

Date : May 08, 2020

CERTIFICATE OF ANALYSIS – GC PROFILING

SAMPLE IDENTIFICATION

Internal code : 20D24-PTH02

Customer identification : Clove Bud - Indonesia - CG0107203R

Type : Essential oil

Source : *Syzygium aromaticum*

Customer : Plant Therapy

ANALYSIS

Method: PC-MAT-007 - Analysis of the composition of an essential oil or other volatile liquide by FAST GC-FID (in French); identifications validated by GC-MS.

Analyst : Sylvain Mercier, M. Sc., Chimiste

Analysis date : May 04, 2020

Checked and approved by :

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

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PHYSICOCHEMICAL DATA

Physical aspect: Faintly yellow liquid

Refractive index: 1.5360 ± 0.0003 (20 °C; method PC-MAT-016)

ISO 3142:1997 - OIL OF CLOVE BUD

Compound	Min. %	Max. %	Observed %	Complies?
Eugenyl acetate	8	15	8	Yes
β-Caryophyllene	2	7	6	Yes
Eugenol	75	87	81	Yes
Refractive index	1.5280	1.5380	1.5360	Yes

CONCLUSION

No adulterant, contaminant or diluent has been detected using this method. The oil complies with the ISO standard for clove bud oil.

ANALYSIS SUMMARY – CONSOLIDATED CONTENTS

New readers of similar reports are encouraged to read table footnotes at least once.

Identification	%	Class
Furfural	0.01	Furan
Limonene	tr	Monoterpene
Linalool	0.01	Monoterpenic alcohol
(E)-4,8-Dimethylnona-1,3,7-triene	0.01	Terpene derivative
Methyl salicylate	0.08	Phenolic ester
Chavicol	0.11	Phenylpropanoid
α -Cubebene	0.04	Sesquiterpene
Eugenol	80.98	Phenylpropanoid
Dihydroeugenol	0.83	Phenylpropanoid
α -Copaene	0.22	Sesquiterpene
β -Bourbonene	tr	Sesquiterpene
β -Elemene	0.01	Sesquiterpene
Isocaryophyllene	0.03	Sesquiterpene
Methyleugenol	0.07	Phenylpropanoid
β -Caryophyllene	6.21	Sesquiterpene
Caryophylla-4(12),8(13)-diene	0.02	Sesquiterpene
α -Humulene	0.89	Sesquiterpene
allo-Aromadendrene	0.01	Sesquiterpene
<i>trans</i> -Cadina-1(6),4-diene	0.02	Sesquiterpene
γ -Muurolene	0.01	Sesquiterpene
β -Selinene	0.03	Sesquiterpene
α -Selinene	0.03	Sesquiterpene
α -Muurolene	0.01	Sesquiterpene
(3Z,6E)- α -Farnesene	0.02	Sesquiterpene
γ -Cadinene	0.02	Sesquiterpene
Cubebol	0.01	Sesquiterpenic alcohol
<i>trans</i> -Calamenene	0.06	Sesquiterpene
δ -Cadinene	0.11	Sesquiterpene
Eugenyl acetate	8.50	Phenylpropanoid ester
Unknown	0.05	Unknown
Unknown	0.05	Phenylpropanoid
Caryophyllenyl alcohol	0.02	Sesquiterpenic alcohol
(E)-Nerolidol	0.02	Sesquiterpenic alcohol
Caryophyllene oxide isomer	0.03	Sesquiterpenic ether
Unknown	0.03	Oxygenated sesquiterpene
Caryophyllene oxide	0.29	Sesquiterpenic ether
Unknown	0.01	Unknown
Humulene epoxide I	0.02	Sesquiterpenic ether
Widdrol	0.01	Sesquiterpenic alcohol
Humulene epoxide II	0.04	Sesquiterpenic ether
(E)-Isoeugenyl acetate	0.04	Phenylpropanoid ester
Caryophylladienol I	0.02	Sesquiterpenic alcohol
Caryophylladienol II	0.03	Sesquiterpenic alcohol
τ -Muurolol	0.01	Sesquiterpenic alcohol
α -Muurolol	0.01	Sesquiterpenic alcohol

14-Hydroxy-(<i>Z</i>)-caryophyllene	0.03	Sesquiterpenic alcohol
α -Cadinol	0.01	Sesquiterpenic alcohol
14-Hydroxy-9-epi-(<i>E</i>)-caryophyllene	0.01	Sesquiterpenic alcohol
(3 <i>Z</i>)-Caryophylla-3,8(13)-dien-5 β -ol	0.06	Sesquiterpenic alcohol
Trimethoxypropylbenzene analog	0.01	Phenylpropanoid
Unknown	0.02	Unknown
(<i>E</i>)-Coniferyl alcohol	0.06	Phenylpropanoid
(<i>E</i>)-Coniferaldehyde	0.05	Phenylpropanoid
(<i>E</i>)-4-(3-Hydroxy-1-propenyl)-2-methoxyphenyl acetate	0.01	Phenylpropanoid ester
Unknown	0.04	Lignan
Unknown	0.06	Lignan
Unknown	0.03	Unknown
Consolidated total	99.41%	

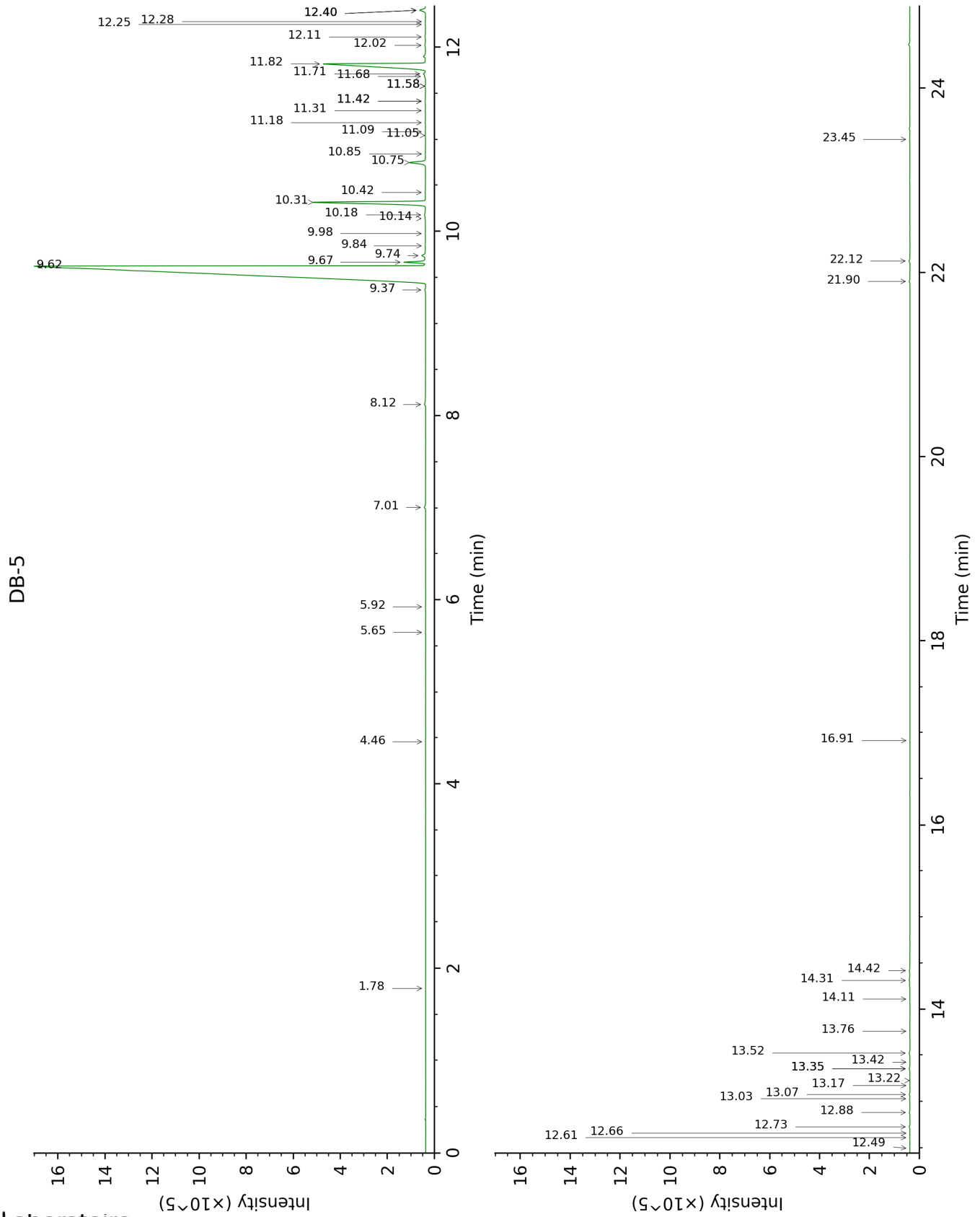
tr: The compound has been detected below 0.005% of total signal.

Note: no correction factor was applied

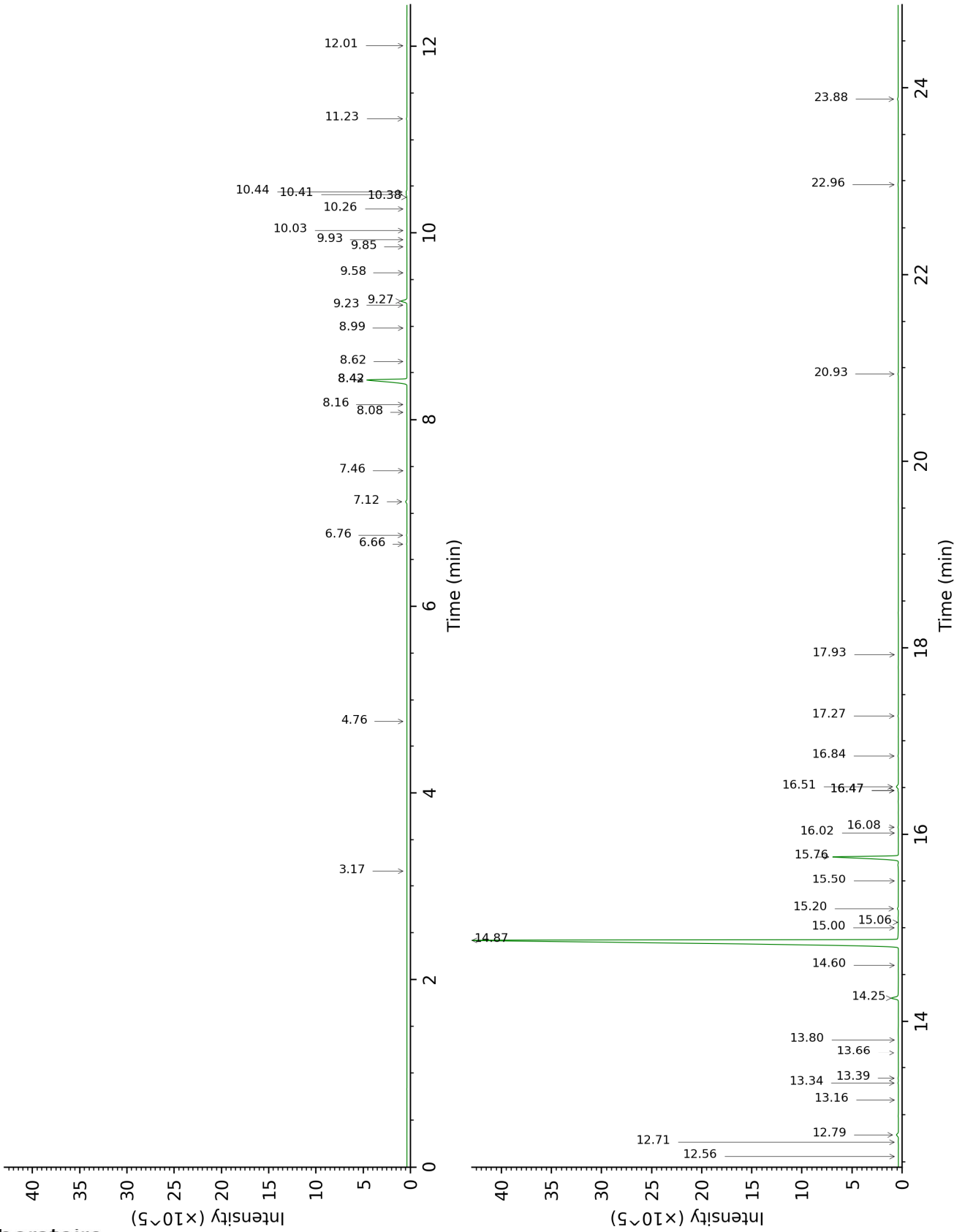
About "consolidated" data: The table above presents the breakdown of the sample volatile constituents after applying an algorithm to collapse data acquired from the multi-columns system of PhytoChemia into a single set of consolidated contents. In case of discrepancies between columns, the algorithm is set to prioritize data from the most standard DB-5 column, and smallest values so as to avoid overestimating individual content. This process is semi-automatic. Advanced users are invited to consult the "Full analysis data" table after the chromatograms in this report to access the full untreated data and perform their own calculations if needed.

Unknowns: Unknown compounds' mass spectral data is presented in the "Full analysis data" table. The occurrence of unknown compounds is to be expected in many samples, and does not denote particular problems unless noted otherwise in the conclusion.

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



DB-WAX



FULL ANALYSIS DATA

Identification	Column DB-5			Column DB-WAX		
	R.T	R.I	%	R.T	R.I	%
Furfural	1.78	835	0.01	6.66	1411	0.03
Limonene	4.46	1024	tr	3.17	1157	tr
Linalool	5.65	1100	0.01	8.08	1517	0.02
(E)-4,8-Dimethylnona-1,3,7-triene	5.92	1118	0.01	4.76	1277	0.01
Methyl salicylate	7.01	1188	0.08	10.44	1705	0.11
Chavicol	8.12	1264	0.11	16.51	2272	0.30
α -Cubebene	9.37	1346	0.04	6.76	1418	0.04
Eugenol	9.62	1364	80.98	14.86	2105	80.98
Dihydroeugenol	9.67	1367	0.83	14.25	2046	0.86
α -Copaene	9.74	1372	0.22	7.12	1445	0.17
β -Bourbonene	9.84	1380	tr	7.46	1470	0.01
β -Elemene	9.98	1389	0.01	8.42*	1544	6.20
Isocaryophyllene	10.14	1401	0.03	8.16	1524	0.01
Methyleugenol	10.18	1403	0.07	13.34	1960	0.04
β -Caryophyllene	10.31	1413	6.21	8.42*	1544	[6.20]
Caryophylla-4(12),8(13)-diene	10.42	1421	0.02	8.62	1559	0.02
α -Humulene	10.75	1446	0.89	9.27	1610	0.77
allo-Aromadendrene	10.85	1453	0.01	8.99	1587	0.01
trans-Cadina-1(6),4-diene	11.05	1468	0.02	9.23	1607	0.02
γ -Muurolene	11.08	1471	0.01	9.58	1635	0.01
β -Selinene	11.18	1478	0.03	9.85	1657	0.01
α -Selinene	11.31	1488	0.03	9.93	1663	0.01
α -Muurolene	11.42*	1496	0.03	10.03	1671	0.01
(3Z,6E)- α -Farnesene	11.42*	1496	[0.03]	10.26	1690	0.02
γ -Cadinene	11.58*	1508	0.03	10.38	1700	0.02
Cubebol	11.58*	1508	[0.03]	12.56	1888	0.01
trans-Calamenene	11.68	1516	0.06	11.23	1772	0.06
δ -Cadinene	11.71	1518	0.11	10.41	1703	0.10
Eugenyl acetate	11.82	1527	8.50	15.76	2195	8.40
Unknown [m/z 164, 135 (98), 93 (86), 107 (83), 79 (69)...]	12.02	1543	0.05	12.01	1839	0.03
Unknown [m/z 180, 93 (70), 55 (62), 77 (55), 164 (55), 103 (50)]	12.11	1550	0.05	20.93	2777	0.05
Caryophyllenyl alcohol	12.25	1560	0.02	13.66	1989	0.02
(E)-Nerolidol	12.28	1563	0.02	13.80	2003	0.02
Caryophyllene oxide isomer	12.40*	1572	0.34	12.71	1902	0.03
Unknown [m/z 161, 187 (32), 105 (30), 205 (24)... 222 (3)]	12.40*	1572	[0.34]	15.00	2118	0.03
Caryophyllene oxide	12.40*	1572	[0.34]	12.79	1909	0.29
Unknown [m/z 151, 178 (54), 123 (20), 55 (13), 161 (11), 77 (10)...]	12.49	1580	0.01			

Humulene epoxide I	12.61	1589	0.02	13.16	1943	0.02
Widdrol	12.66	1593	0.01	14.60	2079	0.02
Humulene epoxide II	12.73	1598	0.04	13.39	1964	0.04
(E)-Isoeugenyl acetate	12.88	1611	0.04	17.27	2352	0.04
Caryophylladienol I	13.03	1623	0.02	16.02	2221	0.01
Caryophylladienol II	13.07	1627	0.03	16.08	2228	0.04
τ-Muurolol	13.17	1635	0.01	15.06	2124	0.01
α-Muurolol	13.22	1639	0.01	15.20	2139	0.09
14-Hydroxy-(Z)-caryophyllene	13.35*	1650	0.05	16.47*	2268	0.04
α-Cadinol	13.35*	1650	[0.05]	15.50	2168	0.01
14-Hydroxy-9-epi-(E)-caryophyllene	13.42	1655	0.01	16.47*	2268	[0.04]
(3Z)-Caryophylla-3,8(13)-dien-5β-ol	13.52	1663	0.06	16.84	2307	0.05
Trimethoxypropylbenzene analog	13.76	1684	0.01	17.93	2425	0.01
Unknown [m/z 180, 125 (44), 55 (32), 93 (25), 43 (24), 149 (23)...]	14.11	1713	0.02			
(E)-Coniferyl alcohol	14.31	1730	0.06	22.96	3040	0.05
(E)-Coniferaldehyde	14.42	1740	0.05	23.88	3166	0.09
(E)-4-(3-Hydroxy-1-propenyl)-2-methoxyphenyl acetate	16.91	1966	0.01			
Unknown [m/z 326, 148 (67), 147 (41), 117 (30), 91 (22)...]	21.90	2500	0.04			
Unknown [m/z 326, 150 (54), 161 (42), 202 (41), 201 (28)]	22.12	2526	0.06			
Unknown [m/z 164, 165 (12), 55 (11), 81 (10), 69 (10), 95 (10)...]	23.45	2690	0.03			
Total identified		99.17%			99.14%	
Total reported		99.42%			99.24%	

*: Two or more compounds are coeluting on this column

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

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