

## SERVICE DE SPECTROMETRIE DE MASSE DE L'ISIC (SSMI)

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### *ANALYSES GC-MS*

Le 03 Mai 2010

**Objet:** Analyse d'une huile essentielle par GC-MS  
**Nom:** **Gingergrass**  
**Lot:** **GGR2001/26**  
**Destinataire :** Entreprise Gedane (Lausanne, Suisse)  
**Composés majoritaires:** **Limonene; Camphene; Borneol; Elemicine**

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### *CONDITIONS EXPERIMENTALES*

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**Type d'instrument :** GC CP-3800 couplé au 1200L Triple quadrupole MS/MS (Varian)  
**Mode d'ionisation :** Impact électronique (IE), 70 eV (mode positif)  
**Gamme de masse :**  $m/z$  50-250 en 0.5 sec  
**Colonne :** FactorFour VF-5ms (5% phenyl-methyl 95% dimethyl polysiloxane, 0.25mm x 30 m)  
**Débit :** 1 mL/min  
**Gradient :** 50°C pendant 3 min; Montée à 150°C en 20 min; Montée à 250°C en 7 min  
**Calibrant :** FC43  
**Echantillons :** Huile essentielle diluée 1:200 dans l'éther. Injection de 1 µL.

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Figure 1 – Chromatogramme TIC-GC/MS d'huile essentielle de Gingergrass (GGR2001/26) analysée sur colonne capillaire

FactorFour VF-5ms (5% phenyl-methyl 95% dimethylpolysiloxane, 0.25mm x 30 m). Les numéros des pics sont reportés dans la Table 1.

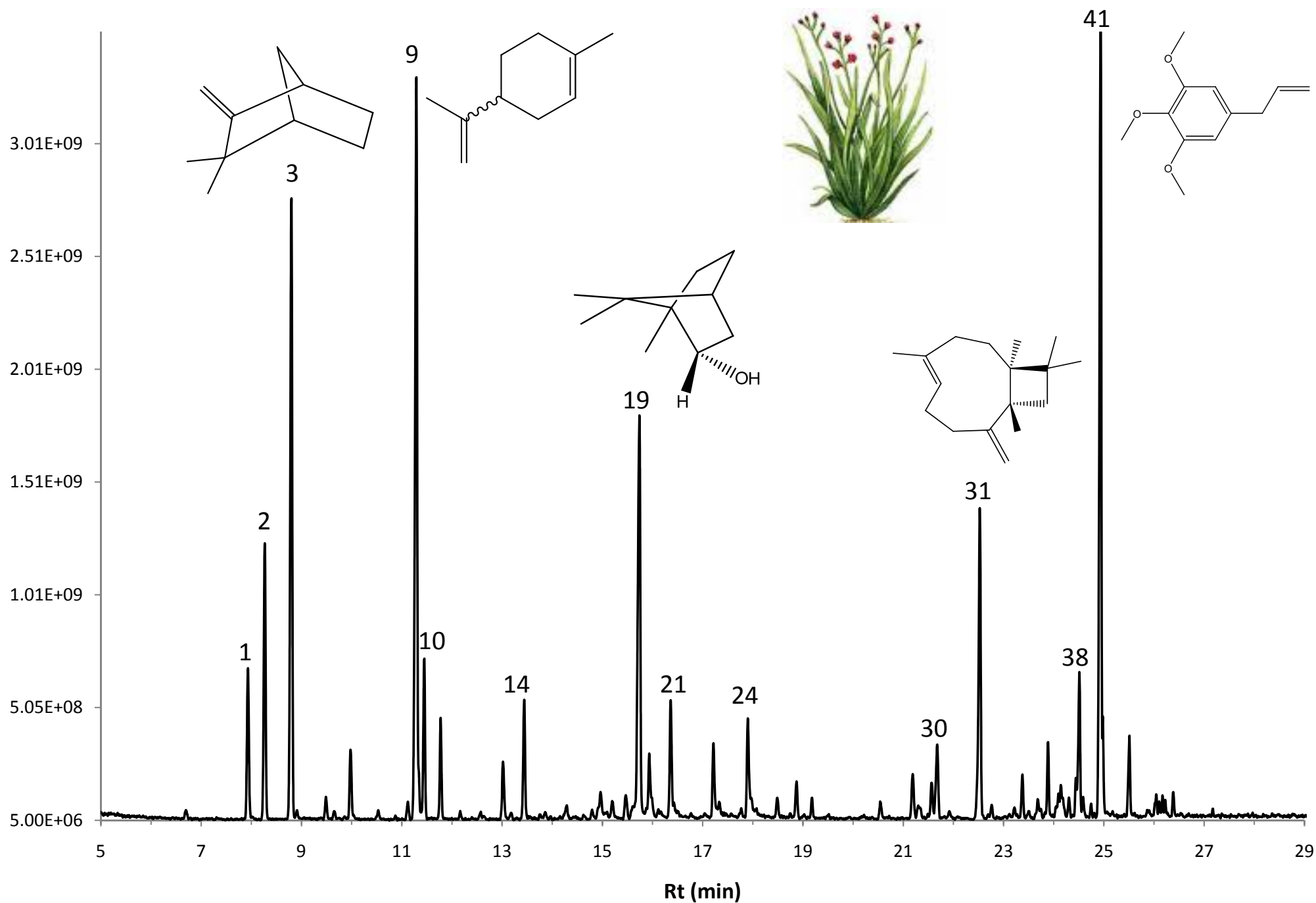


Figure 1 – Chromatogramme TIC-GC/MS d'huile essentielle de Gingergrass (GGR2001/26) analysée sur colonne capillaire

FactorFour VF-5ms (5% phenyl-methyl 95% dimethylpolysiloxane, 0.25mm x 30 m). Les numéros des pics sont reportés dans la Table 1.

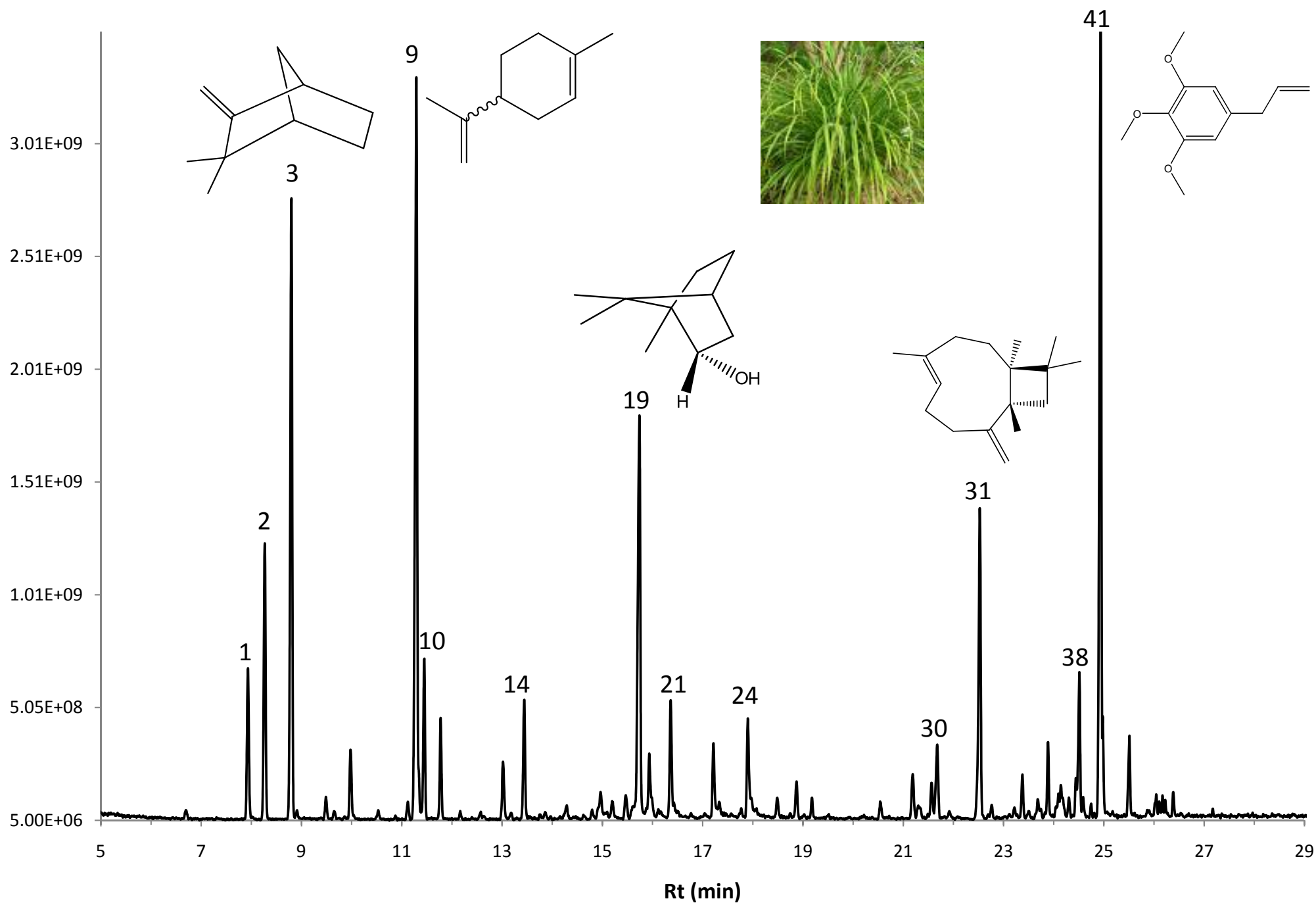


Table 1 – Composition de l'huile essentielle de Gingergrass (GGR2001/26)

N°	Retention Time (min.)	Area	% of Total	Identification (NIST 08/MassFinder)
<b>1</b>	<b>7.93</b>	<b>1.81E+09</b>	<b>2.78</b>	<b>Tricyclene</b>
<b>2</b>	<b>8.27</b>	<b>3.22E+09</b>	<b>4.93</b>	<b><math>\alpha</math>-Pinene</b>
<b>3</b>	<b>8.80</b>	<b>7.58E+09</b>	<b>11.62</b>	<b>Camphene</b>
4	9.49	2.53E+08	0.39	Sabinene
5	9.65	1.52E+08	0.23	$\beta$ -Pinene
6	9.98	8.51E+08	1.30	$\beta$ -Myrcene
7	10.53	6.88E+07	0.11	$\beta/\alpha$ -Phellandrene
8	11.12	2.24E+08	0.34	m/p-Cymene
<b>9</b>	<b>11.29</b>	<b>1.01E+10</b>	<b>15.53</b>	<b>Limonene</b>
<b>10</b>	<b>11.45</b>	<b>1.79E+09</b>	<b>2.75</b>	<b>(Z)-<math>\beta</math>-Ocimene</b>
11	11.78	1.04E+09	1.59	(E)- $\beta$ -Ocimene
12	12.17	8.76E+07	0.13	$\gamma$ -Terpinene
13	13.02	7.15E+08	1.10	$\alpha$ -Terpinolene
<b>14</b>	<b>13.44</b>	<b>1.37E+09</b>	<b>2.09</b>	<b>Linalool</b>
15	14.29	1.16E+08	0.18	Allo-Ocimene
16	14.96	5.00E+08	0.77	Camphor
17	15.20	2.16E+08	0.33	$\beta$ -Citronellal
18	15.47	3.65E+08	0.56	Isomenthone
<b>19</b>	<b>15.74</b>	<b>6.59E+09</b>	<b>10.11</b>	<b>Borneol</b>
20	15.94	1.07E+09	1.64	4-Terpineol
<b>21</b>	<b>16.36</b>	<b>1.37E+09</b>	<b>2.09</b>	<b><math>\alpha</math>-Terpineol</b>
22	16.43	7.21E+07	0.11	Myrtenol
23	17.22	9.10E+08	1.40	R- $\beta$ -Citronellol
<b>24</b>	<b>17.90</b>	<b>1.27E+09</b>	<b>1.95</b>	<b>Trans-Geraniol</b>
25	18.49	2.44E+08	0.37	Citronellyl Formate

Table 1 – Composition de l'huile essentielle de Gingergrass (GGR2001/26) (fin)

N°	Retention Time (min.)	Area	% of Total	Identification (NIST 08/MassFinder)
26	18.87	4.44E+08	0.68	L-Bornyl Acetate
27	19.18	2.17E+08	0.33	Geranyl Fomate
28	21.19	6.21E+08	0.95	Cyclosativene
29	21.57	4.34E+08	0.67	$\beta$ -Bourbonene
<b>30</b>	<b>21.68</b>	<b>1.04E+09</b>	<b>1.60</b>	<b>Cis-<math>\beta</math>-Elemene</b>
<b>31</b>	<b>22.53</b>	<b>4.17E+09</b>	<b>6.39</b>	<b><math>\beta</math>-Caryophyllene</b>
32	22.76	1.41E+08	0.22	Isogermacrene D or $\beta$ -Ylangene
33	23.38	4.69E+08	0.72	$\alpha$ -Caryophyllene
34	23.68	2.76E+08	0.42	7aH,10nH-Cadina-1(6),4-diene or 7bH,10nH-Cadina-1(6),4-diene or Selina-3,5-diene
35	23.89	8.17E+08	1.25	D-Germacrene
36	24.31	2.19E+08	0.34	Trans- $\beta$ -Bergamotene
37	24.44	3.50E+08	0.54	Bicyclosquiphellandrene or $\gamma$ -Cadinene
<b>38</b>	<b>24.51</b>	<b>1.70E+09</b>	<b>2.60</b>	<b><math>\gamma</math>-Amorphene or <math>\beta</math>-Cadinene</b>
39	24.59	2.29E+08	0.35	Calamenene
40	24.75	1.68E+08	0.26	$\alpha$ -Cadinene
<b>41</b>	<b>24.94</b>	<b>9.75E+09</b>	<b>14.95</b>	<b>Elemicine</b>
42	24.98	6.85E+08	1.05	Elemol
43	25.51	8.73E+08	1.34	Caryophyllene Oxide
44	26.17	1.87E+08	0.29	Isoelemicine
45	26.22	1.84E+08	0.28	1-epi-Cubenol or $\tau$ -Cadinol
46	26.38	2.46E+08	0.38	$\alpha$ -Eudesmol

Table 1 – Composition de l'huile essentielle de Gingergrass (GGR2001/26)

N°	Retention Time (min.)	Area	% of Total	Identification (NIST 08/MassFinder)	Prob (%)
1	7.93	1.81E+09	2.78	Tricyclene	18
2	8.27	3.22E+09	4.93	$\alpha$ -Pinene	86
3	8.80	7.58E+09	11.62	Camphene	80
4	9.49	2.53E+08	0.39	Sabinene	73
5	9.65	1.52E+08	0.23	$\beta$ -Pinene	61
6	9.98	8.51E+08	1.30	$\beta$ -Myrcene	65
7	10.53	6.88E+07	0.11	$\beta/\alpha$ -Phellandrene	74/71
8	11.12	2.24E+08	0.34	m/p-Cymene	84/83
9	11.29	1.01E+10	15.53	Limonene	68
10	11.45	1.79E+09	2.75	(Z)- $\beta$ -Ocimene	62
11	11.78	1.04E+09	1.59	(E)- $\beta$ -Ocimene	68
12	12.17	8.76E+07	0.13	$\gamma$ -Terpinene	71
13	13.02	7.15E+08	1.10	$\alpha$ -Terpinolene	10
14	13.44	1.37E+09	2.09	Linalool	65
15	14.29	1.16E+08	0.18	Allo-Ocimene	10
16	14.96	5.00E+08	0.77	Camphor	25
17	15.20	2.16E+08	0.33	$\beta$ -Citronellal	15
18	15.47	3.65E+08	0.56	Isomenthone	20
19	15.74	6.59E+09	10.11	Borneol	70
20	15.94	1.07E+09	1.64	4-Terpineol	50
21	16.36	1.37E+09	2.09	$\alpha$ -Terpineol	84
22	16.43	7.21E+07	0.11	Myrtenol	20
23	17.22	9.10E+08	1.40	R- $\beta$ -Citronellol	20
24	17.90	1.27E+09	1.95	Trans-Geraniol	40
25	18.49	2.44E+08	0.37	Citronellyl Formate	38

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27	19.18	2.17E+08	0.33	Geranyl Fomate	45
28	21.19	6.21E+08	0.95	Cyclosativene	65
29	21.57	4.34E+08	0.67	$\beta$ -Bourbonene	57
<b>30</b>	<b>21.68</b>	<b>1.04E+09</b>	<b>1.60</b>	<b>Cis-<math>\beta</math>-Elemene</b>	<b>72</b>
<b>31</b>	<b>22.53</b>	<b>4.17E+09</b>	<b>6.39</b>	<b><math>\beta</math>-Caryophyllene</b>	<b>68</b>
32	22.76	1.41E+08	0.22	Isogermacrene D or $\beta$ -Ylangene	61/61
33	23.38	4.69E+08	0.72	$\alpha$ -Caryophyllene	26
34	23.68	2.76E+08	0.42	7aH,10nH-Cadina-1(6),4-diene or 7bH,10nH-Cadina-1(6),4-diene or Selina-3,5-diene	75/75/70
35	23.89	8.17E+08	1.25	D-Germacrene	72
36	24.31	2.19E+08	0.34	Trans- $\beta$ -Bergamotene	69
37	24.44	3.50E+08	0.54	Bicyclosquiphellandrene or $\gamma$ -Cadinene	61/68
<b>38</b>	<b>24.51</b>	<b>1.70E+09</b>	<b>2.60</b>	<b><math>\gamma</math>-Amorphene or <math>\beta</math>-Cadinene</b>	<b>61 / 20</b>
39	24.59	2.29E+08	0.35	Calamenene	37
40	24.75	1.68E+08	0.26	$\alpha$ -Cadinene	68
<b>41</b>	<b>24.94</b>	<b>9.75E+09</b>	<b>14.95</b>	<b>Elemicine</b>	<b>58</b>
42	24.98	6.85E+08	1.05	Elemol	32
43	25.51	8.73E+08	1.34	Caryophyllene Oxide	41
44	26.17	1.87E+08	0.29	Isoelimicine	46
45	26.22	1.84E+08	0.28	1-epi-Cubenol or $\tau$ -Cadinol	33/12
46	26.38	2.46E+08	0.38	$\alpha$ -Eudesmol	66