

# Analysis Black Pepper Essential Oil

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**Phyto**Chemia



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#### SAMPLE IDENTIFICATION

**Internal code :** 17E19-FSE15-1-DM

**Customer identification :** Black Pepper - Lot #BLPEP0514PFE

**Type :** Essential oil

**Source :** *Piper nigrum*

**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 :** 2017-05-24

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	1.31	758	0.01	15.44	945	1.11*	Simple phenolic
Tricyclene	3.22	917	0.01	0.01	912	0.98	Monoterpene
$\alpha$ -Thujene	3.31	922	0.07	0.36	949	1.12	Monoterpene
$\alpha$ -Pinene	3.45	930	15.90	[15.44]	945	1.11*	Monoterpene
Camphene	3.70*	945	0.50	0.47	997	1.34	Monoterpene
$\alpha$ -Fenchene	3.70*	945	[0.50]	0.02	987	1.29	Monoterpene
Thuja-2,4(10)-diene	3.79	951	tr	0.45	1051	1.84*	Monoterpene
Sabinene	4.13	971	0.48	[0.45]	1051	1.84*	Monoterpene
$\beta$ -Pinene	4.22	976	12.26	12.03	1038	1.71	Monoterpene
Myrcene	4.47	991	1.36	1.42	1112	2.39	Monoterpene
$\Delta^3$ -Carene	4.77*	1009	10.36	9.17	1079	2.17	Monoterpene
$\alpha$ -Phellandrene	4.77*	1009	[10.36]	1.08	1106	2.31	Monoterpene
$\alpha$ -Terpinene	4.93	1017	0.02	0.02	1118	2.47	Monoterpene
Limone	5.20*	1032	17.31	16.37	1141	2.76	Monoterpene
para-Cymene	5.20*	1032	[17.31]	0.62	1202	3.56	Monoterpene
$\beta$ -Phellandrene	5.20*	1032	[17.31]	0.25	1143	2.79*	Monoterpene
1,8-Cineole	5.23	1034	0.04	[0.25]	1143	2.79*	Monoterp. ether
cis- $\beta$ -Ocimene	5.34	1039	0.01	0.02	1179	3.27	Monoterpene
trans- $\beta$ -Ocimene	5.51	1049	0.14	0.13	1196	3.48	Monoterpene
$\gamma$ -Terpinene	5.70	1059	0.05	0.05	1181	3.30	Monoterpene
cis-Sabinene hydrate	6.01	1076	0.01	0.07	1406	6.64	Monoterp. alcohol
Isoterpinolene	6.10	1081	0.10	0.09	1212	3.71	Monoterpene
Terpinolene	6.17	1085	0.29	0.28	1218	3.77	Monoterpene
para-Cymenene	6.37	1096	0.01	0.01	1377	6.17	Monoterpene
Linalool	6.62	1106	0.33	0.30	1484	8.42	Monoterp. alcohol
trans-para-Mentha-2,8-dien-1-ol	7.11	1124	0.03	0.02	1564	10.91	Monoterp. alcohol
trans-Pinocarveol	7.51	1139	0.10	0.10	1559	10.72	Monoterp. alcohol
Camphor	7.71	1146	0.08	0.14	1419	6.87*	Monoterp. ketone
Terpinen-4-ol	8.69	1182	0.04	0.05	1524	9.44	Monoterp. alcohol
para-Cymen-8-ol	9.16	1199	0.05	0.04	1778	21.89	Monoterp. alcohol
Myrtenal	9.24	1201	0.01	0.02	1532	9.69	Monoterp. aldehyde
$\alpha$ -Terpineol	9.31*	1203	0.16	2.66	1622	13.06*	Monoterp. alcohol
Myrtenol	9.31*	1203	[0.16]	0.04	1696	16.87	Monoterp. alcohol
trans-Carveol	10.26	1224	0.06	0.09	1759	20.58	Monoterp. alcohol
cis-Carveol	11.31	1247	0.02	0.02	1774	21.60	Monoterp. alcohol
Bicycloelemene	15.00	1320	0.08	[0.14]	1419	6.87*	Sesquiterpene
$\delta$ -Elemene	15.27	1324	2.28	2.65	1413	6.75*	Sesquiterpene
$\alpha$ -Cubebene	15.88	1333	0.10	0.12	1399	6.53	Sesquiterpene
Cycloisosativene	17.02	1351	0.28	[2.65]	1413	6.75*	Sesquiterpene
$\alpha$ -Copaene	17.58	1359	0.21	0.21	1425	7.02	Sesquiterpene



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β-Elemene	18.82	1378	1.37	1.79	1522	9.37*	Sesquiterpene
α-Gurjunene	19.56	1389	0.15	0.14	1453	7.68	Sesquiterpene
β-Caryophyllene	20.72*	1405	19.63	20.30	1521	9.33	Sesquiterpene
cis-α-Bergamotene	20.72*	1405	[19.63]	0.15	1494	8.65	Sesquiterpene
β-Gurjunene	20.98	1409	0.03	0.02	1525	9.48	Sesquiterpene
β-Copaene	21.38	1413	0.04	[1.79]	1522	9.37*	Sesquiterpene
trans-α-Bergamotene	21.97	1420	0.42	[1.79]	1522	9.37*	Sesquiterpene
α-Humulene	23.24	1436	1.57	1.63	1573	11.25	Sesquiterpene
trans-β-Farnesene	24.96	1456	0.07	0.07	1630	13.46	Sesquiterpene
γ-Murolene	25.14	1459	0.05	0.05	1596	12.09	Sesquiterpene
Germacrene D	25.46	1462	2.37	2.47	1615	12.81	Sesquiterpene
β-Selinene	26.09	1470	2.56	[2.66]	1622	13.06*	Sesquiterpene
α-Curcumene	26.23	1472	0.12	0.09	1693	16.70	Sesquiterpene
Bicyclogermacrene	26.71	1477	1.74	1.76	1629	13.39	Sesquiterpene
δ-Amorphene	27.57	1488	0.55	0.56	1655	14.79	Sesquiterpene
γ-Cadinene	28.46	1498	0.16				Sesquiterpene
β-Bisabolene	28.64	1501	0.06	0.05	1660	14.99	Sesquiterpene
Cubebol	28.88	1504	0.07	0.05	1845	26.37	Sesquiterp. alcohol
δ-Cadinene	29.16	1508	0.40	0.42	1666	15.30	Sesquiterpene
trans-Calamenene	29.43	1512	0.03	0.03	1728	18.58	Sesquiterpene
trans-α-Bisabolene	31.80	1545	0.24	0.24	1712	17.76	Sesquiterpene
Caryophyllene oxide	33.62*	1570	2.25	1.80	1841	26.09	Sesquiterp. ether
(E)-Nerolidol	33.62*	1570	[2.25]	0.03	1989	35.22	Sesquiterp. alcohol
Spathulenol	33.62*	1570	[2.25]	0.10	2013	36.26	Sesquiterp. alcohol
Humulene epoxide II	35.26	1593	0.14	0.12	1892	29.78	Sesquiterp. ether
Isospathulenol	36.76	1624	0.71	0.74	2143	40.58	Sesquiterp. alcohol
Caryophylla-4(12),8(13)-dien-5β-ol	36.86	1627	0.09	0.06	2193	41.85	Sesquiterp. alcohol
<b>Total identified</b>			<b>97.58%</b>	<b>97.49%</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 :** 1.4845 ± 0.0003 (20 °C)

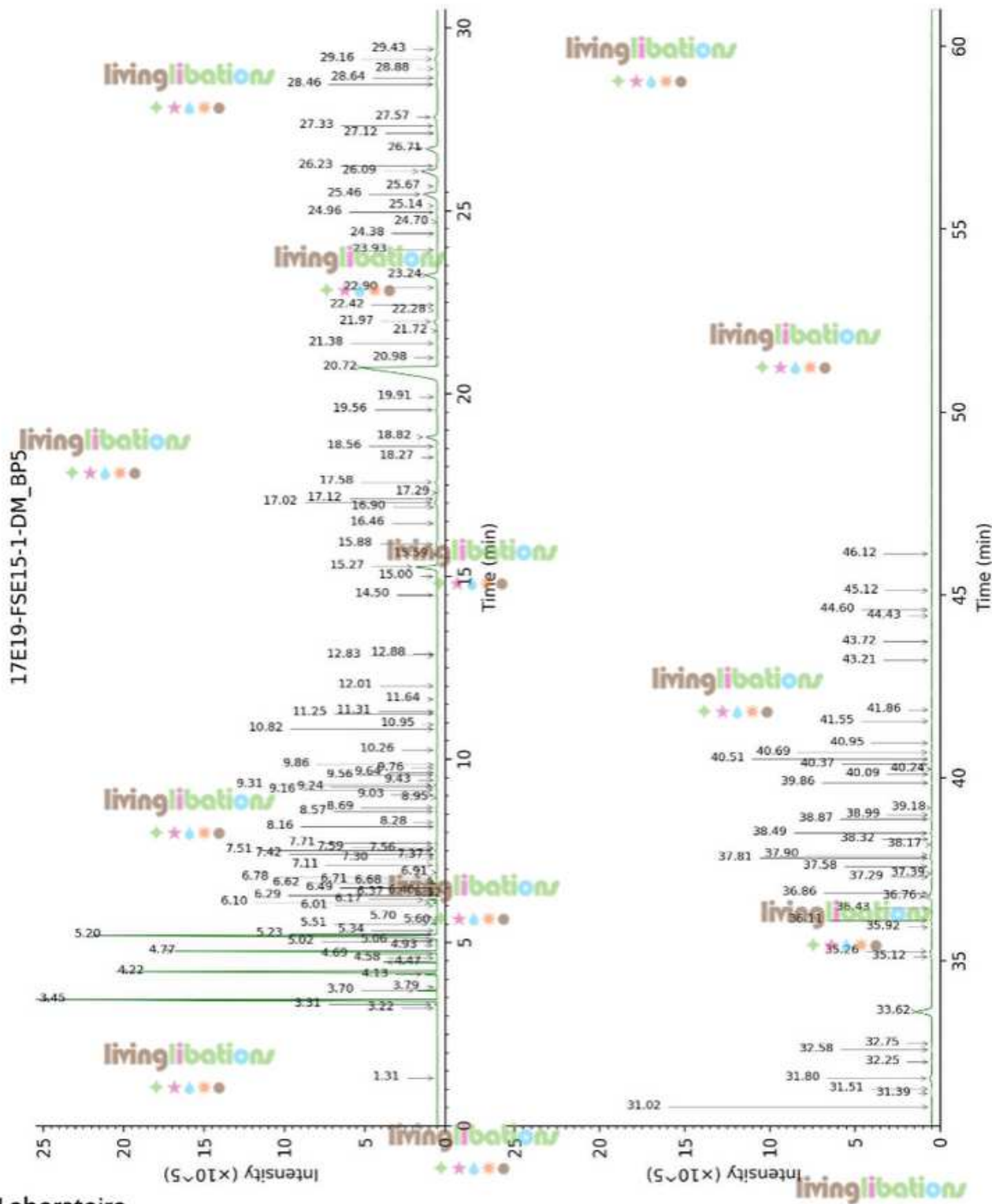
#### CONCLUSION

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

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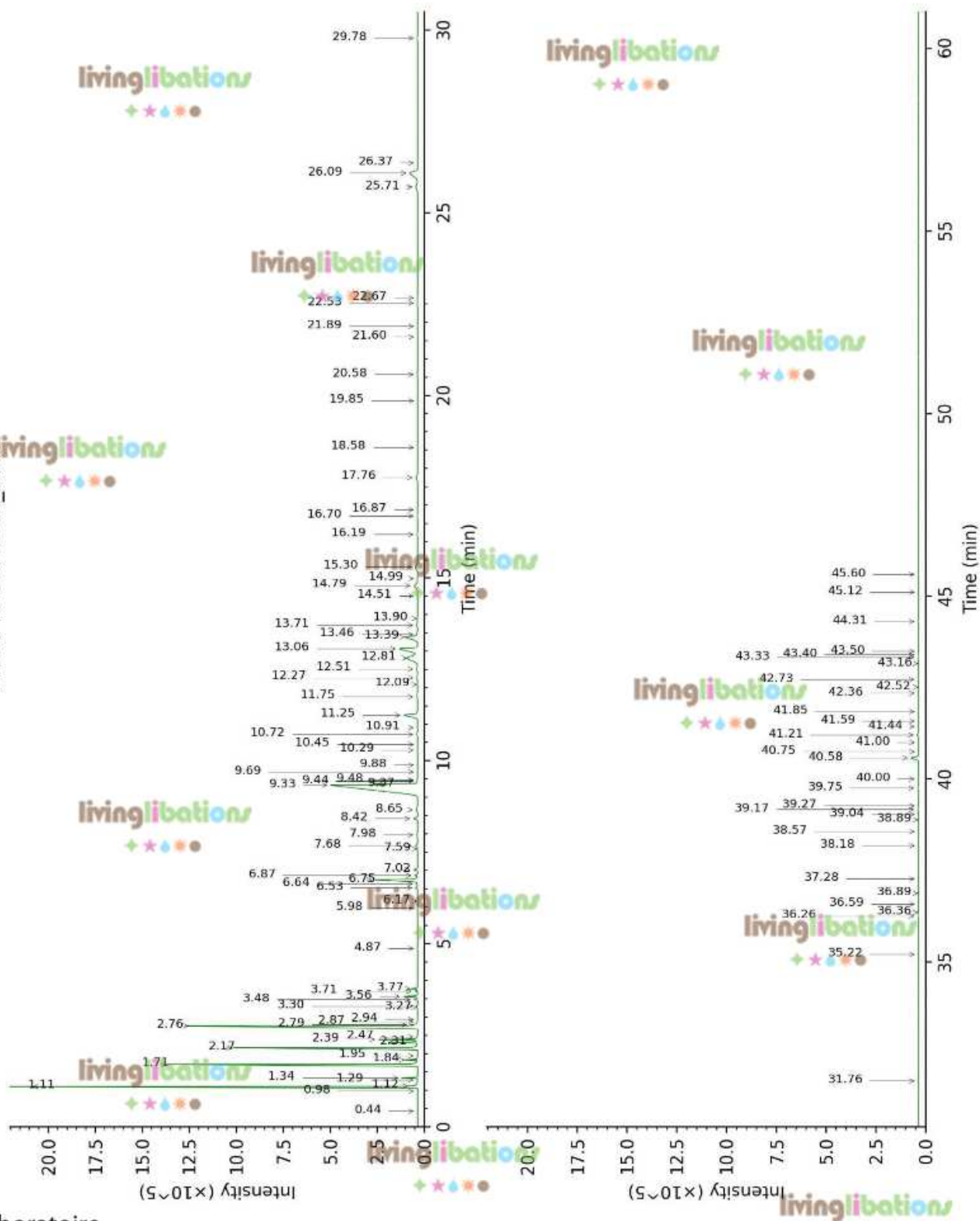
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