

## GC/MS BATCH NUMBER: L90103

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**ESSENTIAL OIL:** LEMONGRASS ORGANIC  
**BOTANICAL NAME:** CYMBOPOBON FLEXOUSUS  
**ORIGIN:** INDIA

KEY CONSTITUENTS PRESENT IN THIS BATCH OF LEMONGRASS ORGANIC OIL	%
GERANIAL	41.7
NERAL	32.2
GERANIOL	5.3
GERANYL ACETATE	3.2
$\beta$ -CARYOPHYLLENE	2.3
6-METHYL-5-HEPTEN-2-ONE	1.4
(E)-ISOCITRAL	1.3
LINALOOL	1.0

Comments from Robert Tisserand: Has an excellent odor profile, characteristic of a genuine and fresh Lemongrass oil. 6 of 7 key ISO constituents are within ISO standard limits. Limonene is slightly low, which is not a concern.

**Date :** August 2, 2016

*SAMPLE IDENTIFICATION*

**Internal code :** 16G22-PTH8-1-SM

**Customer identification :** Org Lemongrass - India - L90103511R

**Type :** Essential oil

**Source :** *Cymbopogon flexuosus*

**Customer :** Plant Therapy

*ANALYSIS*

**Method :** PC-PA-001-15E06, "Analysis of the composition of a liquid essential oil by GC-FID" (in French).

**Analyst :** Sylvain Mercier, M. Sc., chimiste

**Analysis date :** 2016-08-01

Checked and approved by :

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

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IDENTIFIED COMPOUNDS

Identification	Column: BP5			Column: WAX			Molecular Class
	R.T.	R.I.	%	%	R.I.	R.T.	
4-Heptanone	2.57	875	0.01	0.02	1057	1.55	Aliphatic ketone
Tricyclene	3.15	917	0.11	0.10	925	0.80	Monoterpene
$\alpha$ -Pinene	3.34	929	0.16	0.15	944	0.88	Monoterpene
Camphene	3.63	946	0.92	0.90	999	1.10	Monoterpene
Sabinene	4.06	972	0.01	tr	1055	1.53	Monoterpene
$\beta$ -Pinene	4.12	975	tr	tr	1037	1.39	Monoterpene
Myrcene	4.40*	993	0.07	0.03	1126	2.17	Monoterpene
Dehydro-1,8-cineole	4.40*	993	[0.07]	0.01	1143	2.37	Monoterp. ether
6-Methyl-5-hepten-2-one	4.48	997	1.40	1.61	1274	4.04	Aliphatic ketone
$\alpha$ -Phellandrene	4.69	1010	0.04	0.03	1113	2.02	Monoterpene
Octanal	4.80	1015	0.08	0.07	1230	3.43	Aliphatic aldehyde
Limonene	5.08	1031	0.22	0.19	1137	2.30	Monoterpene
1,8-Cineole	5.11	1033	0.01	0.01	1145	2.40	Monoterp. ether
<i>cis</i> - $\beta$ -Ocimene	5.27	1042	0.21	0.19	1184	2.85*	Monoterpene
<i>trans</i> - $\beta$ -Ocimene	5.45	1052	0.14	0.12	1200	3.04	Monoterpene
$\gamma$ -Terpinene	5.64	1062	0.01	[0.19]	1184	2.85*	Monoterpene
Bergamal	5.66	1063	0.03	0.01	1290	4.27	Aliphatic aldehyde
<i>cis</i> -Linalool oxide (fur.)	5.93	1078	0.01	0.01	1376	5.50	Monoterp. alcohol
4-Nonanone	5.99	1081	0.67	0.53	1271	4.00	Aliphatic ketone
Terpinolene	6.10	1088	0.04	0.05	1222	3.32	Monoterpene
<i>trans</i> -Linalool oxide (fur.)	6.24	1096	0.02	0.02	1411	6.01	Monoterp. alcohol
Rose furan	6.33	1100	0.11	0.10	1344	5.02	Monoterp. ether
Perillene	6.44	1105	0.08	0.07	1346	5.06	Monoterp. ether
Linalool	6.64	1112	1.01	0.95	1491	7.53	Monoterp. alcohol
Nonanal	6.69	1114	0.06	0.06	1339	4.97	Aliphatic aldehyde
Unknown (m/z = 81, 70 (71), 67 (57), 109 (47), 41 (43), 82 (42)... 137 (8), 152 (0))	7.40	1141	0.12				Oxygenated monoterpene
exo-Isocitral	7.61	1149	0.09	0.18	1421	6.19*	Monoterp. aldehyde
<i>trans</i> -Chrysanthemal	7.70	1152	0.22	0.24	1427	6.31	Monoterp. aldehyde
Citronellal	7.84	1157	0.22	0.18	1416	6.10	Monoterp. aldehyde
( <i>Z</i> )-Isocitral	8.14	1168	0.68	0.63	1473	7.19	Monoterp. aldehyde
Rosefuran epoxide	8.37	1177	0.16	0.70	1527	8.36*	Monoterp. ether
Borneol	8.55	1184	0.22	0.27	1618	11.11	Monoterp. alcohol
Terpinen-4-ol	8.65	1188	0.04	[0.70]	1527	8.36*	Monoterp. alcohol
( <i>E</i> )-Isocitral	8.74	1191	1.29	1.15	1502	7.74	Monoterp. aldehyde
$\alpha$ -Terpineol	9.33	1209	0.13	0.28	1623	11.37*	Monoterp. alcohol
Decanal	9.62*	1215	0.16	0.11	1438	6.51	Aliphatic aldehyde
endo-Fenchyl acetate	9.62*	1215	[0.16]	0.11	1404	5.91*	Monoterp. ester
Nerol	10.68	1239	0.19	0.12	1726	16.11	Monoterp. alcohol

Citronellol	10.79	1242	0.02	0.03	1722	15.84	Monoterp. alcohol
Neral	11.21	1251	32.17	32.83	1604	10.71	Monoterp. aldehyde
Piperitone	11.62	1260	0.08	[0.28]	1623	11.37*	Monoterp. ketone
Geraniol	12.18	1273	5.30	5.40	1778	19.18	Monoterp. alcohol
Geranial	12.82	1287	41.67	42.32	1653	12.75	Monoterp. aldehyde
Geranyl formate	13.65	1305	0.12	0.16	1626	11.47	Monoterp. ester
$\alpha$ -Cubebene	15.67	1337	0.02	[0.11]	1404	5.91*	Sesquiterpene
Cycloisositivene	16.65	1352	0.15	[0.18]	1421	6.19*	Sesquiterpene
$\alpha$ -Ylangene	16.77	1354	0.10	[0.18]	1421	6.19*	Sesquiterpene
$\alpha$ -Copaene	17.34	1362	0.03	0.03	1433	6.42	Sesquiterpene
Neric acid	17.85	1370	0.13	0.08	2197	40.49	Monoterpenic acid
$\beta$ -Elemene	18.57	1381	0.13	[0.70]	1527	8.36*	Sesquiterpene
Geranyl acetate	19.16	1390	3.24	3.22	1689	14.33	Monoterp. ester
$\beta$ -Caryophyllene	20.22	1406	2.27	1.79	1525	8.29	Sesquiterpene
Geranic acid	20.62	1411	0.39	0.51	2245	41.74	Monoterpenic acid
$\alpha$ -Humulene	22.93	1439	0.24	0.23	1588	10.20	Sesquiterpene
( <i>E</i> )-Isoeugenol	24.95	1463	0.50	0.48	2222	41.19	Phenylpropanoid
Germacrene D	25.11	1465	0.20	[0.28]	1623	11.37*	Sesquiterpene
4- <i>epi</i> -Cubebol	27.05	1489	0.18	0.12	1802	20.55	Sesquiterp. alcohol
$\gamma$ -Cadinene	28.18*	1502	1.06	0.98	1669	13.41	Sesquiterpene
Cubebol	28.18*	1502	[1.06]	0.33	1849	23.70	Sesquiterp. alcohol
$\delta$ -Cadinene	28.80	1511	0.66	0.40	1674	13.63	Sesquiterpene
<i>trans</i> - $\gamma$ -Bisabolene	29.33	1518	0.03	0.03	1683	14.05	Sesquiterpene
10- <i>epi</i> -Cubebol	29.74	1524	0.07	0.08	1853	23.97	Sesquiterpenic alcohol
$\alpha$ -Elemol	32.30	1558	0.09	0.08	1994	33.15	Sesquiterp. alcohol
Caryophyllene oxide	33.42*	1574	0.45	0.37	1844	23.33	Sesquiterp. ether
Geranyl butyrate	33.42*	1574	[0.45]	0.06	1840	23.03	Monoterp. ester
<b>Total identified</b>			<b>98.12%</b>	<b>98.73%</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

#### OTHER DATA

**Physical aspect :** Light yellow liquid

**Refractive index :** 1.4840  $\pm$  0.0003 (20 °C)

#### CONCLUSION

No adulterant, contaminant or diluent were detected using this method.



