

**Ponderosa Pine Cone Essential Oil**

# **ESSENTIAL OIL ANALYSIS**

Laboratoire  
**PhytoChemia**





Date : October 20, 2017

SAMPLE IDENTIFICATION

Internal code : 17J13-FSE2-1-CC

Customer identification : Ponderosa Pine Cone - USA - EB051017

Type : Essential oil

Source : *Pinus ponderosa*

Customer : Flowers Shining Everywhere Inc.



ANALYSIS

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

Identifications double-checked by GC-MS

Analyst : Sylvain Mercier, M. Sc., chimiste

Analysis date : 2017-10-20



Checked and approved by :

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.	
Toluene	1.32	759	0.42	47.92	966	1.23*	Simple phenolic
Unknown (m/z = 79, 78 (45), 91 (35), 77 (24)...)	1.98	826	0.04				
Tricyclene	3.23	915	0.61	0.54	929	1.07	Monoterpene
$\alpha$ -Thujene	3.32	921	0.13	[47.92]	966	1.23*	Monoterpene
$\alpha$ -Pinene	3.49	931	46.67	[47.92]	966	1.23*	Monoterpene
Camphene	3.72*	944	1.07	1.27	1004	1.47*	Monoterpene
$\alpha$ -Fenchene	3.72*	944	[1.07]	[1.27]	1004	1.47*	Monoterpene
Thuja-2,4(10)-diene	3.81	949	1.54	1.96	1057	2.00*	Monoterpene
Sabinene	4.15*	970	2.82	[1.96]	1057	2.00*	Monoterpene
meta-Cymene	4.15*	970	[2.82]				Monoterpene
$\beta$ -Pinene	4.23	974	6.16	5.87	1042	1.84	Monoterpene
para-Menthatriene isomer	4.46	988	0.22				Monoterpene
Myrcene	4.49	989	0.75	3.77	1119	2.59*	Monoterpene
para-Menthatriene isomer II?	4.71	1002	0.11				Monoterpene
$\Delta$ 3-Carene	4.81*	1008	16.30	15.88	1100	2.35	Monoterpene
$\alpha$ -Phellandrene	4.81*	1008	[16.30]	[3.77]	1119	2.59*	Monoterpene
$\alpha$ -Terpinene	4.95	1015	0.10	[3.77]	1119	2.59*	Monoterpene
meta-Cymene	5.05	1021	0.22	0.17	1137	2.83	Monoterpene
para-Cymene	5.16	1027	0.73	1.17	1212	3.83*	Monoterpene
Limonene	5.20	1029	6.55	6.66	1145	2.94	Monoterpene
Cymene analog	5.29	1034	0.07				Monoterpene
cis- $\beta$ -Ocimene	5.36	1038	0.04	0.28	1191	3.55*	Monoterpene
trans- $\beta$ -Ocimene	5.54	1047	0.01	[1.17]	1212	3.83*	Monoterpene
$\gamma$ -Terpinene	5.73	1058	0.18	[0.28]	1191	3.55*	Monoterpene
<i>P. mariana</i> biomarker	6.01	1073	0.06	0.08	1452	7.92	Monoterp. alcohol
meta-Cymenene	6.21	1084	0.53	0.65	1362	6.11	Monoterpene
Terpinolene	6.24	1086	0.48	0.61	1227	4.06	Monoterpene
para-Cymenene	6.43	1096	1.41	1.36	1369	6.23	Monoterpene
Nonanal	6.86	1112	0.01	0.02	1338	5.74	Aliphatic aldehyde
endo-Fenchol	7.16	1123	0.03	0.94	1508	9.32*	Monoterp. alcohol
$\alpha$ -Campholenal	7.27	1127	0.68				Monoterp. aldehyde
trans-Pinocarveol	7.63	1140	0.70	0.83	1568	11.54	Monoterp. alcohol
trans-Verbenol	7.78	1146	0.04	0.42	1595	12.50*	Monoterp. alcohol
Pinocamphone	7.97	1153	0.16	0.21	1427	7.34	Monoterp. ketone
Pinocarvone	8.15	1159	0.14	0.20	1474	8.46	Monoterp. ketone
meta-Mentha-4,6-dien-8-ol?	8.22	1162	0.27				Monoterp. alcohol
Isopinocamphone	8.64	1177	0.08	1.41	1492	8.86*	Monoterp. alcohol
Terpinen-4-ol	8.75	1181	0.18	0.72	1529	10.11*	Monoterp. alcohol



para-Cymen-8-ol	9.17	1196	0.09	0.11	1765	22.06	Monoterp. alcohol
Myrtenal	9.34	1200	0.54	[0.72]	1529	10.11*	Monoterp. aldehyde
$\alpha$ -Terpineol	9.48	1203	0.38	0.26	1623	13.82*	Monoterp. alcohol
Eucarvone	9.84	1211	0.21				Monoterp. ketone
Verbenone	9.97	1214	0.24	[0.42]	1595	12.50*	Monoterp. ketone
Thymol methyl ether	10.48	1226	0.11	[0.72]	1529	10.11*	Monoterp. ether
Carvone	11.42	1246	0.17				Monoterp. ketone
Bornyl acetate	12.94	1280	0.91	[0.94]	1508	9.32*	Monoterp. ester
<i>trans</i> -Pinocarvyl acetate	13.63	1295	0.13	[0.72]	1529	10.11*	Monoterp. ester
$\alpha$ -Longipinene	16.01	1332	0.19	0.19	1410	6.93	Sesquiterpene
Longicyclene	17.27	1351	0.08	0.71	1416	7.07	Sesquiterpene
$\alpha$ -Copaene	17.73	1358	0.28	0.37	1433	7.48	Sesquiterpene
Sativene	18.65	1371	0.06				Sesquiterpene
Longifolene	19.72	1388	1.35	[1.41]	1492	8.86*	Sesquiterpene
$\beta$ -Caryophyllene	20.62	1401	0.18	0.14	1522	9.82	Sesquiterpene
<i>trans</i> - $\alpha$ -Bergamotene	22.20	1419	0.12	[0.72]	1529	10.11*	Sesquiterpene
<i>trans</i> -Cadina-1(6),4-diene	25.10	1454	0.16	0.23	1588	12.23	Sesquiterpene
$\gamma$ -Murolene	25.50	1459	0.14	0.17	1614	13.33	Sesquiterpene
Germacrene D	25.65	1460	0.10	[0.26]	1623	13.82*	Sesquiterpene
$\alpha$ -Murolene	27.69	1485	0.15	0.17	1651	15.27	Sesquiterpene
$\gamma$ -Cadinene	28.73	1497	0.07	0.17	1671	16.32*	Sesquiterpene
$\delta$ -Cadinene	29.41	1507	0.61	0.65	1677	16.61	Sesquiterpene
Zonarene	29.58	1509	0.11	[0.17]	1671	16.32*	Sesquiterpene
<i>trans</i> -Cadina-1,4-diene	29.76	1512	0.08	0.07	1695	17.53	Sesquiterpene
$\alpha$ -Calacorene	31.37	1534	0.04				Sesquiterpene
1-epi-Cubenol	36.66	1616	0.07	0.09	1957	34.55	Sesquiterp. alcohol
Cubenol	37.28	1631	0.03	0.04	1948	34.16	Sesquiterp. alcohol
Cembrene	45.66	1889	0.24				Diterpene
Unknown (m/z = 105, 119 (85), 95 (69), 91 (67), 79 (61)...258)	46.72	1930	0.20				
Unknown (m/z = 109, 105 (73), 119 (64), 257 (54), 91 (54)...272)	47.77	1973	0.36				
18-Norabieta-8,11,13-triene?	48.46	2000	0.22				Norditerpene
<b>Total identified</b>		<b>96.53%</b>	<b>96.31%</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:** Faintly yellow liquid

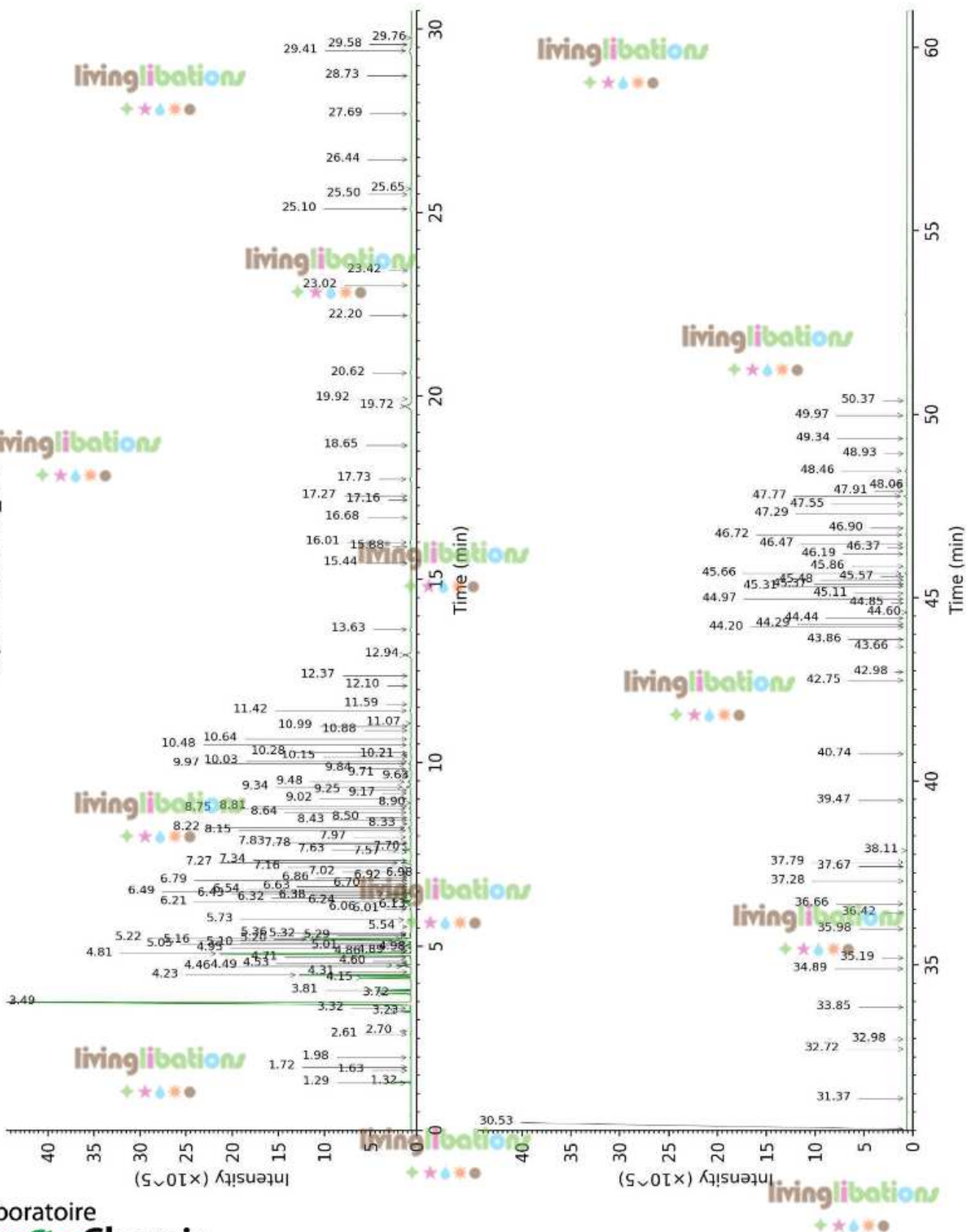
**Refractive index:**  $1.4738 \pm 0.0003$  (20 °C)

#### CONCLUSION

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



17J13-FSE2-1-CC\_BP5





17J13-FSE2-1-CC\_WAX

