



PLANT THERAPY  
100% PURE ESSENTIAL OILS

## GC/MS BATCH NUMBER: M10102

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**ESSENTIAL OIL:** MANDRAIN  
**BOTANICAL NAME:** CITRUS RETICULATA  
**ORIGIN:** BRAZIL

KEY CONSTITUENTS PRESENT IN THIS BATCH OF MANDRAIN OIL	%
LIMONENE	68.3
γ-TERPINENE	18.4
TANGERETIN	2.1
α-PINENE	2.0
MYRCENE	1.7
β-PINENE	1.5

Comments from Robert Tisserand: Beautiful crisp, deep Mandarin odor quality. Meets 10 of 11 ISO standards with p-cymene marginal - not a concern.

**Date :** April 7, 2017

*SAMPLE IDENTIFICATION*

**Internal code :** 17D03-PTH2-1-DM

**Customer identification :** Mandarin Green - Brazil - M1010266R

**Type :** Essential oil

**Source :** *Citrus reticulata*

**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 :** 2017-04-06

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.	
α-Thujene	3.30	922	0.73	0.80	950	1.18	Monoterpene
α-Pinene	3.40	928	1.97	1.99	939	1.14	Monoterpene
Camphene	3.69	945	0.02	0.01	994	1.42	Monoterpene
Sabinene	4.11	970	0.24	0.24	1053	1.94	Monoterpene
β-Pinene	4.18	974	1.49	1.52	1034	1.78	Monoterpene
Myrcene	4.46	991	1.68	1.69	1112	2.52	Monoterpene
α-Phellandrene	4.73	1006	0.06	0.06	1106	2.43	Monoterpene
Octanal	4.84	1012	0.10	0.10	1228	4.08	Aliphatic aldehyde
α-Terpinene	4.92	1016	0.32	0.37	1119	2.60	Monoterpene
Limonene	5.25*	1035	66.50	68.32	1147	2.98	Monoterpene
1,8-Cineole	5.25*	1035	[66.50]	0.28	1149	2.99	Monoterp. ether
para-Cymene	5.25*	1035	[66.50]	0.70	1205	3.74	Monoterpene
cis-β-Ocimene	5.33	1039	tr	19.21	1190	3.54*	Monoterpene
trans-β-Ocimene	5.51	1049	0.03	0.03	1198	3.65	Monoterpene
γ-Terpinene	5.74	1062	18.39	[19.21]	1190	3.54*	Monoterpene
cis-Sabinene hydrate	5.98	1075	0.03	0.04	1402	6.74*	Monoterp. alcohol
Octanol	6.11	1082	0.02	0.02	1498	9.04	Aliphatic alcohol
Terpinolene	6.16	1085	0.79	0.81	1220	3.95	Monoterpene
Linalool	6.59	1105	0.22	0.17	1488	8.79	Monoterp. alcohol
Nonanal	6.73	1111	0.03	0.03	1331	5.62	Aliphatic aldehyde
cis-Limonene oxide	7.28	1131	0.01	0.01	1379	6.38	Monoterp. ether
trans-Limonene oxide	7.39	1135	0.01	[0.04]	1402	6.74*	Monoterp. ether
Citronellal	7.89	1153	0.02	0.02	1412	6.95	Monoterp. aldehyde
Terpinen-4-ol	8.64	1180	0.08	0.07	1523	9.82	Monoterp. alcohol
α-Terpineol	9.24	1201	0.24	0.23	1619	13.53	Monoterp. alcohol
Decanal	9.68	1211	0.09	0.08	1431	7.43	Aliphatic aldehyde
Geranial	12.50	1274	0.01	0.01	1665	15.92	Monoterp. aldehyde
α-Copaene	17.51	1358	0.01	0.01	1423	7.24	Sesquiterpene
β-Caryophyllene	20.33	1401	0.14	0.14	1512	9.45	Sesquiterpene
Dimethyl anthranilate	20.68	1405	0.60	0.60	1929	33.18	Phenolic ester
Dodecanal	21.45	1414	0.02	0.02	1639	14.57	Aliphatic aldehyde
α-Humulene	23.08	1434	0.01	0.01	1572	11.65	Sesquiterpene
α-Selinene	26.50	1475	0.06	0.06	1625	13.85	Sesquiterpene
(E,E)-α-Farnesene	28.78	1503	0.38	0.40	1684	16.92*	Sesquiterpene
δ-Cadinene	28.96	1505	0.01	[0.40]	1684	16.92*	Sesquiterpene
α-Sinensal	41.49	1752	0.33	0.35	2219	42.93	Sesquiterp. aldehyde
Tangeretin	69.90	3162	2.09				Flavonoid
Nobiletin	72.61	3331	0.43				Flavonoid

Heptamethoxyflavone isomer?	72.88	3346	1.07		Flavonoid
<b>Total identified</b>			<b>98.23%</b>	<b>98.40%</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 :** Brownish yellow-green liquid

**Refractive index :** 1.4740 ± 0.0003 (20 °C)

#### CONCLUSION

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



