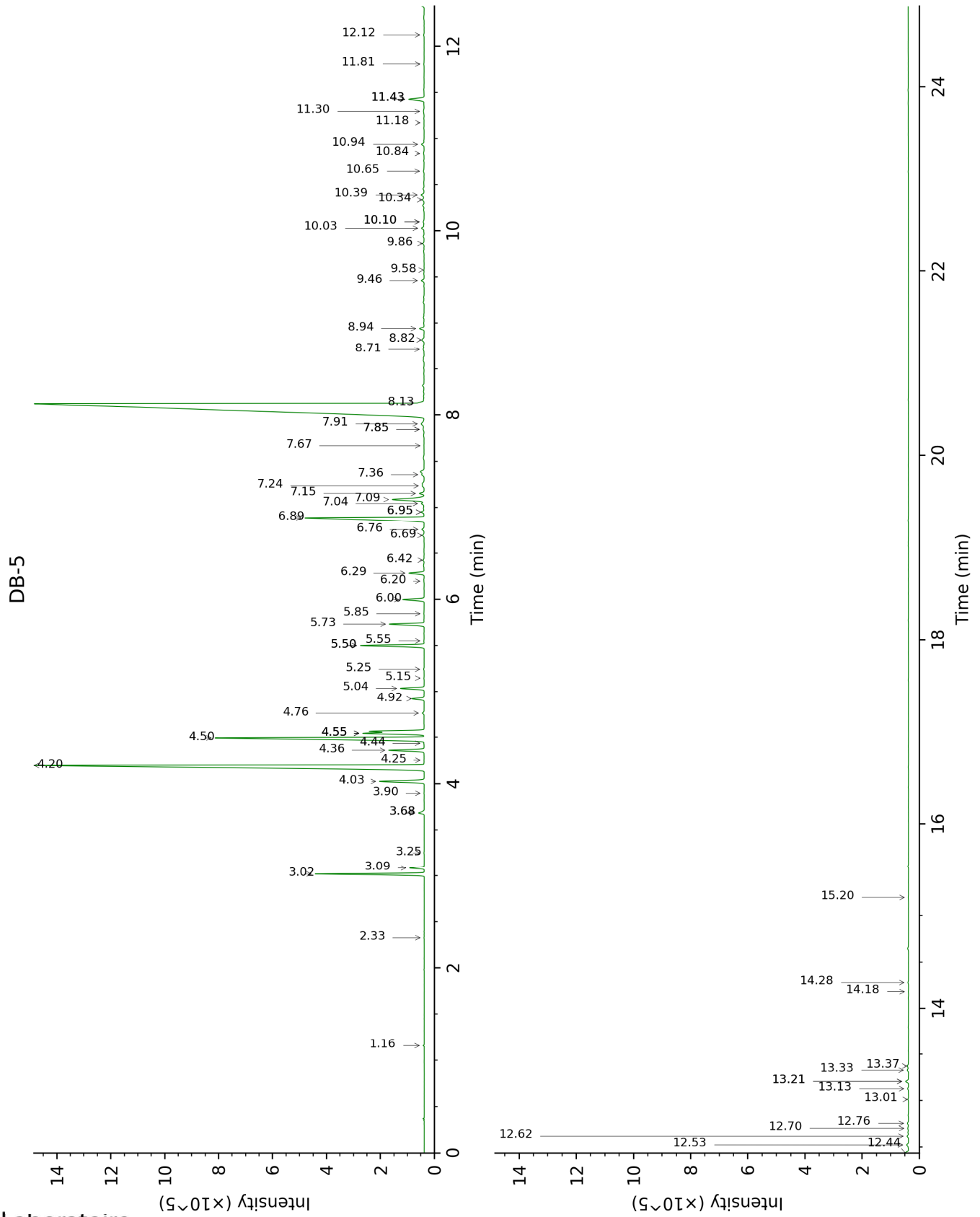
Unknown	0.15	0.16	Unknown
$\alpha$ -Terpinyl acetate	0.10	0.10	Monoterpenic ester
Eugenol	0.01	0.03	Phenylpropanoid
Methyl ( <i>E</i> )-cinnamate	0.05	0.05	Phenylpropanoid ester
$\beta$ -Elemene	0.09	0.12*	Sesquiterpene
Unknown	0.04*	0.01	Unknown
( <i>Z</i> )-Jasmone	[0.04]*	0.04	Jasmonate
$\beta$ -Caryophyllene	0.07	[0.12]*	Sesquiterpene
( <i>trans?</i> )-6-Hydroxypiperitone	0.13	0.07	Monoterpenic alcohol
Aromadendrene	0.04	[5.35]*	Sesquiterpene
$\alpha$ -Humulene	0.03	0.06	Sesquiterpene
allo-Aromadendrene	0.10	0.12	Sesquiterpene
Germacrene D	0.01	[1.46]*	Sesquiterpene
Unknown	0.05		Unknown
Viridiflorene	0.60*	0.10	Sesquiterpene
Bicyclogermacrene	[0.60]*	0.50	Sesquiterpene
$\delta$ -Cadinene	0.02	0.01	Sesquiterpene
$\alpha$ -Elemol	0.02	0.02	Sesquiterpenic alcohol
Spathulenol	0.11	[0.16]*	Sesquiterpenic alcohol
Globulol	0.08	0.08	Sesquiterpenic alcohol
Viridiflorol	0.05	0.08	Sesquiterpenic alcohol
Ledol	0.04	0.02	Sesquiterpenic alcohol
Eudesm-5-en-11-ol analog	0.04	0.06	Sesquiterpenic alcohol
Rosifoliol	0.02	0.03	Sesquiterpenic alcohol
$\gamma$ -Eudesmol	0.03	0.03	Sesquiterpenic alcohol
Isospathulenol	0.10*	0.11	Sesquiterpenic alcohol
$\tau$ -Cadinol	[0.10]*	0.01	Sesquiterpenic alcohol
$\beta$ -Eudesmol	0.05	0.11*	Sesquiterpenic alcohol
$\alpha$ -Eudesmol	0.05	[0.11]*	Sesquiterpenic alcohol
Aromadendrane-4,10-diol	0.01	0.03*	Sesquiterpenic alcohol
(2 <i>E</i> ,6 <i>E</i> )-Farnesol	0.02	[0.03]*	Sesquiterpenic alcohol
Cryptomeridiol	0.02	0.01	Sesquiterpenic alcohol
<b>Total identified</b>	<b>97.91%</b>	<b>97.69%</b>	

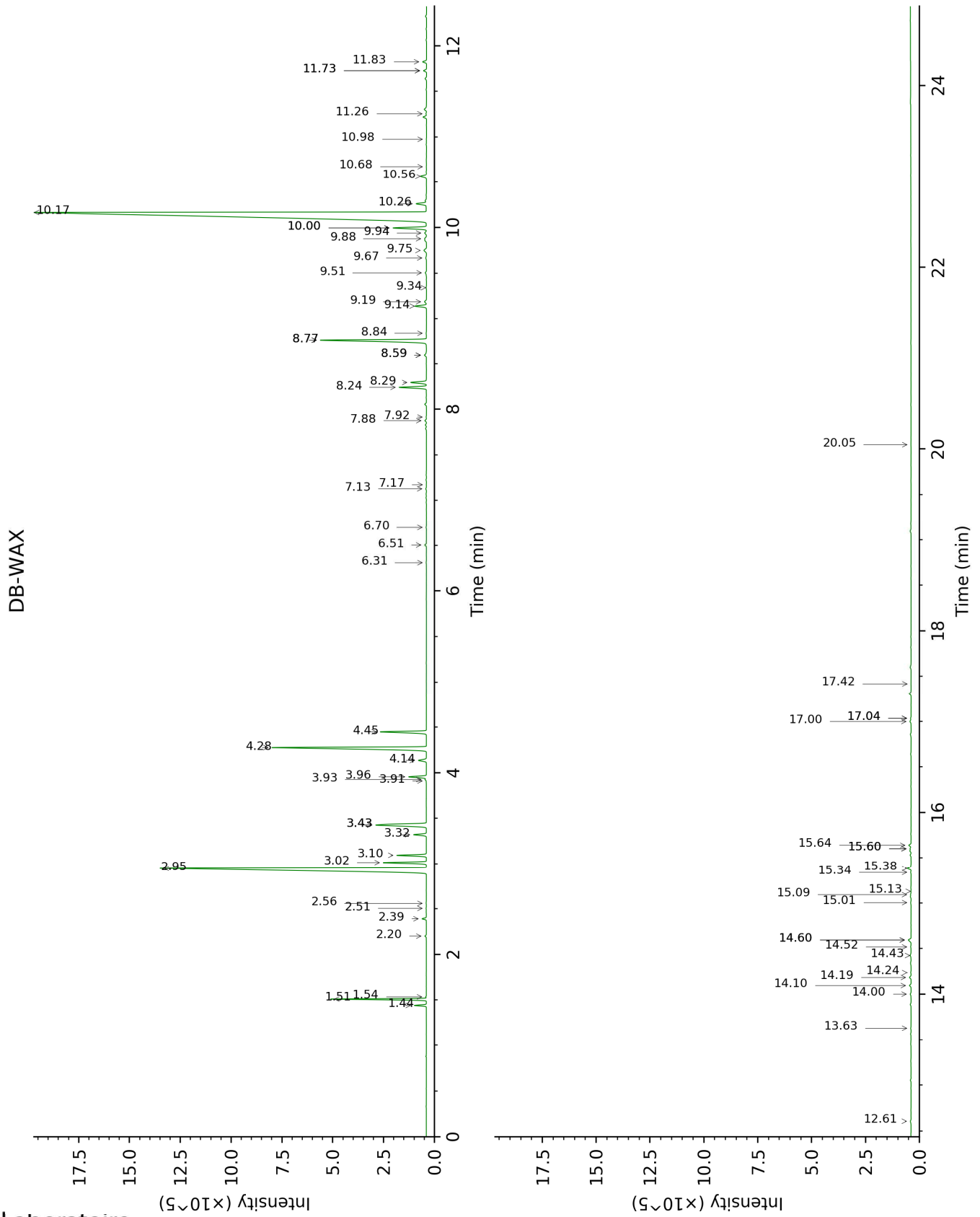
\*: Two or more compounds are coeluting on this column

[xx]: Duplicate percentage due to coelutions, not taken account in the identified total

Note: no correction factor was applied

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FULL ANALYSIS DATA

Identification	Column DB-5			Column DB-WAX		
	R.T	R.I	%	R.T	R.I	%
Toluene	1.16	761	0.02	1.54	1002	0.02
Isoamyl acetate	2.33	874	0.01	2.51	1095	0.01
$\alpha$ -Thujene	3.02	926	2.96	1.51	999	2.82
$\alpha$ -Pinene	3.09	930	0.38	1.44	991	0.36
Camphene	3.25	941	0.01			
Sabinene	3.68*	969	0.21	2.39	1084	0.15
$\beta$ -Pinene	3.68*	969	[0.21]	2.20	1066	0.06
3-Methylpentyl acetate	3.90	984	0.01	3.91	1201	0.01
Myrcene	4.03	992	1.54	3.02	1133	1.50
$\alpha$ -Phellandrene	4.20	1004	18.71	2.95	1128	18.16
$\Delta^3$ -Carene	4.26	1007	0.01			
$\alpha$ -Terpinene	4.36	1014	1.08	3.10	1140	1.04
Carvomenthene	4.44	1019	0.01	2.56	1099	0.01
para-Cymene	4.50	1022	8.00	4.28	1227	7.89
$\beta$ -Phellandrene	4.55*†	1025	3.52	3.43*	1165	2.96
1,8-Cineole	4.55*†	1025	[3.52]	3.43*	1165	[2.96]
Limonene	4.55*†	1025	[3.52]	3.32	1157	0.49
(Z)- $\beta$ -Ocimene	4.76	1039	0.06	3.93	1202	0.05
(E)- $\beta$ -Ocimene	4.92	1049	0.37	4.14	1217	0.37
$\gamma$ -Terpinene	5.04	1056	0.72	3.96	1204	0.71
cis-Sabinene hydrate	5.15	1064	0.01	7.17	1435	0.01
cis-Linalool oxide (fur.)	5.24	1070	0.02	6.70	1400	0.02
para-Cymenene	5.50*	1086	2.04	6.51	1386	0.07
Terpinolene	5.50*	1086	[2.04]	4.45	1240	1.92
Methyl benzoate	5.55	1089	0.01	8.84	1561	0.02
Linalool	5.73	1101	1.13	8.24	1515	1.13
para-Mentha-1,3,8-triene	5.85	1108	0.01	6.31	1372	0.02
cis-para-Menth-2-en-1-ol	6.00	1118	0.69	8.30	1519	0.70
Cosmene?	6.20	1131	0.01			
trans-para-Menth-2-en-1-ol	6.28	1137	0.51	9.14	1584	0.52
Unknown [m/z 95, 43 (74), 109 (72), 82 (62), 110 (50)... 152 (14)]	6.42	1146	0.04	7.13	1432	0.04
Unknown [m/z 95, 110 (38), 81 (21), 79 (16)... 152 (7)]	6.69	1163	0.06	7.88	1487	0.07
Unknown [m/z 95, 110 (43), 81 (28), 41 (15)... 152 (8)]	6.76	1168	0.09	7.92	1490	0.02
Terpinen-4-ol	6.89	1176	5.33	8.77*	1555	5.35
Unknown [m/z 69,	6.95*	1180	0.10			



68 (65), 110 (51), 67 (39), 41 (27), 83 (26)...						
Cryptone	6.95*	1180	[0.10]	9.34	1600	0.02
para-Cymen-8-ol	7.04	1186	0.10	11.73*	1797	0.14
$\alpha$ -Terpineol	7.09	1189	1.42	10.00*	1652	1.46
<i>cis</i> -Piperitol	7.15	1194	0.16	9.75	1633	0.18
$\alpha$ -Phellandrene epoxide	7.24	1199	0.06	11.26	1757	0.03
<i>trans</i> -Piperitol	7.36	1207	0.09	10.56	1698	0.29
Citronellol	7.67	1229	0.01	10.98	1733	0.01
Benzylacetone	7.85*	1241	0.04	11.73*	1797	[0.14]
Neral	7.85*	1241	[0.04]	9.67	1626	0.05
Piperitone	7.91†	1245	46.61	10.17	1666	47.02
Geraniol	8.13†	1261	[46.61]	11.83	1805	0.18
Thymol	8.71	1302	0.04	15.34	2131	0.02
Unknown [m/z 43, 111 (84), 109 (71), 126 (70)...	8.82	1309	0.10	14.60*	2058	0.16
Unknown [m/z 111, 126 (93), 43 (90), 71 (60)...	8.94	1311	0.15	15.38	2136	0.16
$\alpha$ -Terpinyl acetate	9.46	1348	0.10	9.94	1648	0.10
Eugenol	9.58	1356	0.01	15.01	2098	0.03
Methyl ( <i>E</i> )- cinnamate	9.86	1377	0.05	14.00	2002	0.05
$\beta$ -Elemene	10.03	1388	0.09	8.59*	1542	0.12
Unknown [m/z 71, 100 (92), 111 (79), 69 (46), 109 (45)...	10.10*	1393	0.04	17.42	2346	0.01
( <i>Z</i> )-Jasmone	10.10*	1393	[0.04]	12.61	1874	0.04
$\beta$ -Caryophyllene	10.34	1410	0.07	8.59*	1542	[0.12]
( <i>trans</i> ?) $\beta$ -6- Hydroxypiperitone	10.39	1414	0.13	17.00	2301	0.07
Aromadendrene	10.65	1434	0.04	8.77*	1555	[5.35]
$\alpha$ -Humulene	10.84	1449	0.03	9.50	1613	0.06
allo- Aromadendrene	10.94	1456	0.10	9.19	1588	0.12
Germacrene D	11.18	1474	0.01	10.00*	1652	[1.46]
Unknown [m/z 98, 108 (84), 43 (62), 161 (38), 41 (28), 91 (26)...	11.30	1483	0.05			
Viridiflorene	11.43*	1492	0.60	9.88	1643	0.10
Bicyclogermacrene	11.43*	1492	[0.60]	10.26	1674	0.50
$\delta$ -Cadinene	11.81	1522	0.02	10.68	1708	0.01
$\alpha$ -Elemol	12.12	1547	0.02	14.24	2024	0.02
Spathulenol	12.44	1572	0.11	14.60*	2058	[0.16]
Globulol	12.52	1578	0.08	14.10	2011	0.08
Viridiflorol	12.62	1586	0.05	14.18	2019	0.08
Ledol	12.70	1592	0.04	13.63	1967	0.02
Eudesm-5-en-11-ol	12.76	1596	0.04	14.43	2042	0.06

analog						
Rosifoliol	13.01	1617	0.02	14.52	2051	0.03
γ-Eudesmol	13.13	1627	0.03	15.09	2107	0.03
Isospathulenol	13.21*	1633	0.10	15.64	2162	0.11
τ-Cadinol	13.21*	1633	[0.10]	15.13	2110	0.01
β-Eudesmol	13.33	1643	0.05	15.60*†	2158	0.11
α-Eudesmol	13.37	1647	0.05	15.60*†	2158	[0.11]
Aromadendrane-4,10-diol	14.18	1714	0.01	17.04*	2305	0.03
(2E,6E)-Farnesol	14.28	1723	0.02	17.04*	2305	[0.03]
Cryptomeridiol	15.20	1803	0.02	20.05	2645	0.01
<b>Total identified</b>		<b>97.91%</b>			<b>97.69%</b>	
<b>Total reported</b>		<b>98.40%</b>			<b>97.99%</b>	

\*: Two or more compounds are coeluting on this column

[xx]: Duplicate percentage due to coelutions, not taken account in the identified total

†: Peaks apexes were resolved, but peaks overlapped and were summed for analysis

Note: no correction factor was applied

R.T.: Retention time (minutes)

R.I.: Retention index