

Date : April 07, 2020

CERTIFICATE OF ANALYSIS – GC PROFILING

SAMPLE IDENTIFICATION

Internal code : 20C27-PTH03

Customer identification : Clove Bud - Indonesia - CG010693R

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 : Fanny Charlier, B. Sc.

Analysis date : March 30, 2020

Checked and approved by :

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

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PHYSICOCHEMICAL DATA

Physical aspect: Light yellow liquid
Refractive index: 1.5346 ± 0.0003 (20 °C)

ISO 3142:1997 - OIL OF CLOVE BUD

Compound	Min. %	Max. %	Observed %	Complies?
Eugenyl acetate	8	15	10	Yes
β-Caryophyllene	2	7	6	Yes
Eugenol	75	87	81	Yes
Refractive index	1.5280	1.5380	1.5346	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	%	Classe
Acetone	tr	Aliphatic ketone
Isovaleral	tr	Aliphatic aldehyde
2-Methylbutyral	tr	Aliphatic aldehyde
Furfural	0.01	Furan
6-Methyl-5-hepten-2-one	0.01	Aliphatic ketone
Limonene	0.01	Monoterpene
(E)- β -Ocimene	tr	Monoterpene
Terpinolene	0.01	Monoterpene
Linalool	0.01	Monoterpenic alcohol
(E)-4,8-Dimethylnona-1,3,7-triene	0.01	Terpene derivative
Methyl salicylate	0.14	Phenolic ester
Chavicol	0.10	Phenylpropanoid
Eugenol	80.83	Phenylpropanoid
Dihydroeugenol	0.11	Phenylpropanoid
α -Copaene	0.11	Sesquiterpene
β -Elemene	0.01	Sesquiterpene
Isocaryophyllene	0.02	Sesquiterpene
Methyleugenol	0.04	Phenylpropanoid
β -Caryophyllene	5.82	Sesquiterpene
Caryophylla-4(12),8(13)-diene	0.03	Sesquiterpene
α -Humulene	0.73	Sesquiterpene
allo-Aromadendrene	0.02	Sesquiterpene
trans-Cadina-1(6),4-diene	0.04	Sesquiterpene
γ -Murolene	0.01	Sesquiterpene
β -Selinene	0.02	Sesquiterpene
α -Selinene	0.02	Sesquiterpene
α -Murolene	0.02	Sesquiterpene
γ -Cadinene	0.05	Sesquiterpene
trans-Calamenene	0.04	Sesquiterpene
δ -Cadinene	0.10	Sesquiterpene
Eugenyl acetate	9.63	Phenylpropanoid ester
α -Calacorene	0.05	Sesquiterpene
Unknown	0.05	Unknown
Unknown	0.01	Phenylpropanoid
Caryophyllenyl alcohol	0.03	Sesquiterpenic alcohol
(E)-Nerolidol	0.02	Sesquiterpenic alcohol
Caryophyllene oxide	0.18	Sesquiterpenic ether
Unknown	0.14	Oxygenated sesquiterpene
Humulene epoxide I	0.01	Sesquiterpenic ether
Humulol	0.02	Sesquiterpenic alcohol
Humulene epoxide II	0.03	Sesquiterpenic ether
(E)-Isoeugenyl acetate	0.03	Phenylpropanoid ester
1-epi-Cubenol	0.02	Sesquiterpenic alcohol
Caryophylladienol I	0.03	Sesquiterpenic alcohol
Caryophylladienol II	0.06	Sesquiterpenic alcohol
τ -Murolol	0.04	Sesquiterpenic alcohol
α -Murolol	0.02	Sesquiterpenic alcohol

Unknown	0.03	Sesquiterpenic alcohol
α -Cadinol	0.02	Sesquiterpenic alcohol
14-Hydroxy-(Z)-caryophyllene	0.09	Sesquiterpenic alcohol
14-Hydroxy-9-epi-(E)-caryophyllene	0.01	Sesquiterpenic alcohol
14-Hydroxy-(E)-caryophyllene	0.05	Sesquiterpenic alcohol
Germacre-4(15),5,10(14)-trien-1 α -ol	0.01	Sesquiterpenic alcohol
(E)-Coniferyl alcohol	0.01	Phenylpropanoid
(E)-Coniferaldehyde	0.01	Phenylpropanoid
Benzyl benzoate	0.01	Phenolic ester
Unknown	0.01	Oxygenated sesquiterpene
(E)-4-(3-Hydroxy-1-propenyl)-2-methoxyphenyl acetate	0.01	Phenylpropanoid ester
Unknown	0.02	Lignan
Unknown	0.01	Lignan
Squalene	0.01	Triterpene
Consolidated total	99.00%	

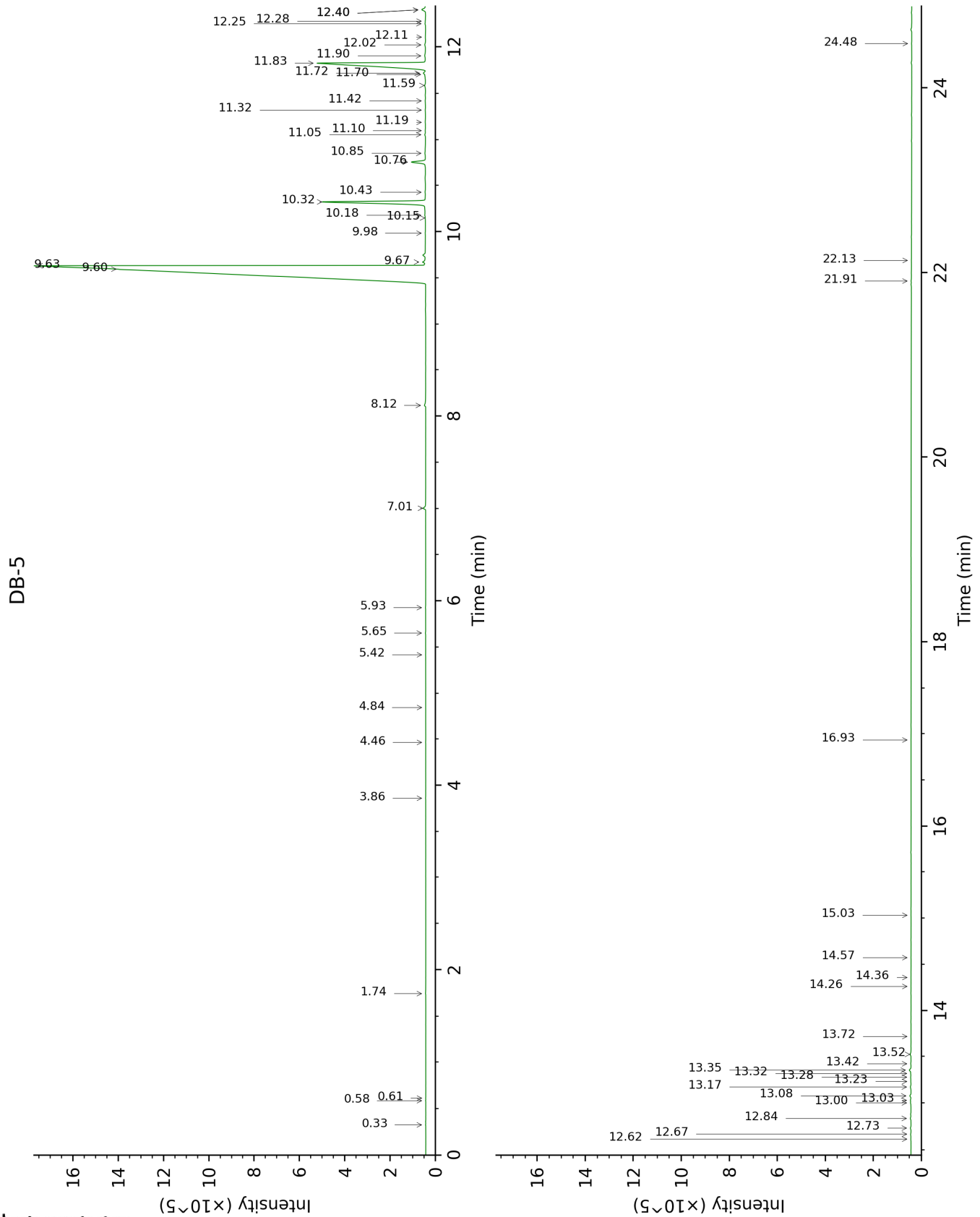
tr: The compound has been detected below 0.005% of total signal.

Note: no correction factor was applied

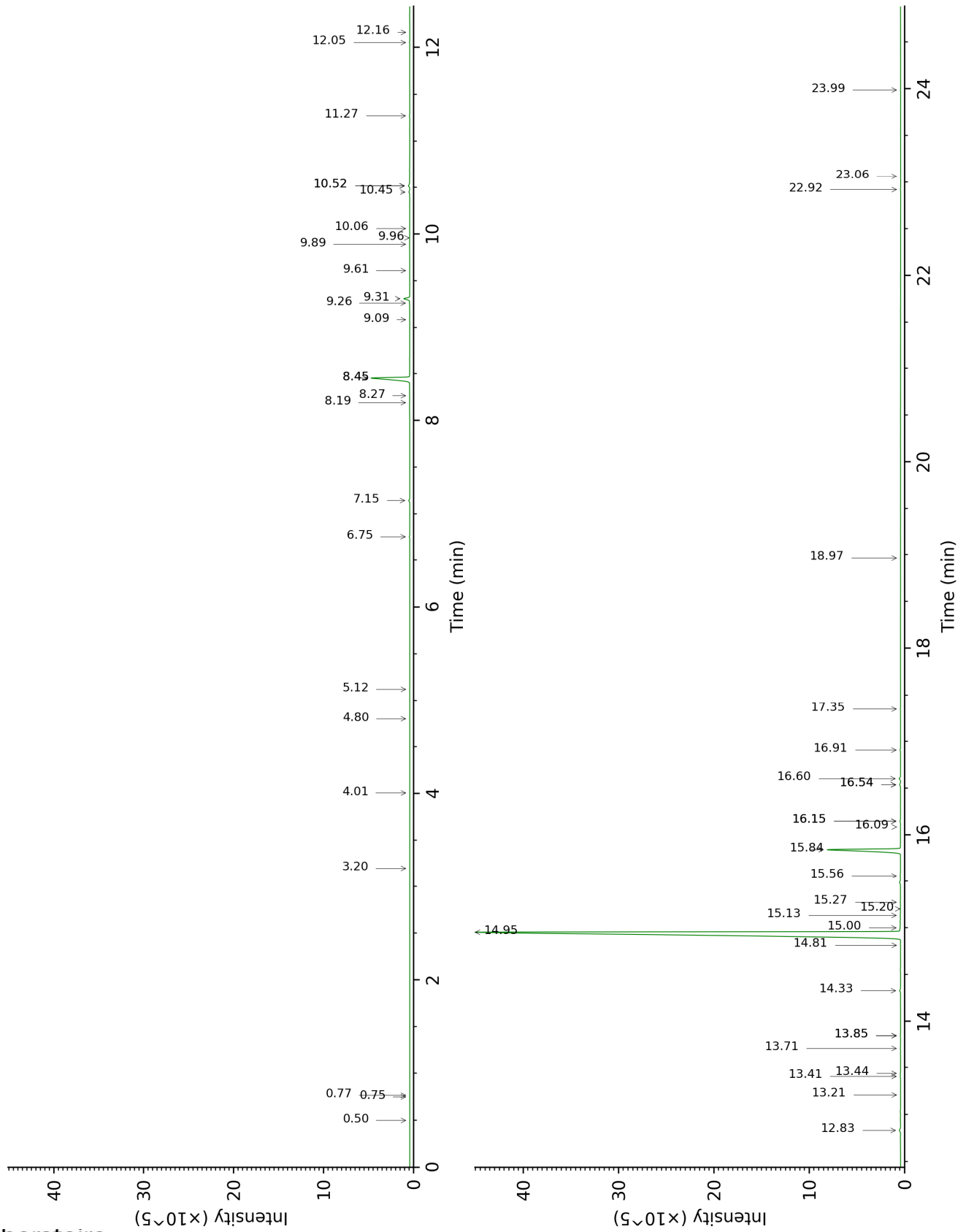
About "consolidated" data: The table above presents the breakdown of the sample volatile constituents after applying an algorithm to collapse data acquired from the multi-columns system of PhytoChemia into a single set of consolidated contents. In case of discrepancies between columns, the algorithm 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	%
Acetone	0.33	522	tr	0.50	786	tr
Isovaleral	0.58	639	tr	0.76	891	tr
2-Methylbutyral	0.61	651	tr	0.75	884	tr
Furfural	1.74	832	0.01	6.75	1414	0.04
6-Methyl-5-hepten-2-one	3.86	986	0.01	5.12	1297	0.01
Limonene	4.46	1025	0.01	3.20	1157	0.01
(E)- β -Ocimene	4.84	1049	tr	4.01	1217	0.01
Terpinolene	5.42	1085	0.01			
Linalool	5.65	1100	0.01	8.19	1522	0.02
(E)-4,8-Dimethylnona-1,3,7-triene	5.93	1118	0.01	4.80	1274	0.01
Methyl salicylate	7.01	1189	0.14	10.52*	1707	0.18
Chavicol	8.12	1265	0.10	16.60	2276	0.15
Eugenol	9.60†	1363	81.43	14.95	2108	80.83
Dihydroeugenol	9.63†	1366	[81.43]	14.33	2048	0.11
α -Copaene	9.67†	1369	[81.43]	7.15	1444	0.11
β -Elemene	9.98	1391	0.01	8.45*	1542	5.60
Isocaryophyllene	10.15	1402	0.02	8.27	1528	0.02
Methyleugenol	10.18	1404	0.04	13.41	1961	0.04
β -Caryophyllene	10.32	1415	5.82	8.45*	1542	[5.60]
Caryophylla-4(12),8(13)-diene	10.42	1423	0.03			
α -Humulene	10.76	1448	0.73	9.31	1609	0.68
allo-Aromadendrene	10.85	1455	0.02	9.08	1591	0.02
<i>trans</i> -Cadina-1(6),4-diene	11.05	1470	0.04	9.26	1605	0.04
γ -Muurolene	11.10	1473	0.01	9.61	1633	0.01
β -Selinene	11.19	1480	0.02	9.89	1656	0.03
α -Selinene	11.32	1489	0.02	9.96	1661	0.02
α -Muurolene	11.42	1497	0.02	10.06	1669	0.01
γ -Cadinene	11.59	1509	0.05	10.45	1701	0.10
<i>trans</i> -Calamenene	11.70	1519	0.04	11.27	1770	0.04
δ -Cadinene	11.72	1520	0.10	10.52*	1707	[0.18]
Eugenyl acetate	11.83	1528	9.63	15.84	2197	9.61
α -Calacorene	11.90	1534	0.05	12.16	1848	0.01
Unknown [m/z 164, 135 (98), 93 (86), 107 (83), 79 (69)...]	12.02	1544	0.05	12.05	1838	0.02
Unknown [m/z 180, 93 (70), 55 (62), 77 (55), 164 (55), 103 (50)]	12.11	1550	0.01			
Caryophyllenyl alcohol	12.25	1562	0.03	13.71	1989	0.04

(E)-Nerolidol	12.28	1564	0.02	13.85*	2002	0.03
Caryophyllene oxide	12.40*	1574	0.23	12.83	1908	0.18
Unknown [m/z 161, 187 (32), 105 (30), 205 (24)... 222 (3)]	12.40*	1574	[0.23]	15.00	2113	0.14
Humulene epoxide I	12.62	1590	0.01	13.21	1942	0.01
Humulol	12.67	1594	0.02	14.81	2094	0.02
Humulene epoxide II	12.73	1600	0.03	13.44	1964	0.03
(E)-Isoeugenyl acetate	12.84	1608	0.03	17.35	2355	0.02
1-epi-Cubenol	13.00	1622	0.02	13.85*	2002	[0.03]
Caryophylladienol I	13.03	1624	0.03	16.15*	2229	0.06
Caryophylladienol II	13.08	1628	0.06	16.15*	2229	[0.06]
τ-Muurolol	13.17	1636	0.04	15.13	2126	0.05
α-Muurolol	13.23	1641	0.02	15.20	2133	0.02
Unknown cadinol analog II [m/z 95, 121 (73), 43 (57), 79 (43), 161 (43), 109)40)... 204 (35), 222 (2)]	13.28	1644	0.03	15.27	2140	0.05
α-Cadinol	13.32	1648	0.02	15.56	2169	0.04
14-Hydroxy-(Z)-caryophyllene	13.35	1651	0.09	16.54*	2269	0.10
14-Hydroxy-9-epi-(E)-caryophyllene	13.42	1656	0.01	16.54*	2269	[0.10]
14-Hydroxy-(E)-caryophyllene	13.52	1665	0.05	16.91	2308	0.05
Germacra-4(15),5,10(14)-trien-1α-ol	13.72	1681	0.01	16.09	2222	0.01
(E)-Coniferyl alcohol	14.26	1727	0.01	23.06	3051	0.01
(E)-Coniferaldehyde	14.36	1735	0.01	23.99	3179	0.02
Benzyl benzoate	14.57	1754	0.01	18.97	2537	0.01
Unknown [m/z 109, 123 (96), 127 (95), 55 (87), 81 (85), 41 (69)...220 (5)]	15.03	1794	0.01			
(E)-4-(3-Hydroxy-1-propenyl)-2-methoxyphenyl acetate	16.93	1969	0.01			
Unknown [m/z	21.91	2504	0.02			

326, 148 (67), 147 (41), 117 (30), 91 (22)...						
Unknown [m/z 326, 150 (54), 161 (42), 202 (41), 201 (28)]	22.13	2530	0.01			
Squalene	24.48	2830	0.01	22.92	3031	0.02
Total identified		99.17%			98.42%	
Total reported		99.30%			98.62%	

*: Two or more compounds are coeluting on this column

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