



## GC/MS BATCH NUMBER: P10105

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**ESSENTIAL OIL:** PALMAROSA  
**BOTANICAL NAME:** CYMBOPOGON MARTINI  
**ORIGIN:** INDIA

KEY CONSTITUENTS PRESENT IN THIS BATCH OF PALMAROSA OIL	%
Geraniol	79.13
Geranyl acetate	9.77
Linalool	2.70
$\beta$ -Caryophyllene	1.86
(E)- $\beta$ -Ocimene	1.56

Comments from Robert Tisserand: Delightful sweet-green, rosy odor quality. All thirteen key ISO constituents are within range.

Date : October 23, 2018

CERTIFICATE OF ANALYSIS – GC PROFILING

SAMPLE IDENTIFICATION

**Internal code :** 18J15-PTH14-1-CC

**Customer identification :** Palmarosa - India - P1010586R

**Type :** Essential oil

**Source :** *Cymbopogon martini*

**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 :** Benoit Roger, Ph. D.

**Analysis date :** October 18, 2018

Checked and approved by :



Sylvain Mercier, M. Sc., chimiste 2014-005

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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:**  $1.4718 \pm 0.0003$  (20 °C)

*CONCLUSION*

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

## ANALYSIS SUMMARY

Identification	DB-5 (%)	DB-WAX (%)	Classe
2-Methyl-3-buten-2-ol	tr	0.01	Aliphatic alcohol
Isovaleral	0.01	0.01	Aliphatic aldehyde
Isoamyl alcohol	0.02	0.02*	Aliphatic alcohol
Isoamyl acetate	0.01	0.01	Aliphatic ester
2-Heptanone	tr	tr	Aliphatic ketone
6-Methyl-5-hepten-2-one	0.05	0.05	Aliphatic ketone
<i>trans</i> -Dehydroxylinalool oxide	0.19*	[0.02]*	Monoterpenic ether
Myrcene	[0.19]*	0.17	Monoterpene
<i>cis</i> -Dehydroxylinalool oxide	0.02	0.01	Monoterpenic ether
Limonene	0.10	0.11	Monoterpene
( <i>Z</i> )- $\beta$ -Ocimene	0.43	0.40	Monoterpene
( <i>E</i> )- $\beta$ -Ocimene	1.56	1.51	Monoterpene
<i>cis</i> -Linalool oxide (fur.)	0.01	0.02	Monoterpenic alcohol
Octanol	0.01	0.01	Aliphatic alcohol
Terpinolene	0.02*	0.01	Monoterpene
<i>trans</i> -Linalool oxide (fur.)	[0.02]*	0.01	Monoterpenic alcohol
Linalool	2.70	2.62	Monoterpenic alcohol
Citronellal	0.06	0.06	Monoterpenic aldehyde
$\alpha$ -Terpineol	tr	[0.05]	Monoterpenic alcohol
Decanal	0.01	0.01	Aliphatic aldehyde
Nerol	0.15	0.16	Monoterpenic alcohol
2,3-Epoxygeranial?	0.07*		Monoterpenic aldehyde
Citronellol	[0.07]*	0.07	Monoterpenic alcohol
Neral	0.22	0.19	Monoterpenic aldehyde
Isoamyl hexanoate	0.01	0.01	Aliphatic ester
Geraniol	[79.32]	79.13	Monoterpenic alcohol
Geranial	79.32	0.35*	Monoterpenic aldehyde
Geranyl formate	0.08	0.08	Monoterpenic ester
2,3-Epoxygeraniol?	0.02		Oxygenated monoterpene
Geranic acid	0.01	0.01	Aliphatic acid
Geranyl acetate	9.77	9.35	Monoterpenic ester
$\beta$ -Elemene	0.10	1.88*	Sesquiterpene
$\beta$ -Caryophyllene	1.86	[1.88]*	Sesquiterpene
<i>trans</i> - $\alpha$ -Bergamotene	0.02*	[1.88]*	Sesquiterpene
$\alpha$ -Guaiene	[0.02]*	tr	Sesquiterpene
$\alpha$ -Humulene	0.11	0.11	Sesquiterpene
Selina-4,11-diene	tr	0.01	Sesquiterpene
Germacrene D	0.06	0.05	Sesquiterpene
$\alpha$ -Muurolole	0.03	[0.35]*	Sesquiterpene
$\gamma$ -Cadinene	0.03	0.08*	Sesquiterpene
$\delta$ -Cadinene	0.02	[0.08]*	Sesquiterpene
Unknown	0.20*		Unknown
Geranyl butyrate	[0.20]*	0.19	Monoterpenic ester
( <i>E</i> )-Nerolidol	0.13	0.11	Sesquiterpenic alcohol
Caryophyllene oxide	0.17*	0.15	Sesquiterpenic ether
Caryophyllene oxide isomer	[0.17]*	0.02	Sesquiterpenic ether
Humulene epoxide II	0.01	0.01	Sesquiterpenic ether
Geranyl isovalerate	0.03		Monoterpenic ester

(3Z)-Caryophylla-3,8(13)-dien-5β-ol	0.01	0.86*	Sesquiterpenic alcohol
(2E,6E)-Farnesol	0.56	[0.86]*	Sesquiterpenic alcohol
Geranyl caproate	0.78	0.74	Monoterpenic ester
(2E,6E)-Farnesyl acetate	0.11	0.10	Sesquiterpenic ester
Phytone	0.03	0.04	Terpenic ketone
Geranyl caprylate	0.18		Monoterpenic ester
Unknown	0.01		Monoterpenic ester
<b>Total identified</b>	<b>99.31%</b>	<b>98.77%</b>	

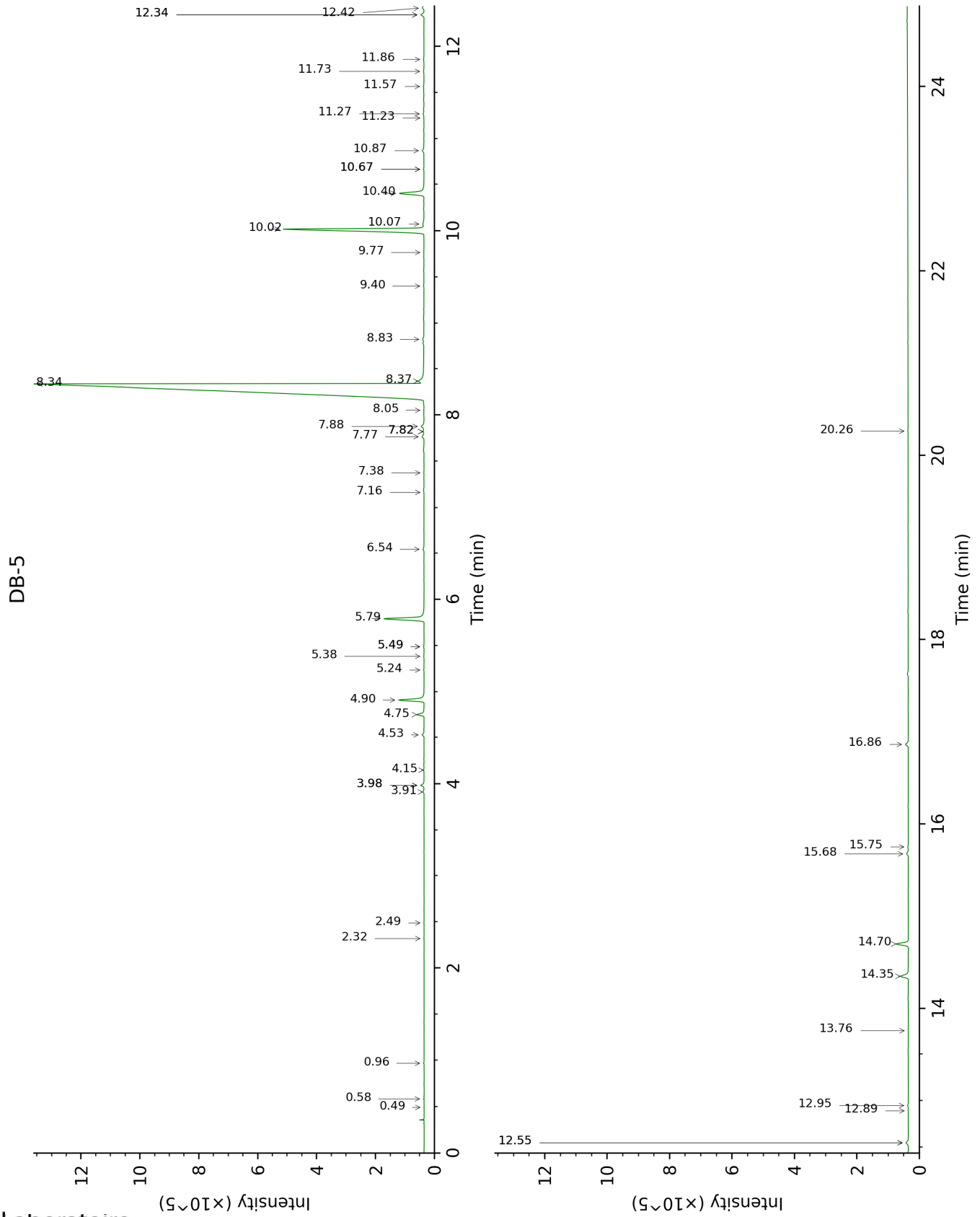
\*: Two or more compounds are coeluting on this column

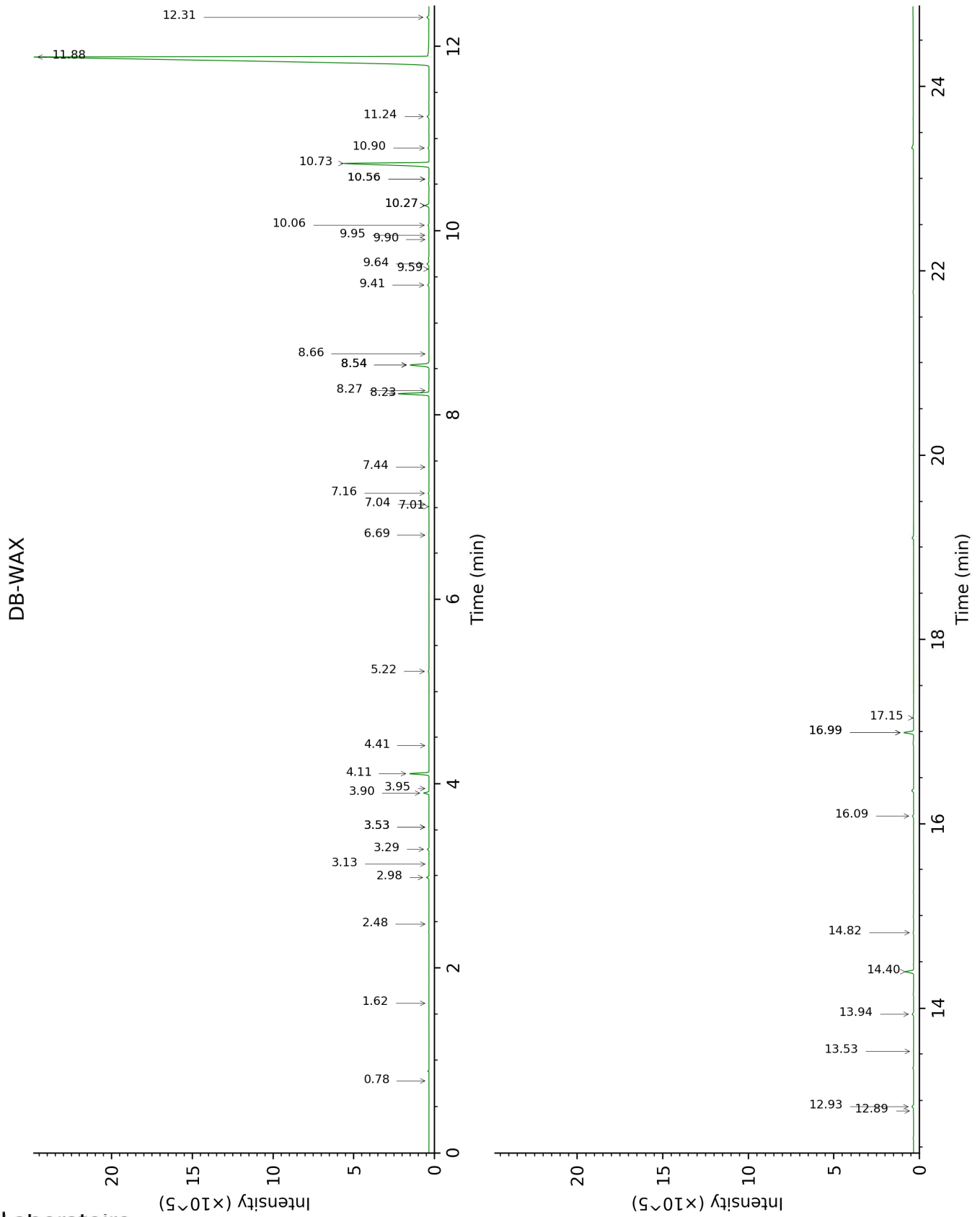
[xx]: Duplicate percentage due to coelutions, not taken account in the identified total

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

Note: no correction factor was applied

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FULL ANALYSIS DATA

Identification	Column DB-5			Column DB-WAX		
	R.T	R.I	%	R.T	R.I	%
2-Methyl-3-buten-2-ol	0.49	604	tr	1.62	1013	0.01
Isovaleral	0.58	638	0.01	0.78	884	0.01
Isoamyl alcohol	0.96	733	0.02	3.53*	1177	0.02
Isoamyl acetate	2.32	876	0.01	2.48	1095	0.01
2-Heptanone	2.49	890	tr	3.13	1146	tr
6-Methyl-5-hepten-2-one	3.91	986	0.05	5.22	1300	0.05
<i>trans</i> -Dehydroxylinalool oxide	3.98*	991	0.19	3.53*	1177	[0.02]
Myrcene	3.98*	991	[0.19]	2.98	1134	0.17
<i>cis</i> -Dehydroxylinalool oxide	4.15	1002	0.02	3.95	1209	0.01
Limonene	4.53	1026	0.10	3.29	1158	0.11
( <i>Z</i> )- $\beta$ -Ocimene	4.75	1039	0.43	3.90	1206	0.40
( <i>E</i> )- $\beta$ -Ocimene	4.90	1049	1.56	4.11	1221	1.51
<i>cis</i> -Linalool oxide (fur.)	5.24	1069	0.01	6.69	1405	0.02
Octanol	5.38	1078	0.01	8.27	1522	0.01
Terpinolene	5.49*	1085	0.02	4.41	1244	0.01
<i>trans</i> -Linalool oxide (fur.)	5.49*	1085	[0.02]	7.01	1428	0.01
Linalool	5.79	1104	2.70	8.23	1519	2.62
Citronellal	6.54	1151	0.06	7.16	1439	0.06
$\alpha$ -Terpineol	7.16	1190	tr	9.90†	1650	[0.05]
Decanal	7.38	1204	0.01	7.44	1460	0.01
Nerol	7.77	1229	0.15	11.24	1761	0.16
2,3-Epoxygeranial?	7.82*	1233	0.07			
Citronellol	7.82*	1233	[0.07]	10.90	1732	0.07
Neral	7.88	1237	0.22	9.64	1629	0.19
Isoamyl hexanoate	8.05	1248	0.01	7.04	1430	0.01
Geraniol	8.34†	1267	[79.32]	11.88	1816	79.13
Geranial	8.37†	1269	79.32	10.27*	1680	0.35
Geranyl formate	8.83	1300	0.08	10.06	1663	0.08
2,3-Epoxygeraniol?	9.40	1341	0.02			
Geranic acid	9.76	1366	0.01	17.15	2324	0.01
Geranyl acetate	10.02	1384	9.77	10.74	1718	9.35
$\beta$ -Elemene	10.07	1387	0.10	8.54*	1543	1.88
$\beta$ -Caryophyllene	10.40	1411	1.86	8.54*	1543	[1.88]
<i>trans</i> - $\alpha$ -Bergamotene	10.67*	1430	0.02	8.54*	1543	[1.88]
$\alpha$ -Guaiene	10.67*	1430	[0.02]	8.66	1552	tr
$\alpha$ -Humulene	10.87	1445	0.11	9.41	1611	0.11

Selina-4,11-diene	11.23	1471	tr	9.59	1624	0.01
Germacrene D	11.27	1474	0.06	9.95†	1654	0.05
α-Murolene	11.57	1496	0.03	10.27*	1680	[0.35]
γ-Cadinene	11.73	1508	0.03	10.56*†	1703	0.08
δ-Cadinene	11.86	1518	0.02	10.56*†	1703	[0.08]
Unknown [m/z 59, 68 (63), 43 (31), 67 (27), 81 (27), 94 (25), 69 (23), 41 (22), 84 (20)...]	12.34*	1556	0.20			
Geranyl butyrate	12.34*	1556	[0.20]	12.31	1854	0.19
(E)-Nerolidol	12.42	1562	0.13	13.94	2001	0.11
Caryophyllene oxide	12.55*	1572	0.17	12.93	1909	0.15
Caryophyllene oxide isomer	12.55*	1572	[0.17]	12.89	1905	0.02
Humulene epoxide II	12.89	1598	0.01	13.53	1963	0.01
Geranyl isovalerate	12.95	1603	0.03			
(3Z)-Caryophylla-3,8(13)-dien-5β-ol	13.76	1669	0.01	16.99*	2306	0.86
(2E,6E)-Farnesol	14.35	1718	0.56	16.99*	2306	[0.86]
Geranyl caproate	14.70	1748	0.78	14.40	2045	0.74
(2E,6E)-Farnesyl acetate	15.68	1834	0.11	16.09	2212	0.10
Phytone	15.75	1841	0.03	14.82	2086	0.04
Geranyl caprylate	16.86	1942	0.18			
Unknown [m/z 69, 81 (47), 109 (33), 41 (26), 95 (19), 137 (18)...]	20.26	2288	0.01			
<b>Total identified</b>		<b>99.31%</b>			<b>98.77%</b>	
<b>Total reported</b>		<b>99.32%</b>			<b>98.77%</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