

# Analysis Turmeric Essential Oil

Laboratoire  
**Phyto**Chemia





Date : May 11, 2017

SAMPLE IDENTIFICATION

Internal code : 17E05-FSE1-1-DM

Customer identification : Turmeric Root CO2 - Lot #561218

Type : Essential oil

Source : *Curcuma longa*

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).

Analyst : Sylvain Mercier, M. Sc., chimiste

Analysis date : 2017-05-11

Checked and approved by :



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



Note: This report may not be published, including online, without the written consent from Laboratoire PhytoChemia.

This report is digitally signed, it is only considered valid if the digital signature is intact.



# IDENTIFIED COMPOUNDS

Identification	Column: BP5			Column: WAX			Molecular Class
	R.T.	R.I.	%	%	R.I.	R.T.	
Toluene	1.30	757	0.01	0.01	955	1.15	Simple phenolic
$\alpha$ -Pinene	3.41	928	0.03	0.02	942	1.10	Monoterpene
$\beta$ -Pinene	4.18	974	0.02	0.02	1038	1.71	Monoterpene
Myrcene	4.46	991	0.02	0.02	1115	2.43	Monoterpene
$\alpha$ -Phellandrene	4.73*	1006	0.39	0.36	1109	2.35	Monoterpene
$\Delta^3$ -Carene	4.73*	1006	[0.39]	0.01	1080	2.17	Monoterpene
$\alpha$ -Terpinene	4.92*	1017	0.02	0.02	1121	2.52	Monoterpene
para-Cymene	5.10	1027	0.13	0.13	1207	3.63	Monoterpene
Limonene	5.14	1029	0.05	0.04	1139	2.75	Monoterpene
$\beta$ -Phellandrene	5.17	1031	0.01	0.58	1144	2.81*	Monoterpene
1,8-Cineole	5.20	1032	0.58	[0.58]	1144	2.81*	Monoterp. ether
$\gamma$ -Terpinene	5.69	1059	0.02	0.02	1187	3.36	Monoterpene
Terpinolene	6.17	1085	0.32	0.30	1222	3.84	Monoterpene
para-Cymenene	6.36	1095	0.01	0.01	1365	6.00	Monoterpene
Terpinen-4-ol	8.68	1182	0.02	0.02	1527	9.57	Monoterp. alcohol
para-Methylacetophenone	9.00	1194	0.01	0.02	1671	15.58	Simple phenolic
para-Cymen-8-ol	9.14	1199	0.06	0.09	1787	22.42	Monoterp. alcohol
$\alpha$ -Terpineol	9.30	1203	0.06	0.07	1625	13.14	Monoterp. alcohol
Carvacrol	15.55	1328	0.03	0.03	2133	40.29	Monoterp. alcohol
$\beta$ -Elemene	18.75	1377	0.03	1.05	1519	9.26*	Sesquiterpene
Unknown (m/z = 119, 161 (37), 176 (32), 91 (26))	19.22	1384	0.02	0.03	1830	25.29	
Sesquithujene	19.95	1395	0.07	0.08	1502	8.84*	Sesquiterpene
$\beta$ -Caryophyllene	20.42	1402	1.04	[1.05]	1519	9.26*	Sesquiterpene
$\alpha$ -Santalene	20.91	1408	0.04	0.03	1522	9.37	Sesquiterpene
trans- $\alpha$ -Bergamotene	21.98	1421	0.03	0.02	1524	9.45	Sesquiterpene
cis- $\beta$ -Farnesene	22.68	1429	0.18	0.14	1587	11.78	Sesquiterpene
$\alpha$ -Humulene	23.16	1435	0.23	0.21	1577	11.39	Sesquiterpene
Thujopsadiene	23.87	1443	0.05	0.04	1608	12.51	Sesquiterpene
trans- $\beta$ -Farnesene	24.32*	1449	0.22	0.21	1614	12.74*	Sesquiterpene
$\beta$ -Acoradiene	24.32*	1449	[0.22]	0.08	1591	11.91	Sesquiterpene
$\gamma$ -Curcumene	25.82	1467	0.13	[0.21]	1614	12.74*	Sesquiterpene
ar-Curcumene	26.37	1473	1.78	6.48	1695	16.82*	Sesquiterpene
$\alpha$ -Zingiberene	27.75	1490	5.60	5.61	1653	14.70	Sesquiterpene
$\beta$ -Bisabolene	28.65	1501	0.93	0.86	1658	14.87	Sesquiterpene
$\beta$ -Curcumene	29.11	1507	0.04	0.04	1675	15.79	Sesquiterpene
$\beta$ -Sesquiphellandrene	30.10	1521	4.86	[6.48]	1695	16.82*	Sesquiterpene
trans- $\gamma$ -Bisabolene	30.66	1529	0.08	[6.48]	1695	16.82*	Sesquiterpene
trans- $\alpha$ -Bisabolene	31.40	1539	0.07	0.09	1720	18.11	Sesquiterpene
cis-Sesquisabinene hydrate	32.82	1559	0.15				Sesquiterp. alcohol
Caryophyllene oxide	33.56*	1569	0.21	0.08	1846	26.44	Sesquiterp. ether



(E)-Nerolidol	33.56*	1569	[0.21]	0.12	1982	34.88	Sesquiterp. alcohol
ar-Dihydroturmerone	34.54	1583	0.39	1.43	2206	42.19	Sesquiterp. ketone
ar-Turmerol	35.58	1597	0.14				Sesquiterp. alcohol
Unknown (m/z = 119, 91 (19), 105 (19), 132 (18)... 218 (2))	36.00	1606	0.39				Oxygenated sesquiterp.
Tumerone	36.69	1623	0.55				Sesquiterp. ketone
ar-Turmerone	38.59†	1669	42.06	25.24	2077	38.54*	Sesquiterp. ketone
β-Turmerone	38.91†	1677	[42.06]	15.33	2145	40.63	Sesquiterp. ketone
Germacone	38.97†	1678	[42.06]	[25.24]	2077	38.54*	Sesquiterp. ketone
(Z)-γ-Atlantone	39.05	1680	0.51	0.41	2081	38.68	Sesquiterp. ketone
Unknown (m/z = 120, 91 (37), 85 (36), 41 (34), 77 (28), 119 (27), 93 (27)...) )	39.45	1690	0.69				Oxygenated sesquiterp.
(E)-γ-Atlantone	39.68	1696	0.30	0.32	2111	39.60	Sesquiterp. ketone
α-Turmerone	40.05	1706	14.33	14.43	2130	40.17	Sesquiterp. ketone
(Z)-α-Atlantone	40.29	1714	0.27	0.27	2154	40.86	Sesquiterp. ketone
Curcphenol	40.44	1718	0.14	0.14	2582	50.26	Sesquiterp. alcohol
(6R,7R)-Bisabolone	40.74	1728	0.22				Sesquiterp. ketone
(6S,7R)-Bisabolone	41.26	1744	0.99	0.85	2184	41.63	Sesquiterp. ketone
C. longa biomarker	41.74	1759	0.82	0.68	2288	44.15	
(E)-α-Atlantone	42.23	1775	0.80	[1.43]	2206	42.19*	Sesquiterp. ketone
C. longa biomarker	43.07	1802	0.64	0.77	2552	49.70	
C. longa biomarker	45.47	1889	0.55	0.55	2741	53.19	
Unknown (m/z = 83, 135 (75), 118 (44), 55 (29), 91 (27), 232 (21))	45.60	1894	0.39				Oxygenated sesquiterp.
Unknown (m/z = 83, 137 (72), 110 (60), 55 (37), 109 (26)...) )	45.92	1906	0.63				
Unknown (m/z = 83, 149 (65), 135 (53), 55 (30), 214 (27)... 2327 (11))	47.16	1956	0.41				Oxygenated sesquiterp.
C. longa biomarker	48.31	2002	0.67	0.81	3120	59.56	
<b>Total identified</b>			<b>80.91%</b>	<b>78.14%</b>			

\*: Two or more compounds are coeluting on this column

†: Peak apexes were resolved, but the peaks overlapped and were summed for analysis.

[xx]: Duplicate percentage due to coelutions, not taken account in the identified total

Note: no correction factor was applied

Essential oil, *Curcuma longa*  
Internal Code: 17E05-FSE1-1-DM

Customer Identification:  
Turmeric Root CO2 - Lot #561218

Report prepared for  
Flowers Shining Everywhere Inc.

#### OTHER DATA

**Physical aspect:** Bright yellow liquid

**Refractive index:**  $1.5105 \pm 0.0003$  (20 °C)

#### CONCLUSION

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

livinglibations  
+ ★ ★ ★ ●

livinglibations  
+ ★ ★ ★ ●

livinglibations  
+ ★ ★ ★ ●

livinglibations  
+ ★ ★ ★ ●

livinglibations  
+ ★ ★ ★ ●

livinglibations  
+ ★ ★ ★ ●

livinglibations  
+ ★ ★ ★ ●

livinglibations  
+ ★ ★ ★ ●

livinglibations  
+ ★ ★ ★ ●

livinglibations  
+ ★ ★ ★ ●

livinglibations  
+ ★ ★ ★ ●

livinglibations  
+ ★ ★ ★ ●

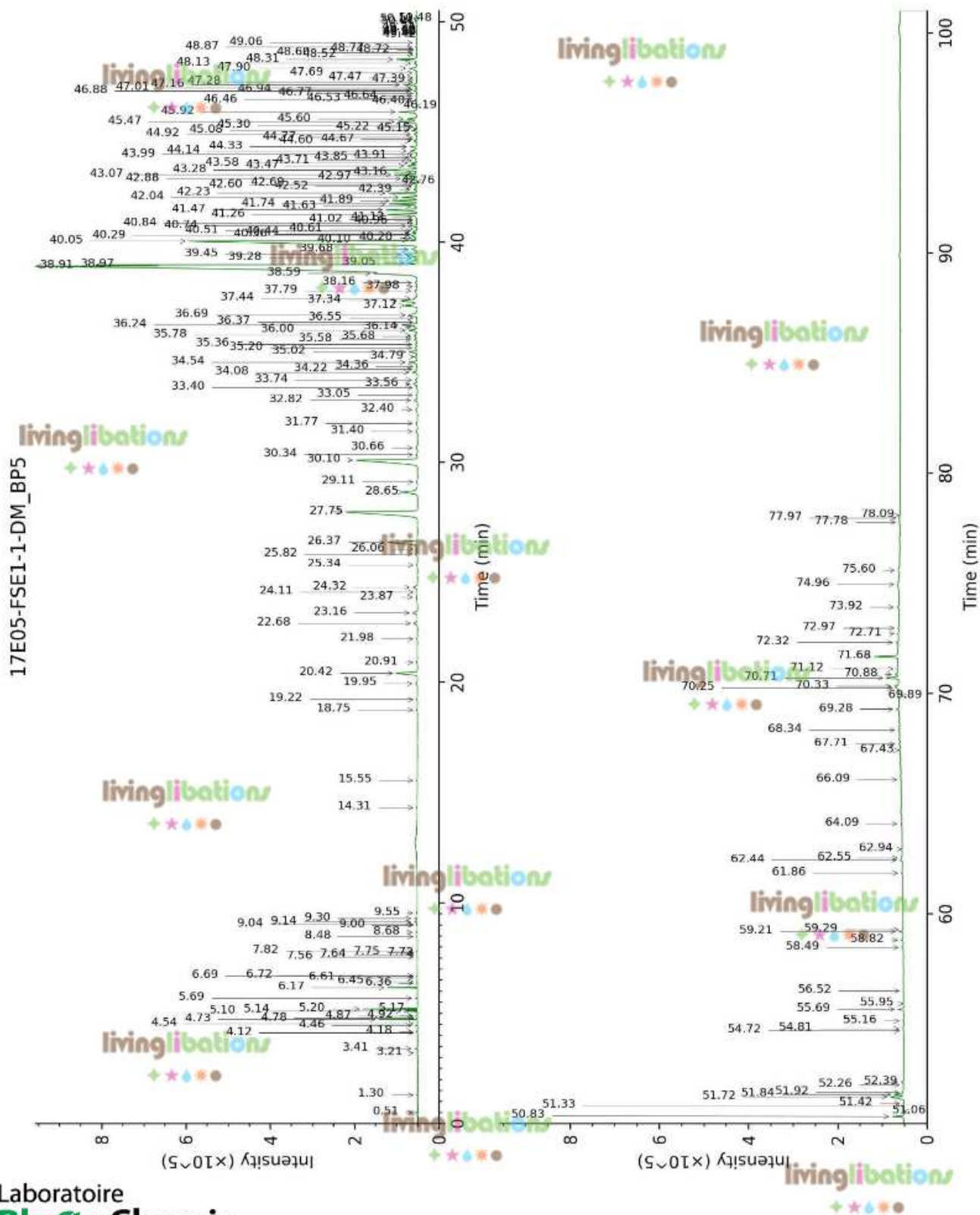
Laboratoire  
**Phyto**Chemia

*Plus que des analyses... des conseils*

Essential oil, *Curcuma longa*  
Internal Code: 17E05-FSE1-1-DM

Customer Identification:  
Turmeric Root CO2 - Lot #561218

Report prepared for  
Flowers Shining Everywhere Inc.



Laboratoire  
**PhytoChemia**

Plus que des analyses... des conseils

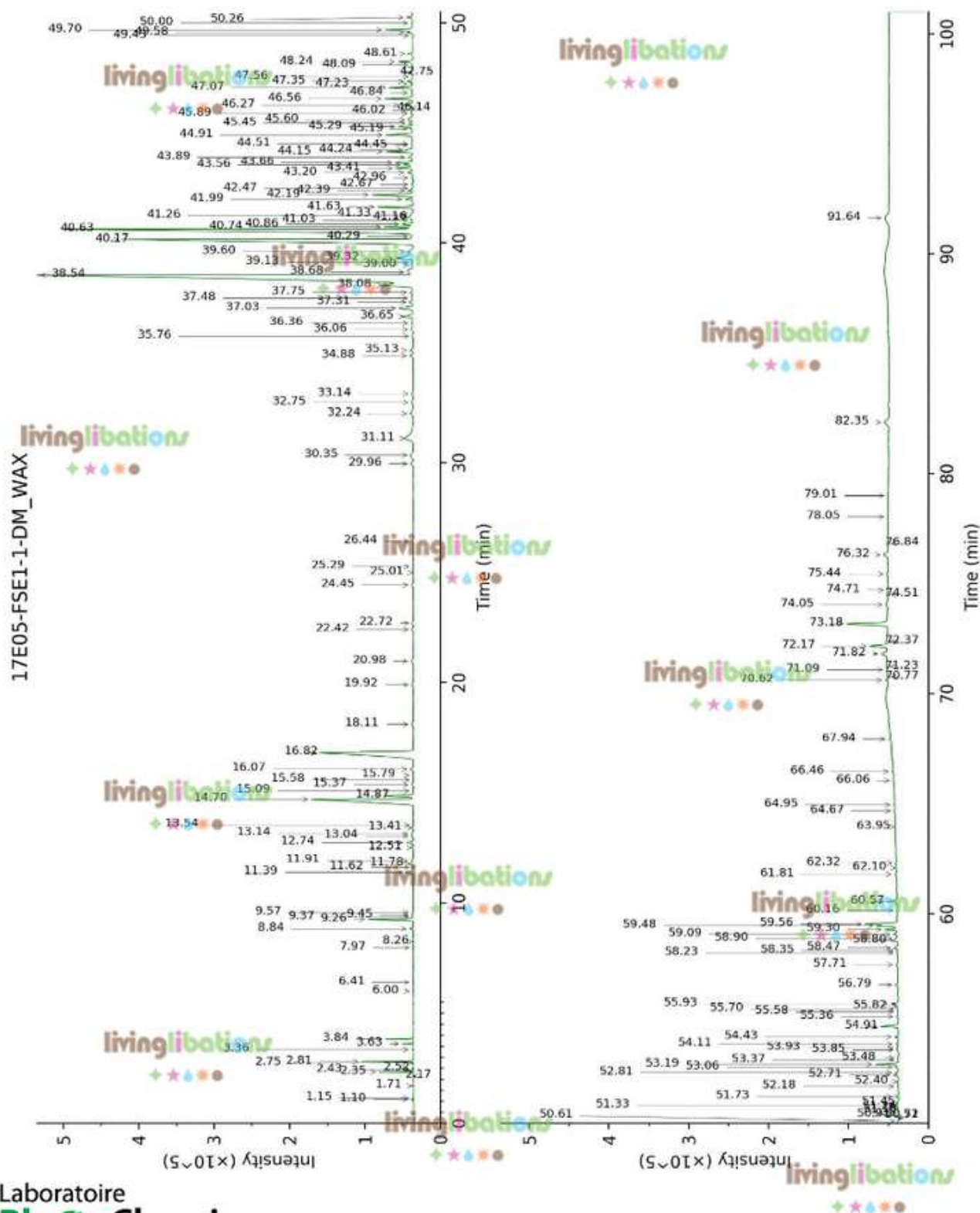
Page 5 of 6



Essential oil, *Curcuma longa*  
Internal Code: 17E05-FSE1-1-DM

Customer Identification:  
Turmeric Root CO2 - Lot #561218

Report prepared for  
Flowers Shining Everywhere Inc.



Laboratoire  
**PhytoChemia**

Plus que des analyses... des conseils

Page 6 of 6