Date : March 07, 2018

CERTIFICATE OF ANALYSIS - GC PROFILING

SAMPLE IDENTIFICATION

Internal code : 18B20-PLG30-1-CC
Customer identification : Anise Star
Type : Essential oil
Source : *Illicium verum*
Customer : Plant Guru

ANALYSIS

Method: PC-PA-014-17J19 - Analysis of the composition of an essential oil, or other volatile liquid, by FAST GC-FID (in French); identifications validated by GC-MS.
Analyst : Sarah-Eve Tremblay, M. Sc. A., Chimiste
Analysis date : March 06, 2018

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Note: This report may not be published, including online, without the written consent from Laboratoire PhytoChemia.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

Laboratoire PhytoChemia
3225-A Boul. St-François, Jonquière (Qc) G7T 1A1 | www.phytochemia.com

PHYSICOCHEMICAL DATA

Physical aspect: Faintly yellow liquid
Refractive index: 1.5490 ± 0.0003 (20 °C)

CONCLUSION

No adulterant, contaminant or diluent has been detected using this method.

3225-A, Boul. St-François, Jonquière (Qc) G7T 1A1 | www.phytochemia.com

ANALYSIS SUMMARY

Identification	DB-5 (%)	DB-WAX (%)	Classe
Acetaldehyde	0.09	0.10	Aliphatic aldehyde
2-Methyl-3-buten-2-ol	0.01	0.01	Aliphatic alcohol
Isovaleral	tr	tr	Aliphatic aldehyde
Toluene	tr	tr	Simple phenolic
Furfural	0.01	tr	Aliphatic alcohol
α-Thujene	0.01	0.02	Monoterpene
α-Pinene	0.64	0.65	Monoterpene
Camphene	0.02*	0.01	Monoterpene
α-Fenchene	[0.02]*	tr	Monoterpene
β-Pinene	0.10*	0.05	Monoterpene
Sabinene	[0.10]*	0.05	Monoterpene
Myrcene	0.07	0.07	Monoterpene
Pseudolimonene	0.12*	0.01	Monoterpene
α-Phellandrene	[0.12]*	0.11	Monoterpene
Δ3-Carene	0.22	0.23	Monoterpene
α-Terpinene	0.01	0.02	Monoterpene
para-Cymene	1.64	0.25	Monoterpene
1,8-Cineole	[1.64]*	0.41*	Monoterpenic ether
β-Phellandrene	[1.64]*	[0.41]*	Monoterpene
Limonene	[1.64]*	1.07	Monoterpene
(*Z*)-β-Ocimene	0.01	0.01	Monoterpene
(*E*)-β-Ocimene	0.01	0.02	Monoterpene
γ-Terpinene	0.03	0.04	Monoterpene
cis-Linalool oxide (fur.)	0.01	0.02	Monoterpenic alcohol
Terpinolene	0.03	0.04	Monoterpene
trans-Linalool oxide (fur.)	0.01	0.02	Monoterpenic alcohol
Methyl benzoate	0.01	tr	Phenolic ester
Linalool	1.23	1.28	Monoterpenic alcohol
trans-Pinocarveol	0.01	0.04	Monoterpenic alcohol
Borneol	0.02	0.17*	Monoterpenic alcohol
Terpinen-4-ol	0.18	0.21*	Monoterpenic alcohol
α-Terpineol	0.15	[0.17]*	Monoterpenic alcohol
Methylchavicol	4.07	4.11*	Phenylpropanoid
(*Z*)-Anethole	3.38*	0.29	Phenylpropanoid
para-Anisaldehyde	[3.38]*	3.13	Simple phenolic
(*E*)-Anethole	78.33	79.09	Phenylpropanoid
Methyl meta-anisate	0.10*		Phenolic ester
α-Copaene	[0.10]*	0.09	Sesquiterpene
Unknown	3.30	3.28	Phenylpropanoid
para-Acetonylanisole	0.26	0.23	Phenylpropanoid
β-Elemene	0.04	0.75*	Sesquiterpene
β-Caryophyllene	0.40*	[0.75]*	Sesquiterpene
cis-α-Bergamotene	[0.40]*	0.09	Sesquiterpene
Aromadendrene	0.42*	[0.21]*	Sesquiterpene
(*Z*)-β-Farnesene?	[0.42]*	0.05	Sesquiterpene
trans-α-Bergamotene	[0.42]*	[0.75]*	Sesquiterpene
cis-β-Bergamotene?	0.02		Sesquiterpene
α-Humulene	0.08	[4.11]*	Sesquiterpene

3225-A, Boul. St-François, Jonquière (Qc) G7T 1A1 | www.phytochemia.com

Methyl (*Z*)-isoeugenol	0.07		Phenylpropanoid
Bicyclogermacrene	0.07*	0.03	Sesquiterpene
Viridiflorene	[0.07]*	0.05	Sesquiterpene
α-Muurolene	0.01	0.02	Sesquiterpene
β-Bisabolene	0.08	0.09	Sesquiterpene
γ-Cadinene	0.07	0.10*	Sesquiterpene
trans-Calamenene	0.10*	0.02	Sesquiterpene
δ-Cadinene	[0.10]*	[0.10]*	Sesquiterpene
α-Elemol	0.05	0.01	Sesquiterpenic alcohol
(*E*)-Nerolidol	0.10	0.11	Sesquiterpenic alcohol
1-(4-Methoxyphenyl)propane-1,2-diol isomer I	0.33		Phenylpropanoid
1-(4-Methoxyphenyl)propane-1,2-diol isomer II	0.14		Phenylpropanoid
(*Z*)-Foeniculin	0.08	0.04	Phenylpropanoid
Viridiflorol	0.08	0.02	Sesquiterpenic alcohol
γ-Eudesmol	0.07	0.06	Sesquiterpenic alcohol
τ-Cadinol	0.05	0.02	Sesquiterpenic alcohol
β-Eudesmol	0.02	0.02	Sesquiterpenic alcohol
α-Cadinol	0.07	0.06	Sesquiterpenic alcohol
(*E*)-Foeniculin	1.20	1.13	Phenylpropanoid
Unknown	0.08		Phenylpropanoid
Total identified	**94.35%**	**94.51%**	

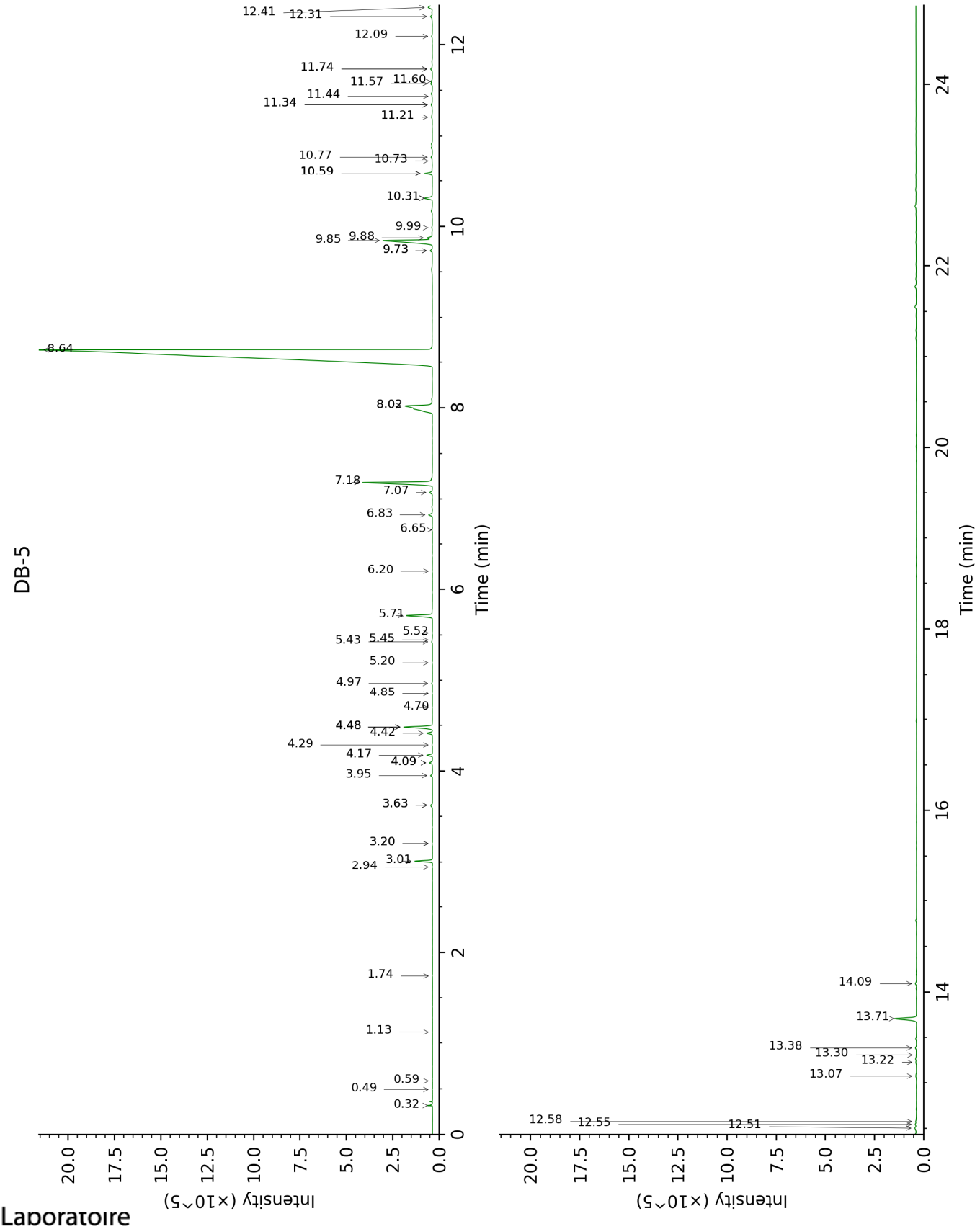
*: Two or more compounds are coeluting on this column
[xx]: Duplicate percentage due to coelutions, not taken account in the identified total
tr: The compound has been detected below 0.005% of total signal.

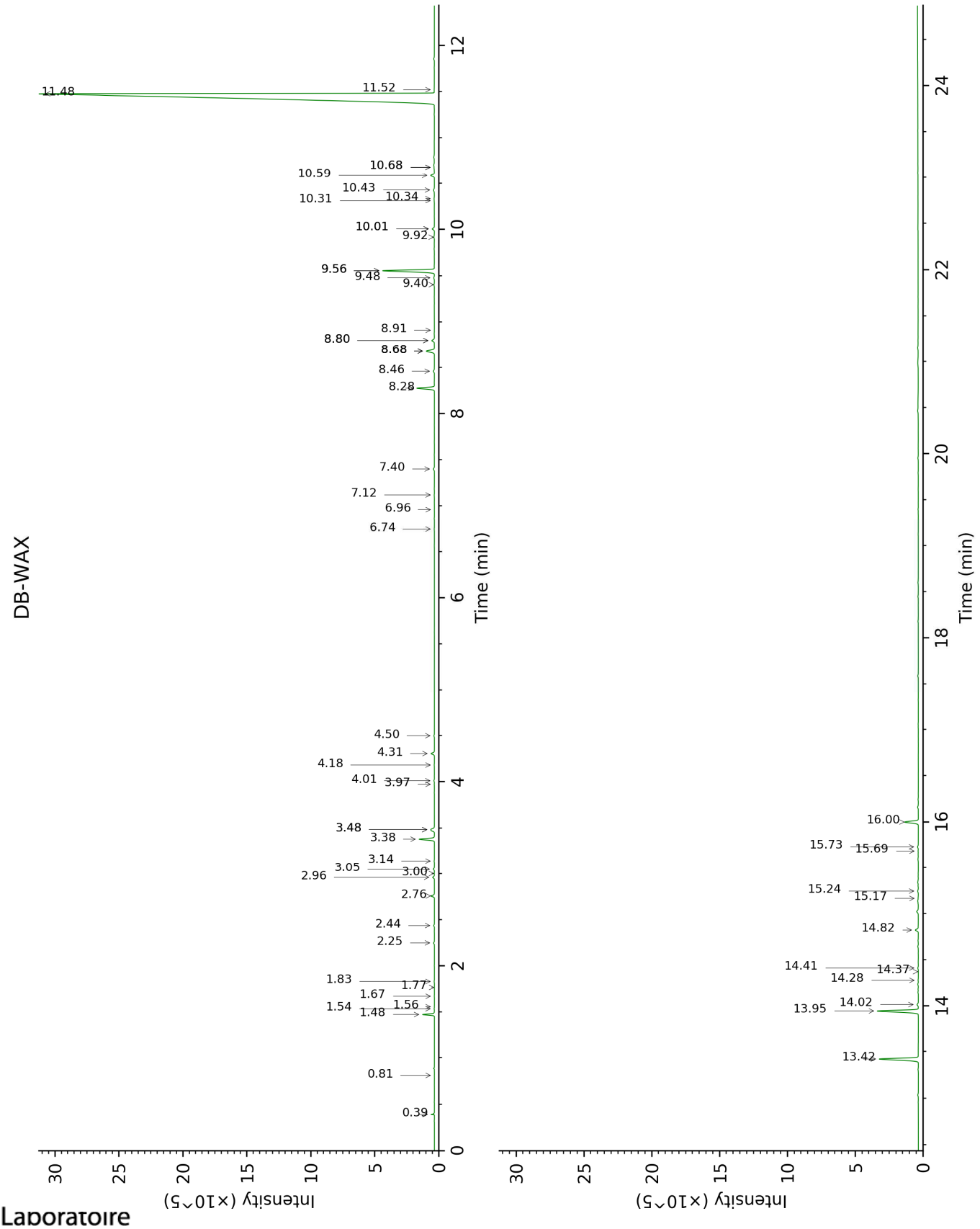
Note: no correction factor was applied

3225-A, Boul. St-François, Jonquière (Qc) G7T 1A1 | www.phytochemia.com

This page was intentionally left blank. The following pages present the complete data of the analysis.

3225-A, Boul. St-François, Jonquière (Qc) G7T 1A1 | www.phytochemia.com


DB-5
12.41
12.31
12.09
11.74
11.57
11.60
11.44
11.34
11.21
10.77
10.73
10.59
10.31
9.99
9.85
9.88
9.73
8.64
8.02
7.18
7.07
6.83
6.65
6.20
5.71
5.52
5.43
5.45
5.20
4.97
4.85
4.70
4.48
4.42
4.29
4.17
4.09
3.95
3.63
3.20
3.01
2.94
1.74
1.13
0.59
0.49
0.32
Time (min)
Intensity (×10^5)
14.09
13.71
13.38
13.30
13.22
13.07
12.58
12.55
12.51
Time (min)
Intensity (×10^5)


DB-WAX
Intensity (×10^5)
Time (min)
11.48
11.52
10.59
10.68
10.43
10.31
10.34
10.01
9.92
9.56
9.48
9.40
8.91
8.80
8.68
8.46
8.28
7.40
7.12
6.96
6.74
4.50
4.31
4.18
4.01
3.97
3.48
3.38
3.14
3.05
2.96
3.00
2.76
2.44
2.25
1.83
1.77
1.67
1.54
1.56
1.48
0.81
0.39
16.00
15.73
15.69
15.24
15.17
14.82
14.41
14.37
14.28
13.95
14.02
13.42

FULL ANALYSIS DATA

Identification	Column DB-5			Column DB-WAX		
	R.T	R.I	%	R.T	R.I	%
Acetaldehyde	0.32	495	0.09	0.39	626	0.10
2-Methyl-3-buten-2-ol	0.49	605	0.01	1.67	1014	0.01
Isovaleral	0.59	638	tr	0.81	883	tr
Toluene	1.13	753	tr	1.56	1004	tr
Furfural	1.74	825	0.01	6.96	1417	tr
α-Thujene	2.94	920	0.01	1.54	1002	0.02
α-Pinene	3.01	925	0.64	1.48	995	0.65
Camphene	3.20*	938	0.02	1.83	1030	0.01
α-Fenchene	3.20*	938	[0.02]	1.77	1024	tr
β-Pinene	3.63*	966	0.10	2.25	1069	0.05
Sabinene	3.63*	966	[0.10]	2.44	1086	0.05
Myrcene	3.95	988	0.07	3.05	1134	0.07
Pseudolimonene	4.09*	997	0.12	3.00	1130	0.01
α-Phellandrene	4.09*	997	[0.12]	2.96	1127	0.11
Δ3-Carene	4.17	1002	0.22	2.76	1112	0.23
α-Terpinene	4.29	1009	0.01	3.14	1141	0.02
para-Cymene	4.42†	1017	1.64	4.31	1227	0.25
1,8-Cineole	4.48*†	1022	[1.64]	3.48*	1167	0.41
β-Phellandrene	4.48*†	1022	[1.64]	3.48*	1167	[0.41]
Limonene	4.48*†	1022	[1.64]	3.38	1159	1.07
(*Z*)-β-Ocimene	4.70	1035	0.01	3.97	1204	0.01
(*E*)-β-Ocimene	4.85	1045	0.01	4.18	1218	0.02
γ-Terpinene	4.97	1052	0.03	4.01	1206	0.04
cis-Linalool oxide (fur.)	5.20	1066	0.01	6.74	1401	0.02
Terpinolene	5.43	1081	0.03	4.50	1241	0.04
trans-Linalool oxide (fur.)	5.45	1082	0.01	7.12	1429	0.02
Methyl benzoate	5.52	1087	0.01	8.91	1564	tr
Linalool	5.71	1099	1.23	8.28	1515	1.28
trans-Pinocarveol	6.20	1130	0.01	9.40	1602	0.04
Borneol	6.65	1159	0.02	10.01*	1651	0.17
Terpinen-4-ol	6.83	1170	0.18	8.80*	1555	0.21
α-Terpineol	7.07	1186	0.15	10.01*	1651	[0.17]
Methylchavicol	7.18	1193	4.07	9.56*	1614	4.11
(*Z*)-Anethole	8.02*†	1248	3.38	10.59	1698	0.29
para-Anisaldehyde	8.02*†	1248	[3.38]	13.42	1945	3.13
(*E*)-Anethole	8.64	1289	78.33	11.48	1773	79.09
Methyl meta-anisate	9.73*	1366	0.10			
α-Copaene	9.73*	1366	[0.10]	7.40	1449	0.09
Unknown [121, 91 (60), 120 (39), 164 (37), 77 (34), 135 (26)]	9.85	1374	3.30	13.95	1994	3.28
para-Acetonylanisole	9.88	1376	0.26	14.82	2078	0.23
β-Elemene	9.99	1384	0.04	8.68*	1546	0.75
β-Caryophyllene	10.31*	1407	0.40	8.68*	1546	[0.75]
cis-α-Bergamotene	10.31*	1407	[0.40]	8.46	1529	0.09
Aromadendrene	10.59*	1427	0.42	8.80*	1555	[0.21]
(*Z*)-β-Farnesene?	10.59*	1427	[0.42]	9.48	1608	0.05
trans-α-Bergamotene	10.59*	1427	[0.42]	8.68*	1546	[0.75]

cis-β-Bergamotene?	10.73	1438	0.02			
α-Humulene	10.77	1441	0.08	9.56*	1614	[4.11]
Methyl (*Z*)-isoeugenol	11.21	1473	0.07			
Bicyclogermacrene	11.34*	1484	0.07	10.34	1677	0.03
Viridiflorene	11.34*	1484	[0.07]	9.92	1643	0.05
α-Muurolene	11.44	1490	0.01	10.31	1675	0.02
β-Bisabolene	11.58	1501	0.08	10.43	1684	0.09
γ-Cadinene	11.60	1503	0.07	10.68*†	1706	0.10
trans-Calamenene	11.74*	1513	0.10	11.52	1776	0.02
δ-Cadinene	11.74*	1513	[0.10]	10.68*†	1706	[0.10]
α-Elemol	12.09	1542	0.05	14.37	2034	0.01
(*E*)-Nerolidol	12.31	1558	0.10	14.02	2000	0.11
1-(4-Methoxyphenyl)propane-1,2-diol isomer I	12.41	1566	0.33			
1-(4-Methoxyphenyl)propane-1,2-diol isomer II	12.50	1574	0.14			
(*Z*)-Foeniculin	12.55	1577	0.08	14.41	2038	0.04
Viridiflorol	12.58	1579	0.08	14.28	2026	0.02
γ-Eudesmol	13.07	1619	0.07	15.24	2119	0.06
τ-Cadinol	13.22	1631	0.05	15.17	2111	0.02
β-Eudesmol	13.30	1638	0.02	15.68	2163	0.02
α-Cadinol	13.38	1644	0.07	15.73	2168	0.06
(*E*)-Foeniculin	13.71	1671	1.20	16.00	2195	1.13
Unknown [m/z 137, 109 (15), 43 (10), 164 (9), 138 (9)...]	14.09	1703	0.08			
Total identified		**94.35%**			**94.51%**	
Total reported		**97.73%**			**97.78%**	

*: Two or more compounds are coeluting on this column
[xx]: Duplicate percentage due to coelutions, not taken account in the identified total
†: Peaks apexes were resolved, but peaks overlapped and were summed for analysis
tr: The compound has been detected below 0.005% of total signal.

Note: no correction factor was applied
R.T.: Retention time (minutes)
R.I.: Retention index

3225-A, Boul. St-François, Jonquière (Qc) G7T 1A1 | www.phytochemia.com