

**Date :** March 07, 2018

**CERTIFICATE OF ANALYSIS - GC PROFILING**

*SAMPLE IDENTIFICATION*

**Internal code :** 18B20-PLG29-1-CC

**Customer identification :** Allspice

**Type :** Essential oil

**Source :** *Pimenta officinalis*

**Customer :** Plant Guru

*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 :** Sarah-Eve Tremblay, M. Sc. A., Chimiste

**Analysis date :** March 06, 2018

Checked and approved by :

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

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*PHYSICOCHEMICAL DATA*

**Physical aspect:** Light yellow liquid

**Refractive index:**  $1.5340 \pm 0.0003$  (20 °C)

*CONCLUSION*

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

ANALYSIS SUMMARY

Identification	DB-5 (%)	DB-WAX (%)	Classe
Toluene	tr	tr	Simple phenolic
(3Z)-Hexenol	tr	tr	Aliphatic alcohol
$\alpha$ -Thujene	0.01	0.01	Monoterpene
$\alpha$ -Pinene	0.03	0.03	Monoterpene
$\beta$ -Pinene	tr	0.01	Monoterpene
Myrcene	0.02	0.02	Monoterpene
$\alpha$ -Phellandrene	0.07	0.07	Monoterpene
$\Delta^3$ -Carene	0.01	0.01	Monoterpene
$\alpha$ -Terpinene	0.02	0.02	Monoterpene
para-Cymene	0.13	0.14	Monoterpene
Limonene	0.21*	0.06	Monoterpene
1,8-Cineole	[0.21]*	0.16*	Monoterpenic ether
$\beta$ -Phellandrene	[0.21]*	[0.16]*	Monoterpene
(Z)- $\beta$ -Ocimene	0.01	0.01	Monoterpene
(E)- $\beta$ -Ocimene	0.07	0.07	Monoterpene
$\gamma$ -Terpinene	0.03	0.03	Monoterpene
Terpinolene	0.08	0.09	Monoterpene
<i>trans</i> -Linalool oxide (fur.)	0.01	0.02	Monoterpenic alcohol
Linalool	0.03	0.04	Monoterpenic alcohol
Terpinen-4-ol	0.07	0.16*	Monoterpenic alcohol
para-Cymen-8-ol	0.02	0.02	Monoterpenic alcohol
$\alpha$ -Terpineol	0.06	0.06	Monoterpenic alcohol
Methylchavicol	0.01	1.03*	Phenylpropanoid
Chavicol	0.04	0.07	Phenylpropanoid
Eugenol	82.36	82.55	Phenylpropanoid
$\alpha$ -Copaene	0.17	0.12	Sesquiterpene
$\beta$ -Elemene	0.19	5.99*	Sesquiterpene
$\alpha$ -Gurjunene	0.10	0.11	Sesquiterpene
Methyleugenol	5.19	5.22	Phenylpropanoid
$\beta$ -Caryophyllene	5.83	[5.99]*	Sesquiterpene
$\beta$ -Copaene	0.04	0.01	Sesquiterpene
Aromadendrene	0.06	[0.16]*	Sesquiterpene
<i>trans</i> - $\alpha$ -Bergamotene	0.02	[5.99]*	Sesquiterpene
$\alpha$ -Humulene	1.04	[1.03]*	Sesquiterpene
allo-Aromadendrene	0.24	0.21	Sesquiterpene
Selina-4,11-diene	0.19	0.17	Sesquiterpene
$\gamma$ -Muurolene	0.06	0.08*	Sesquiterpene
$\alpha$ -Amorphene	0.03	[0.08]*	Sesquiterpene
$\beta$ -Selinene	0.36	0.38	Sesquiterpene
$\alpha$ -Selinene	0.61*	0.47	Sesquiterpene
Viridiflorene	[0.61]*	0.15	Sesquiterpene
$\alpha$ -Muurolene	0.07	0.06	Sesquiterpene
$\gamma$ -Cadinene	0.10	0.32*	Sesquiterpene
<i>trans</i> -Calamenene	0.31*	0.03	Sesquiterpene
$\delta$ -Cadinene	[0.31]*	[0.32]*	Sesquiterpene
Zonarene	[0.31]*	[0.32]*	Sesquiterpene
<i>trans</i> -Cadina-1,4-diene	0.01	0.02	Sesquiterpene
$\alpha$ -Cadinene	0.02	0.02	Sesquiterpene

$\alpha$ -Calacorene	0.02	0.02	Sesquiterpene
Caryophyllene oxide isomer	0.18*	0.03	Sesquiterpenic ether
Spathulenol	[0.18]*	0.01	Sesquiterpenic alcohol
Caryophyllene oxide	[0.18]*	0.16	Sesquiterpenic ether
Globulol	0.08	0.08	Sesquiterpenic alcohol
Viridiflorol	0.04	0.05	Sesquiterpenic alcohol
Cubeban-11-ol	0.07	0.06	Sesquiterpenic alcohol
Eudesm-5-en-11-ol	0.05	0.04*	Sesquiterpenic alcohol
Methoxyeugenol	0.01	0.03	Phenylpropanoid
Unknown	0.09	0.07	Oxygenated sesquiterpene
Rosifoliol	0.04	[0.04]*	Sesquiterpenic alcohol
$\tau$ -Muurolool	0.07*	0.06	Sesquiterpenic alcohol
$\tau$ -Cadinol	[0.07]*	[82.55]	Sesquiterpenic alcohol
$\alpha$ -Cadinol	0.22*	0.07	Sesquiterpenic alcohol
Selin-11-en-4 $\alpha$ -ol	[0.22]*	0.15	Sesquiterpenic alcohol
<b>Total identified</b>	<b>98.72%</b>	<b>98.82%</b>	

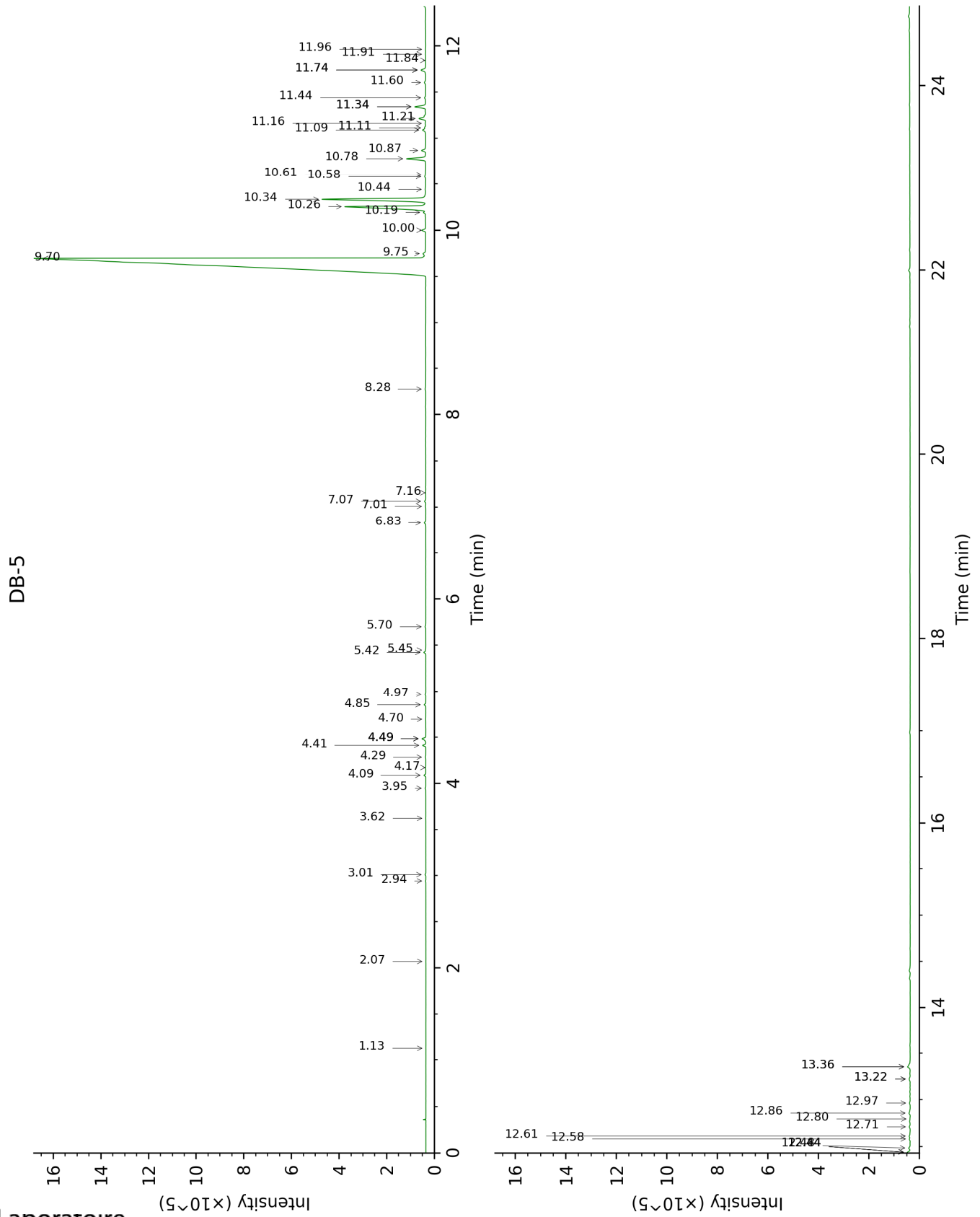
\*: Two or more compounds are coeluting on this column

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

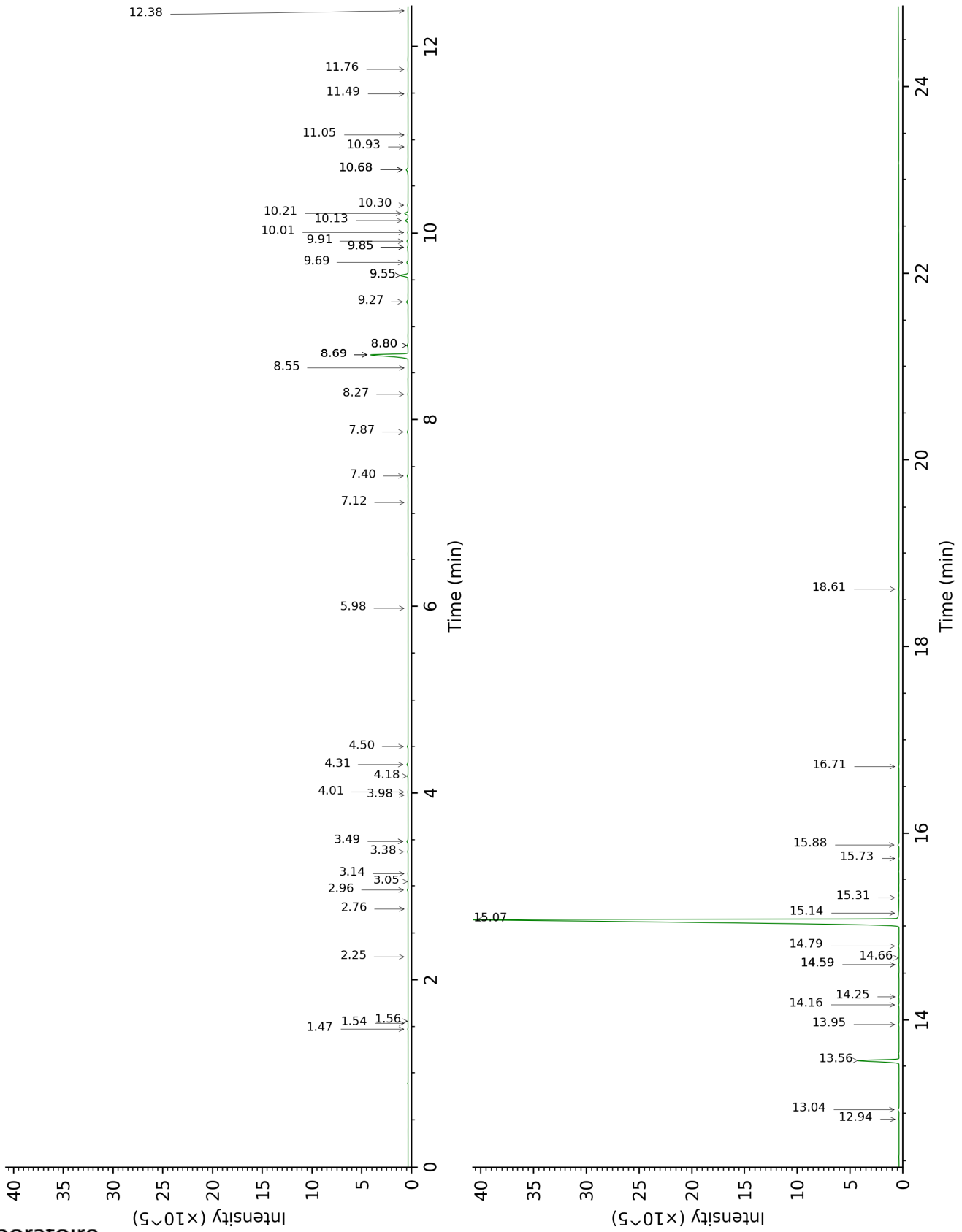
tr: The compound has been detected below 0.005% of total signal.

Note: no correction factor was applied

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DB-WAX



FULL ANALYSIS DATA

Identification	Column DB-5			Column DB-WAX		
	R.T	R.I	%	R.T	R.I	%
Toluene	1.13	753	tr	1.56	1004	tr
(3Z)-Hexenol	2.07	852	tr	5.98	1346	tr
α-Thujene	2.94	920	0.01	1.54	1002	0.01
α-Pinene	3.01	925	0.03	1.47	995	0.03
β-Pinene	3.62	966	tr	2.25	1069	0.01
Myrcene	3.95	988	0.02	3.05	1134	0.02
α-Phellandrene	4.09	997	0.07	2.96	1127	0.07
Δ <sup>3</sup> -Carene	4.17	1002	0.01	2.76	1112	0.01
α-Terpinene	4.29	1009	0.02	3.14	1141	0.02
para-Cymene	4.41	1017	0.13	4.31	1227	0.14
Limonene	4.48*	1022	0.21	3.38	1159	0.06
1,8-Cineole	4.48*	1022	[0.21]	3.49*	1167	0.16
β-Phellandrene	4.48*	1022	[0.21]	3.49*	1167	[0.16]
(Z)-β-Ocimene	4.70	1035	0.01	3.98	1204	0.01
(E)-β-Ocimene	4.85	1045	0.07	4.18	1218	0.07
γ-Terpinene	4.97	1052	0.03	4.01	1206	0.03
Terpinolene	5.42	1081	0.08	4.50	1241	0.09
trans-Linalool oxide (fur.)	5.45	1082	0.01	7.12	1428	0.02
Linalool	5.70	1098	0.03	8.27	1515	0.04
Terpinen-4-ol	6.83	1170	0.07	8.80*	1555	0.16
para-Cymen-8-ol	7.01	1182	0.02	11.76	1796	0.02
α-Terpineol	7.06	1185	0.06	10.01	1650	0.06
Methylchavicol	7.16	1191	0.01	9.55*	1614	1.03
Chavicol	8.28	1265	0.04	16.71	2269	0.07
Eugenol	9.70	1363	82.36	15.07†	2102	82.55
α-Copaene	9.75	1367	0.17	7.40	1449	0.12
β-Elemene	10.00	1385	0.19	8.69*	1547	5.99
α-Gurjunene	10.19	1398	0.10	7.87	1484	0.11
Methyleugenol	10.26	1403	5.19	13.56	1958	5.22
β-Caryophyllene	10.34	1409	5.83	8.69*	1547	[5.99]
β-Copaene	10.44	1417	0.04	8.55	1536	0.01
Aromadendrene	10.58	1427	0.06	8.80*	1555	[0.16]
trans-α- Bergamotene	10.61	1429	0.02	8.69*	1547	[5.99]
α-Humulene	10.78	1442	1.04	9.55*	1614	[1.03]
allo- Aromadendrene	10.87	1448	0.24	9.27	1591	0.21
Selina-4,11- diene	11.09	1465	0.19	9.69	1625	0.17
γ-Muurolene	11.11	1467	0.06	9.85*	1638	0.08
α-Amorphene	11.16	1470	0.03	9.85*	1638	[0.08]
β-Selinene	11.22	1474	0.36	10.13	1661	0.38
α-Selinene	11.34*	1484	0.61	10.21	1667	0.47
Viridiflorene	11.34*	1484	[0.61]	9.91	1643	0.15
α-Muurolene	11.44	1491	0.07	10.30	1674	0.06
γ-Cadinene	11.60	1503	0.10	10.68*	1706	0.32
trans-	11.74*	1514	0.31	11.49	1774	0.03



Calamenene						
δ-Cadinene	11.74*	1514	[0.31]	10.68*	1706	[0.32]
Zonarene	11.74*	1514	[0.31]	10.68*	1706	[0.32]
<i>trans</i> -Cadina-1,4-diene	11.84	1522	0.01	10.93	1726	0.02
α-Cadinene	11.91	1527	0.02	11.06	1737	0.02
α-Calacorene	11.96	1531	0.02	12.38	1851	0.02
Caryophyllene oxide isomer	12.44*	1568	0.18	12.94	1901	0.03
Spathulenol	12.44*	1568	[0.18]	14.66	2062	0.01
Caryophyllene oxide	12.44*	1568	[0.18]	13.04	1910	0.16
Globulol	12.48	1572	0.08	14.16	2014	0.08
Viridiflorol	12.58	1580	0.04	14.25	2023	0.05
Cubeban-11-ol	12.61	1582	0.07	13.95	1994	0.06
Eudesm-5-en-11-ol	12.71	1590	0.05	14.59*	2055	0.04
Methoxyeugenol	12.80	1596	0.01	18.62	2476	0.03
Unknown [m/z 43, 81 (97), 135 (71), 95 (62), 204 (61), 71 (59), 207 (56)... 222 (3)]	12.86	1602	0.09	14.79	2074	0.07
Rosifoliol	12.97	1610	0.04	14.59*	2055	[0.04]
τ-Muurolol	13.22*	1632	0.07	15.31	2125	0.06
τ-Cadinol	13.22*	1632	[0.07]	15.14†	2109	[82.55]
α-Cadinol	13.36*	1642	0.22	15.73	2168	0.07
Selin-11-en-4α-ol	13.36*	1642	[0.22]	15.88	2182	0.15
<b>Total identified</b>		<b>98.72%</b>			<b>98.82%</b>	
<b>Total reported</b>		<b>98.80%</b>			<b>98.89%</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

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