

## GC/MS BATCH NUMBER: L90102

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**ESSENTIAL OIL:** LEMONGRASS ORGANIC  
**BOTANICAL NAME:** CYMBOPOGON FLEXUOSUS  
**ORIGIN:** NEPAL

KEY CONSTITUENTS PRESENT IN THIS BATCH OF LEMONGRASS ORGANIC OIL	%
GERANIAL	41.4
NERAL	32.6
GERANIOL	5.3
GERANYL ACETATE	3.5
β-CARYOPHYLLENE	1.6
(E)-ISOCITRAL	1.6
CAMPHENE	1.4
6-METHYL-5-HEPTEN-2-ONE	1.3
LINALOOL	1.3
(Z)-ISOCITRAL	1.1

Comments from Robert Tisserand: A lively, fresh Lemongrass oil. Conforms to the ISO standard except for slightly low limonene, which does not concern me.

**Date :** October 28, 2015

*SAMPLE IDENTIFICATION*

**Internal code :** 15J20-PTH10-1-LC

**Customer identification :** Lemongrass Organic - Nepal - L9010253R

**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 :** Alexis St-Gelais, M. Sc.

**Analysis date :** 2015-10-21

IDENTIFIED COMPOUNDS

Identification	Column: BP5			Column: WAX			Molecular Class
	R.T.	R.I.	%	%	R.I.	R.T.	
Ethanol	0.28	476	0.01	0.01	893	0.65	Aliphatic alcohol
Acetone	0.30	483	0.03	0.03	715	0.41	Aliphatic ketone
2-Methyl-3-buten-2-ol	0.42	531	0.03	0.03	1009	1.21	Aliphatic alcohol
Isovaleral	0.51	566	0.02	0.02	866	0.60	Aliphatic aldehyde
2-Methylbutyral	0.53	575	0.01	0.01	859	0.59	Aliphatic aldehyde
Hexanal	1.31	804	0.01	0.00	1043	1.51	Aliphatic aldehyde
cis-Hex-3-en-1-ol	1.97	862	0.01	0.01	1347	5.43	Aliphatic alcohol
4-Heptanone	2.10	873	0.02	0.01	1089	1.92	Aliphatic ketone
Tricyclene	2.61	913	0.18	0.17	964	0.97	Monoterpene
α-Pinene	2.79	925	0.26	0.24	985	1.06	Monoterpene
Camphene	3.05	941	1.38	1.37	1025	1.35	Monoterpene
Sabinene	3.46	967	0.01	0.01	1083	1.87	Monoterpene
β-Pinene	3.50	970	0.01	0.01	1064	1.70	Monoterpene
Myrcene	3.80*	989	0.32	0.27	1134	2.45	Monoterpene
Dehydro-1,8-cineole	3.80*	989	[0.32]	0.05	1148	2.62	Monoterp. ether
6-Methyl-5-hepten-2-one	3.88	994	1.31	1.31	1300	4.71	Aliphatic ketone
Pseudolimonene	3.99	1001	0.02	0.01	1129	2.38	Monoterpene
Octanal	4.17	1011	0.08	0.08	1252	4.02*	Aliphatic aldehyde
Limonene	4.44*	1027	0.37	0.32	1157	2.74	Monoterpene
1,8-Cineole	4.44*	1027	[0.37]	0.03	1164	2.82	Monoterp. ether
para-Cymene	4.44*	1027	[0.37]	0.01	1228	3.67	Monoterpene
cis-β-Ocimene	4.64	1038	0.34	0.33	1206	3.36*	Monoterpene
trans-β-Ocimene	4.81	1048	0.21	0.19	1221	3.57	Monoterpene
γ-Terpinene	4.97	1057	0.02	[0.33]	1206	3.36*	Monoterpene
Bergamal	5.01	1059	0.01	0.02	1314	4.93	Aliphatic aldehyde
4-Nonanone	5.34	1078	0.92	0.91	1291	4.58	Aliphatic ketone
Terpinolene	5.43	1083	0.06	0.04	1240	3.85	Monoterpene
Rose furan	5.74	1101	0.07	0.10	1367	5.73	Monoterp. ether
2-Methylbutyl 2-methylbutyrate	5.85	1106	0.09	[0.08]	1252	4.02*	Aliphatic ester
Linalool	5.90	1108	1.29	1.34	1515	8.80	Monoterp. alcohol
Unknown (m/z = 81, 70 (71), 67 (57), 109 (47), 41 (43), 82 (42)... 137 (8), 152 (0))	6.50	1136	0.14				Oxygenated monoterpene
exo-Isocitral	6.68	1144	0.15	0.07	1428	6.80	Monoterp. aldehyde
trans-Chrysanthemal	6.74	1146	0.29	0.30	1447	7.21	Monoterp. aldehyde
Citronellal	6.87	1153	0.20	0.20	1434	6.92*	Monoterp. aldehyde
(Z)-Isocitral	7.11	1164	1.06	0.80	1503	8.39	Monoterp. aldehyde
Rosefuran epoxide	7.34	1174	0.16	0.10	1552	9.98	Monoterp. ether
Borneol	7.49	1181	0.03	0.03	1638	13.37	Monoterp. alcohol

Terpinen-4-ol	7.55	1184	0.05	0.05	1544	9.74	Monoterp. alcohol
(E)-Isocitral	7.60	1186	1.60	1.21	1525	9.10	Monoterp. aldehyde
α-Terpineol	8.03	1203	0.51	0.46	1640	13.47	Monoterp. alcohol
β-Phellandren-8-ol	8.11	1205	0.08	0.07	1725	17.87	Monoterp. alcohol
Decanal	8.30*	1211	0.16	0.11	1454	7.35	Aliphatic aldehyde
endo-Fenchyl acetate	8.30*	1211	[0.16]	0.15	1422	6.68*	Sesquiterpene
Nerol	9.06	1231	0.10	0.16	1748	19.29	Monoterp. alcohol
Neral	9.65	1247	32.64	32.55	1623	12.68	Monoterp. aldehyde
Geraniol	10.33	1265	5.27	5.52	1804	22.81	Monoterp. alcohol
Geranial	11.01	1284	41.43	41.62	1675	15.13	Monoterp. aldehyde
Geranyl formate	11.83	1304	0.02				Monoterp. ester
Cycloisosativene	14.20	1345	0.08	[0.15]	1422	6.68*	Sesquiterpene
α-Ylangene	14.32	1347	0.06	0.05	1425	6.75	Monoterp. ester
α-Copaene	14.72	1354	0.03	[0.20]	1434	6.92*	Sesquiterpene
β-Bourbonene	15.17	1362	0.02	0.03	1465	7.58	Sesquiterpene
β-Elemene	15.82	1374	0.05	0.03	1537	9.49	Sesquiterpene
Geranyl acetate	16.42	1384	3.53	3.32	1712	17.07	Monoterp. ester
Geranic acid	16.54	1386	0.12	0.26	2278	43.69	Monoterp. acid
β-Caryophyllene	17.20	1398	1.63	1.47	1532	9.34	Sesquiterpene
α-Humulene	19.61	1430	0.17	0.19	1601	11.61	Sesquiterpene
(E)-Isoeugenol	21.37	1453	0.38	0.46	2260	43.26	Phenylpropanoid
Germacrene D	21.61	1456	0.21	0.20	1635	13.24	Sesquiterpene
4-epi-Cubebol	23.54	1482	0.07	0.05	1815	23.60	Sesquiterp. alcohol
γ-Cadinene	24.46	1494	0.98	1.00	1682	15.46	Sesquiterpene
Cubebol	25.05*	1501	0.39	0.18	1863	27.06	Sesquiterp. alcohol
δ-Cadinene	25.05*	1501	[0.39]	0.25	1688	15.73	Sesquiterpene
trans-γ-Bisabolene	25.93*	1512	0.13	0.08	1699	16.26	Sesquiterpene
10-epi-Cubebol	25.93*	1512	[0.13]	0.04	1876	28.05	Sesquiterp. alcohol
Caryophyllene oxide	29.70	1557	0.26	0.30	1858	26.74	Sesquiterp. ether
Geranyl butyrate	30.06	1561	0.12	0.14	1844	25.70	Monoterp. ester
<b>Total identified</b>			<b>99.07%</b>	<b>98.38%</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 :**  $1.4855 \pm 0.0003$  (20 °C)

*CONCLUSION*

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

Checked and approved by :

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

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