

## GC/MS BATCH NUMBER: MFO100

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**ESSENTIAL OIL:** MANUKA  
**BOTANICAL NAME:** LEPTOSPERMUM SCOPARIUM  
**ORIGIN:** NEW ZEALAND

KEY CONSTITUENTS PRESENT IN THIS BATCH OF MANUKA OIL	%
LEPTOSPERMONE	16.5
trans-CALAMENENE	11.4
iso-LEPTOSPERMONE	5.9
cis-MUUROLA-3,5-DIENE	5.5
$\delta$ -Cadinene	5.3
FLAVESONE	4.6
trans-CADINA-1,4-DIENE	4.1
$\alpha$ -COPAENE	3.9
$\beta$ -SELINENE	3.8
$\alpha$ -SELINENE	3.8
trans-CADINA-1(6),4-DIENE	3.1
$\alpha$ -CUBEBENE	3.1
$\beta$ -CARYOPHYLLENE	2.8
$\alpha$ -PINENE	1.7
cis-MUUROLA-4(14),5-DIENE	1.4
AROMADENDRENE	1.2

Comments from Robert Tisserand: This is a good quality, genuine Manuka oil.

**Date :** August 30, 2016

*SAMPLE IDENTIFICATION*

**Internal code :** 16H30-PTH6-1-DM

**Customer identification :** Manuka - MFO10064R

**Type :** Essential oil

**Source :** *Leptospermum scoparium*

**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 :** 2016-08-30

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.	
2,4-Dimethyl-3-pentanone	1.52	780	0.02	0.01	913	0.73	Aliphatic ketone
$\alpha$ -Thujene	3.25	918	0.03				Monoterpene
$\alpha$ -Pinene	3.35	924	1.68	1.75	946	0.86	Monoterpene
Camphene	3.64	942	0.01	0.01	997	1.08	Monoterpene
Sabinene	4.07	968	0.01	0.01	1056	1.50	Monoterpene
$\beta$ -Pinene	4.13	971	0.23	0.23	1039	1.36	Monoterpene
Myrcene	4.41	988	0.28	0.25	1115	1.98	Monoterpene
<i>cis</i> -Hex-3-en-1-yl acetate	4.82	1011	0.05	0.05	1258	3.74	Aliphatic ester
$\alpha$ -Terpinene	4.87	1014	0.03	0.03	1121	2.05	Monoterpene
<i>para</i> -Cymene	5.06	1025	0.18	0.16	1207	3.04	Monoterpene
Limonene	5.09	1027	0.10	0.08	1139	2.26	Monoterpene
1,8-Cineole	5.15	1030	0.12	0.15	1143	2.31	Monoterp. ether
<i>cis</i> - $\beta$ -Ocimene	5.28	1037	tr	0.17	1187	2.82*	Monoterpene
<i>trans</i> - $\beta$ -Ocimene	5.46	1047	0.04	0.02	1201	2.98	Monoterpene
$\gamma$ -Terpinene	5.64	1057	0.18	[0.17]	1187	2.82*	Monoterpene
Terpinolene	6.11	1083	0.06	0.05	1223	3.26	Monoterpene
2,4-Dimethyl-heptane-3,5-dione	6.47	1100	0.03	0.04	1459	6.77	Aliphatic ketone
Isoamyl isovalerate	6.64*	1107	0.17	0.13	1252	3.65	Aliphatic ester
2-Methylbutyl 2-methylbutyrate	6.64*	1107	[0.17]	0.03	1232	3.39	Aliphatic ester
2-Methylbutyl isovalerate	6.74	1110	0.02				Aliphatic ester
3-Methyl-3-butenyl isovalerate	6.88	1115	0.21	0.22	1320	4.59	Aliphatic ester
Prenyl isovalerate	7.71	1146	0.03				Aliphatic ester
Dimethyl octanedione isomer	7.83	1151	0.03				Aliphatic ketone
2,7-Dimethyl-3,5-octanedione	7.98	1157	0.06				Aliphatic ketone
Terpinen-4-ol	8.68	1183	0.04	3.44	1527	8.13*	Monoterp. alcohol
Isoamyl tiglate	9.14	1198	0.11	3.32	1417	5.99*	Aliphatic ester
Prenyl 3-methylcrotonate?	9.42	1205	0.07				Aliphatic ester
Prenyl tiglate	11.22	1245	0.07	0.06	1492	7.40	Aliphatic ester
$\delta$ -Elemene	15.06	1319	0.02	[3.32]	1417	5.99*	Sesquiterpene
$\alpha$ -Cubebene	15.75	1330	3.05	[3.32]	1417	5.99*	Sesquiterpene
$\alpha$ -Ylangene	16.93	1348	0.21	0.19	1431	6.26	Sesquiterpene
$\alpha$ -Copaene	17.46	1356	3.91	4.09	1439	6.41	Sesquiterpene
$\beta$ -Cubebene	18.37	1370	0.10	0.11	1476	7.09	Sesquiterpene
$\beta$ -Elemene	18.64*	1374	0.56	[3.44]	1527	8.13*	Sesquiterpene
Benzyl isovalerate	18.64*	1374	[0.56]	0.08	1813	20.43	Phenolic ester

$\alpha$ -Gurjunene	19.35	1385	0.83	0.84	1467	6.94	Sesquiterpene
$\beta$ -Caryophyllene	20.30	1399	2.79	[3.44]	1527	8.13*	Sesquiterpene
$\beta$ -Gurjunene	20.87	1406	0.14	0.06	1523	7.99	Sesquiterpene
<i>trans</i> - $\alpha$ -Bergamotene	21.17	1409	0.14	[3.44]	1527	8.13*	Sesquiterpene
Aromadendrene	21.64	1415	1.18	1.19	1538	8.43	Sesquiterpene
Seychellene	21.82	1417	0.12	0.42	1543	8.59*	Sesquiterpene
6,9-Guaiadiene	22.25	1423	0.19	[0.42]	1543	8.59*	Sesquiterpene
<i>cis</i> -Muuro-la-3,5-diene	22.74	1428	5.50	5.41	1561	9.13	Sesquiterpene
$\alpha$ -Humulene	23.05	1432	0.54	3.36	1590	9.99*	Sesquiterpene
allo-Aromadendrene	23.29	1435	0.65	0.81	1567	9.31	Sesquiterpene
Unknown (m/z = 105, 161 (58), 91 (41), 93 (41)... 204 (21))	24.07	1445	0.08				Sesquiterpene
<i>trans</i> -Cadin-1(6),4-diene	24.77	1453	3.12	[3.36]	1590	9.99*	Sesquiterpene
$\gamma$ -Muuro-lene	24.95	1455	0.12	0.14	1615	10.72	Sesquiterpene
$\alpha$ -Amorphene	25.12	1457	0.82	0.95	1618	10.83	Sesquiterpene
$\beta$ -Selinene	25.93	1467	3.77	4.84	1636	11.48*	Sesquiterpene
<i>cis</i> -Muuro-la-4(14),5-diene	26.09	1469	1.40	[4.84]	1636	11.48*	Sesquiterpene
$\alpha$ -Selinene	26.58	1474	3.75	3.71	1643	11.79	Sesquiterpene
$\alpha$ -Muuro-lene	27.27	1482	0.72	0.67	1653	12.26	Sesquiterpene
$\delta$ -Guaiene	27.41	1484	0.53	0.77	1624	11.02	Sesquiterpene
$\gamma$ -Cadinene	28.30	1495	0.80	0.37	1670	12.99	Sesquiterpene
$\delta$ -Cadinene	29.09	1506	5.25	5.88	1675	13.25	Sesquiterpene
( <i>E,E</i> )- $\alpha$ -Farnesene	29.22	1507	0.89	5.20	1701	14.39*	Sesquiterpene
<i>trans</i> -Calamenene	29.61	1513	11.37	11.49	1746	16.56	Sesquiterpene
<i>trans</i> -Cadin-1,4-diene	30.26	1522	4.14	[5.20]	1701	14.39*	Sesquiterpene
$\alpha$ -Calacorene	30.68	1527	0.35	0.29	1803	19.86	Sesquiterpene
$\gamma$ -Calacorene	30.99	1531	0.48	0.62	1807	20.09	Sesquiterpene
Flavesone	31.68*	1541	4.81	4.57	1892	25.62	Triketone
$\beta$ -Calacorene	31.68*	1541	[4.81]	0.06	1848	22.59	Sesquiterpene
Caryophyllene oxide	33.53	1566	0.46	0.34	1854	23.01	Sesquiterp. ether
Spathulenol	33.75	1569	0.58	0.55	2029	34.11	Sesquiterp. alcohol
Globulol	34.11	1574	0.25	16.79	1986	31.54*	Sesquiterp. alcohol
Gleenol	34.65	1582	0.38	6.46	1957	29.92*	Sesquiterp. alcohol
iso-Leptospermone	36.10	1607	5.86	[6.46]	1957	29.92*	Triketone
$\gamma$ -Eudesmol	36.72*	1622	17.65	0.17	2080	36.21	Sesquiterp. alcohol
Leptospermone	36.72*	1622	[17.65]	[16.79]	1986	31.54*	Triketone
Cubenol	37.12	1632	1.01	0.79	1955	29.75	Sesquiterp. alcohol
$\beta$ -Eudesmol	37.74*	1647	0.74	0.13	2112	37.32	Sesquiterp. alcohol
$\alpha$ -Eudesmol	37.74*	1647	[0.74]	0.37	2119	37.52	Sesquiterp. alcohol
$\alpha$ -Cadinol	37.91	1651	0.36	0.42	2121	37.60	Sesquiterp. alcohol
<i>trans</i> -Calamenen-10-ol	38.01	1653	0.13	0.26	2221	40.43	Sesquiterp. alcohol
Cadalene	38.70	1670	0.37	0.29	2075	36.06	Sesquiterpene

Grandiflorone	51.97	2161	0.60	0.50	2966	54.55	Triketone
<b>Total identified</b>			<b>94.50%</b>	<b>93.40%</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 :** Yellow liquid

**Refractive index :** 1.4995 ± 0.0003 (20 °C)

#### CONCLUSION

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



