**Date :** May 27, 2022

# *Certificate of Analysis – GC Profiling*

## *Sample identification*

**Internal code :** 22E12-PTH01
**Customer identification :** Ginger Root CO2 ORGANIC - G40109208R
**Type :** CO2 extract
**Source :** *Zingiber officinale*
**Customer :** Plant Therapy

## *Analysis*

**Method:** Dilution of a known amount with an appropriate solvent, and addition of a methyl octanoate internal standard for quantitation. Application of a correction factor[1]. Analysis with PC-MAT-004 - Terpenes and volatiles profiling by response factor (in French); identifications validated by GC-MS.
**Analyst :** Pamela Lavoie, M.Sc., Chimiste
**Analysis date :** May 26, 2022

Checked and approved by :

Alexis St-Gelais, Ph. D., Chimiste 2013-174

*Notes: This report may not be published, including online, without the written consent from Laboratoire PhytoChemia.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. The results only describe the samples that were submitted to the assays.*

## *Reference*

(1) Cachet, T.; Brevard, H.; Chaintreau, A.; Demyttenaere, J.; French, L.; Gassenmeier, K.; Joulain, D.; Koenig, T.; Leijs, H.; Liddle, P.; et al. IOFI Recommended Practice for the Use of Predicted Relative-Response Factors for the Rapid Quantification of Volatile Flavouring *Compounds by GC-FID. Flavour Fragr. J. 2016, 31 (3), 191–194.*



Laboratoire PhytoChemia
628 Boulevard du Saguenay Ouest, Saguenay (Qc) G7J 1H4 | www.phytochemia.com

## *PHYSICOCHEMICAL DATA*

**Physical aspect:** Brown viscous liquid
**Refractive index:** 1.5074 ± 0.0003 (20 °C; method PC-MAT-016)

## *CONCLUSION*

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

628 Boulevard du Saguenay, Saguenay (Qc) G7J 1H4 | www.phytochemia.com

## *ANALYSIS SUMMARY*

| Identification | (mg/g) | % m/m | Classe |
|---|---|---|---|
| Hexanal | 35.75 | 3.58 | Aliphatic aldehyde |
| 2-Heptanone | 0.69 | 0.07 | Aliphatic ketone |
| 2-Heptanol | 0.07 | 0.01 | Aliphatic alcohol |
| α-Pinene | 2.55 | 0.26 | Monoterpene |
| α-Fenchene | 0.09 | 0.01 | Monoterpene |
| Camphene | 7.63 | 0.76 | Monoterpene |
| β-Pinene | 0.42 | 0.04 | Monoterpene |
| Sabinene | 0.13 | 0.01 | Monoterpene |
| 6-Methyl-5-hepten-2-one | 0.66 | 0.07 | Aliphatic ketone |
| Myrcene | 1.56 | 0.16 | Monoterpene |
| Pseudolimonene | 0.08 | 0.01 | Monoterpene |
| α-Phellandrene | 0.51 | 0.05 | Monoterpene |
| Octanal | 8.14 | 0.81 | Aliphatic aldehyde |
| Δ3-Carene | 0.14 | 0.01 | Monoterpene |
| para-Cymene | 0.15 | 0.02 | Monoterpene |
| 1,8-Cineole | 6.25 | 0.63 | Monoterpenic ether |
| β-Phellandrene | 9.01 | 0.90 | Monoterpene |
| Limonene | 2.32 | 0.23 | Monoterpene |
| γ-Terpinene | 0.13 | 0.01 | Monoterpene |
| Terpinolene | 0.51 | 0.05 | Monoterpene |
| Unknown | 1.04 | 0.10 | Oxygenated monoterpene |
| Rosefuran | 0.69 | 0.07 | Monoterpenic ether |
| Linalool | 1.44 | 0.14 | Monoterpenic alcohol |
| 2-Nonanol | 0.35 | 0.04 | Aliphatic alcohol |
| (*E*)-4,8-Dimethylnona-1,3,7-triene | 0.18 | 0.02 | Terpene derivative |
| Unknown | 0.18 | 0.02 | Unknown |
| Camphor | 0.46 | 0.05 | Monoterpenic ketone |
| Camphene hydrate | 0.35 | 0.04 | Monoterpenic alcohol |
| exo-Isocitral | 0.35 | 0.04 | Monoterpenic aldehyde |
| Citronellal | 0.15 | 0.02 | Monoterpenic aldehyde |
| Borneol | 4.69 | 0.47 | Monoterpenic alcohol |
| Isoneral | 0.41 | 0.04 | Monoterpenic aldehyde |
| Rosefuran oxide | 0.56 | 0.06 | Monoterpenic ether |
| Terpinen-4-ol | [0.46] | [0.05] | Monoterpenic alcohol |
| para-Cymen-8-ol | 0.48 | 0.05 | Monoterpenic alcohol |
| Myrtenal | 0.03 | 0.00 | Monoterpenic aldehyde |
| α-Terpineol | 2.41 | 0.24 | Monoterpenic alcohol |
| Myrtenol | 0.60 | 0.06 | Monoterpenic alcohol |
| Decanal | 13.91 | 1.39 | Aliphatic aldehyde |
| 2,3-Epoxyneral? | 0.26 | 0.03 | Monoterpenic aldehyde |
| Citronellol | 1.75 | 0.18 | Monoterpenic alcohol |
| Neral | 8.99 | 0.90 | Monoterpenic aldehyde |
| Unknown | 0.61 | 0.06 | Oxygenated monoterpene |
| Geraniol | 1.55 | 0.16 | Monoterpenic alcohol |
| Geranial | 14.55 | 1.46 | Monoterpenic aldehyde |
| Bornyl acetate | 0.48 | 0.05 | Monoterpenic ester |
| 2-Undecanone | 1.51 | 0.15 | Aliphatic ketone |
| 2-Undecanol | 0.30 | 0.03 | Aliphatic alcohol |



628 Boulevard du Saguenay, Saguenay (Qc) G7J 1H4 | www.phytochemia.com

| | | | |
|---|---|---|---|
| δ-Elemene | 0.33 | 0.03 | Sesquiterpene |
| Citronellyl acetate | 0.32 | 0.03 | Monoterpenic ester |
| Cyclosativene I | 0.67 | 0.07 | Sesquiterpene |
| Cyclosativene II | 0.28 | 0.03 | Sesquiterpene |
| α-Copaene | 1.73 | 0.17 | Sesquiterpene |
| Geranyl acetate | 0.98 | 0.10 | Monoterpenic ester |
| β-Cubebene | 0.40 | 0.04 | Sesquiterpene |
| β-Elemene | 2.49 | 0.25 | Sesquiterpene |
| Sesquithujene | 0.92 | 0.09 | Sesquiterpene |
| Dodecanal | 0.64 | 0.06 | Aliphatic aldehyde |
| β-Caryophyllene | 0.50 | 0.05 | Sesquiterpene |
| β-Copaene | 0.26 | 0.03 | Sesquiterpene |
| γ-Elemene | 0.78 | 0.08 | Sesquiterpene |
| *trans*-α-Bergamotene | 0.19 | 0.02 | Sesquiterpene |
| Nerylacetone? | 0.21 | 0.02 | Terpenic ketone |
| Sesquisabinene A | 0.21 | 0.02 | Sesquiterpene |
| Unknown | 0.84 | 0.08 | Sesquiterpene |
| α-Humulene | 0.25 | 0.03 | Sesquiterpene |
| allo-Aromadendrene | 1.40 | 0.14 | Sesquiterpene |
| Sesquisabinene B | 1.14 | 0.11 | Sesquiterpene |
| (*E*)-β-Farnesene | 1.53 | 0.15 | Sesquiterpene |
| Selina-4,11-diene | 0.59 | 0.06 | Sesquiterpene |
| γ-Muurolene | 0.61 | 0.06 | Sesquiterpene |
| Germacrene D | 5.73 | 0.57 | Sesquiterpene |
| ar-Curcumene | 17.46 | 1.75 | Sesquiterpene |
| β-Selinene | 0.35 | 0.04 | Sesquiterpene |
| Unknown | 5.38 | 0.54 | Sesquiterpene |
| epi-Cubebol | 0.37 | 0.04 | Sesquiterpenic alcohol |
| 2-Tridecanone | 0.04 | 0.00 | Aliphatic ketone |
| Bicyclosesquiphellandrene? | 10.87 | 1.09 | Sesquiterpene |
| α-Zingiberene | 109.02 | 10.90 | Sesquiterpene |
| γ-Cadinene | 1.54 | 0.15 | Sesquiterpene |
| Cubebol | 0.72 | 0.07 | Sesquiterpenic alcohol |
| β-Bisabolene | 22.04 | 2.20 | Sesquiterpene |
| 7-epi-α-Selinene | 0.55 | 0.06 | Sesquiterpene |
| (3*E*,6*E*)-α-Farnesene | 25.08 | 2.51 | Sesquiterpene |
| δ-Cadinene | 0.30 | 0.03 | Sesquiterpene |
| *trans*-Calamenene | 0.12 | 0.01 | Sesquiterpene |
| β-Sesquiphellandrene | 44.89 | 4.49 | Sesquiterpene |
| (*E*)-γ-Bisabolene | 1.86 | 0.19 | Sesquiterpene |
| Unknown | 0.22 | 0.02 | Oxygenated sesquiterpene |
| α-Elemol | 1.73 | 0.17 | Sesquiterpenic alcohol |
| Germacrene B | 1.68 | 0.17 | Sesquiterpene |
| *cis*-Sesquisabinene hydrate | 0.98 | 0.10 | Sesquiterpenic alcohol |
| (*E*)-Nerolidol | 2.06 | 0.21 | Sesquiterpenic alcohol |
| 1'-Hydroxyeugenol | 0.22 | 0.02 | Phenylpropanoid |
| ar-Turmerol | 0.24 | 0.02 | Sesquiterpenic alcohol |
| *trans*-Sesquisabinene hydrate | 2.19 | 0.22 | Sesquiterpenic alcohol |
| Unknown | 0.31 | 0.03 | Oxygenated sesquiterpene |
| *cis*-Zingiberenol | 3.47 | 0.35 | Sesquiterpenic alcohol |
| Unknown | 1.70 | 0.17 | Oxygenated sesquiterpene |
| γ-Eudesmol | 0.51 | 0.05 | Sesquiterpenic alcohol |



628 Boulevard du Saguenay, Saguenay (Qc) G7J 1H4 | www.phytochemia.com

| | | | |
|---|---|---|---|
| *trans*-Zingiberenol | 1.59 | 0.16 | Sesquiterpenic alcohol |
| Zingerone | 92.80 | 9.28 | Phenylbutanoid |
| β-Eudesmol | 1.90 | 0.19 | Sesquiterpenic alcohol |
| α-Eudesmol | 1.23 | 0.12 | Sesquiterpenic alcohol |
| (3*E*,5*E*)-7-Hydroxyfarnesene | 0.87 | 0.09 | Sesquiterpenic alcohol |
| Zingerone methyl ether | 0.94 | 0.09 | Simple phenolic |
| α-Bisabolol | 0.49 | 0.05 | Sesquiterpenic alcohol |
| Unknown | 3.53 | 0.35 | Oxygenated sesquiterpene |
| Unknown | 2.82 | 0.28 | Oxygenated sesquiterpene |
| Unknown | 1.63 | 0.16 | Oxygenated sesquiterpene |
| Oplopanone | 0.24 | 0.02 | Sesquiterpenic alcohol |
| Xanthorizzhol? | 1.45 | 0.15 | Sesquiterpenic alcohol |
| Unknown | 0.81 | 0.08 | Oxygenated sesquiterpene |
| Unknown | 0.81 | 0.08 | Oxygenated sesquiterpene |
| Unknown | 0.96 | 0.10 | Oxygenated sesquiterpene |
| Unknown | 4.16 | 0.42 | Oxygenated sesquiterpene |
| Cryptomeridiol | 0.35 | 0.04 | Sesquiterpenic alcohol |
| Unknown | 1.32 | 0.13 | Oxygenated sesquiterpene |
| Unknown | 0.93 | 0.09 | Oxygenated sesquiterpene |
| Unknown | 0.53 | 0.05 | Oxygenated sesquiterpene |
| Unknown | 0.50 | 0.05 | Unknown |
| Unknown | 0.19 | 0.02 | Oxygenated sesquiterpene |
| Geranyl-para-cymene | 1.21 | 0.12 | Diterpene |
| Palmitic acid | 2.60 | 0.26 | Aliphatic acid |
| [4]-Shogaol | 0.54 | 0.05 | Gingerol derivative |
| Unknown | 0.33 | 0.03 | Gingerol derivative |
| Unknown | 0.73 | 0.07 | Gingerol derivative |
| Unknown | 0.40 | 0.04 | Oxygenated diterpene |
| Linoleic acid | 1.08 | 0.11 | Aliphatic acid |
| Oleic acid | 3.26 | 0.33 | Aliphatic acid |
| *cis*-Vaccenic acid? | 1.07 | 0.11 | Aliphatic acid |
| [4]-Gingerol | 1.16 | 0.12 | Gingerol derivative |
| [4]-Isogingerol? | 2.38 | 0.24 | Gingerol derivative |
| [6]-Isoshogaol? | 4.66 | 0.47 | Gingerol derivative |
| [6]-Paradol | 2.20 | 0.22 | Gingerol derivative |
| Methyl [6]-isoshogaol? | 0.28 | 0.03 | Gingerol derivative |
| [6]-Dihydroparadol? | 0.39 | 0.04 | Gingerol derivative |
| [6]-Shogaol | 22.63 | 2.26 | Gingerol derivative |
| Methyl [6]-shogaol | 0.80 | 0.08 | Gingerol derivative |
| Acetoxy-[6]-dihydroparadol | 0.30 | 0.03 | Gingerol derivative |
| Diacetoxy-[4]-gingerdiol | 0.72 | 0.07 | Gingerol derivative |
| Geranyl laurate | 0.52 | 0.05 | Monoterpenic ester |
| [6]-Gingerol | 7.19 | 0.72 | Gingerol derivative |
| [6]-Isogingerol? | 0.17 | 0.02 | Gingerol derivative |
| [8]-Isoshogaol | 0.26 | 0.03 | Gingerol derivative |
| Unknown | [0.29] | [0.03] | Gingerol derivative |
| Methyl [6]-gingerol | 0.51 | 0.05 | Gingerol derivative |
| 1-(4'-Hydroxy-3'-methoxyphenyl)-7-dodecen-3-one? | 0.87 | 0.09 | Gingerol derivative |
| [8]-Paradol | 0.54 | 0.05 | Gingerol derivative |
| Acetoxy-[6]-gingerol | 0.23 | 0.02 | Gingerol derivative |
| Unknown | 0.37 | 0.04 | Gingerol derivative |



628 Boulevard du Saguenay, Saguenay (Qc) G7J 1H4 | www.phytochemia.com

| | | | |
|---|---|---|---|
| [6]-Gingerdiol isomer I | 3.27 | 0.33 | Gingerol derivative |
| [6]-Gingerdiol isomer II | 1.50 | 0.15 | Gingerol derivative |
| [8]-Shogaol | 4.80 | 0.48 | Gingerol derivative |
| 5-Acetoxy-[6]-gingerdiol | 0.73 | 0.07 | Gingerol derivative |
| Methyl 5-acetoxy-[6]-gingerdiol | 0.46 | 0.05 | Gingerol derivative |
| Diacetoxy-[6]-gingerdiol | 10.53 | 1.05 | Gingerol derivative |
| [8]-Gingerdione | 3.92 | 0.39 | Gingerol derivative |
| 1-Dehydro-[6]-gingerdione | 1.21 | 0.12 | Gingerol derivative |
| [10]-Isoshogaol | 0.75 | 0.08 | Gingerol derivative |
| [10]-Paradol | 1.78 | 0.18 | Gingerol derivative |
| Unknown | 0.41 | 0.04 | Gingerol derivative |
| Unknown | 0.41 | 0.04 | Gingerol derivative |
| [10]-Shogaol | 5.79 | 0.58 | Gingerol derivative |
| Unknown | 0.47 | 0.05 | Gingerol derivative |
| 1-Dehydro-[8]-gingerdione | 0.26 | 0.03 | Gingerol derivative |
| [12]-Isoshogaol? | 1.45 | 0.15 | Gingerol derivative |
| [12]-Shogaol | 0.30 | 0.03 | Gingerol derivative |
| [6]-Gingerdiol geranial acetal | 1.86 | 0.19 | Gingerol derivative |
| **Consolidated total** | **631.27 mg/g** | **63.13%** | |

*: Individual compounds concentration could not be found due to overlapping coelutions on columns considered
[xx]: Duplicate percentage due to coelutions, not taken into account in the consolidated total

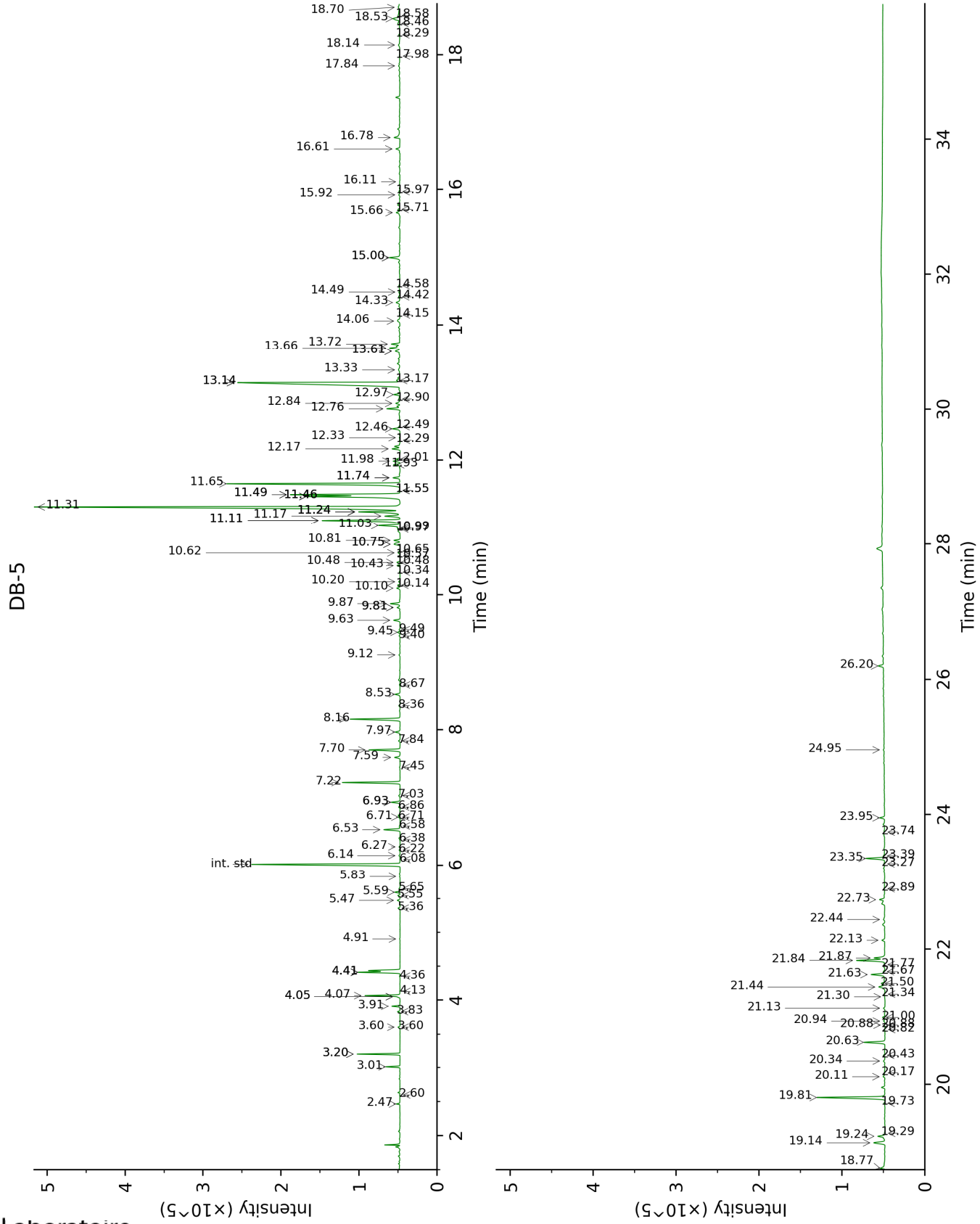
Individual compounds contents were corrected following the method of Cachet et al., 2016 (Flavour and Fragrance Journal guidelines).
Unknown compounds are expressed in equivalents of internal standard without correction.

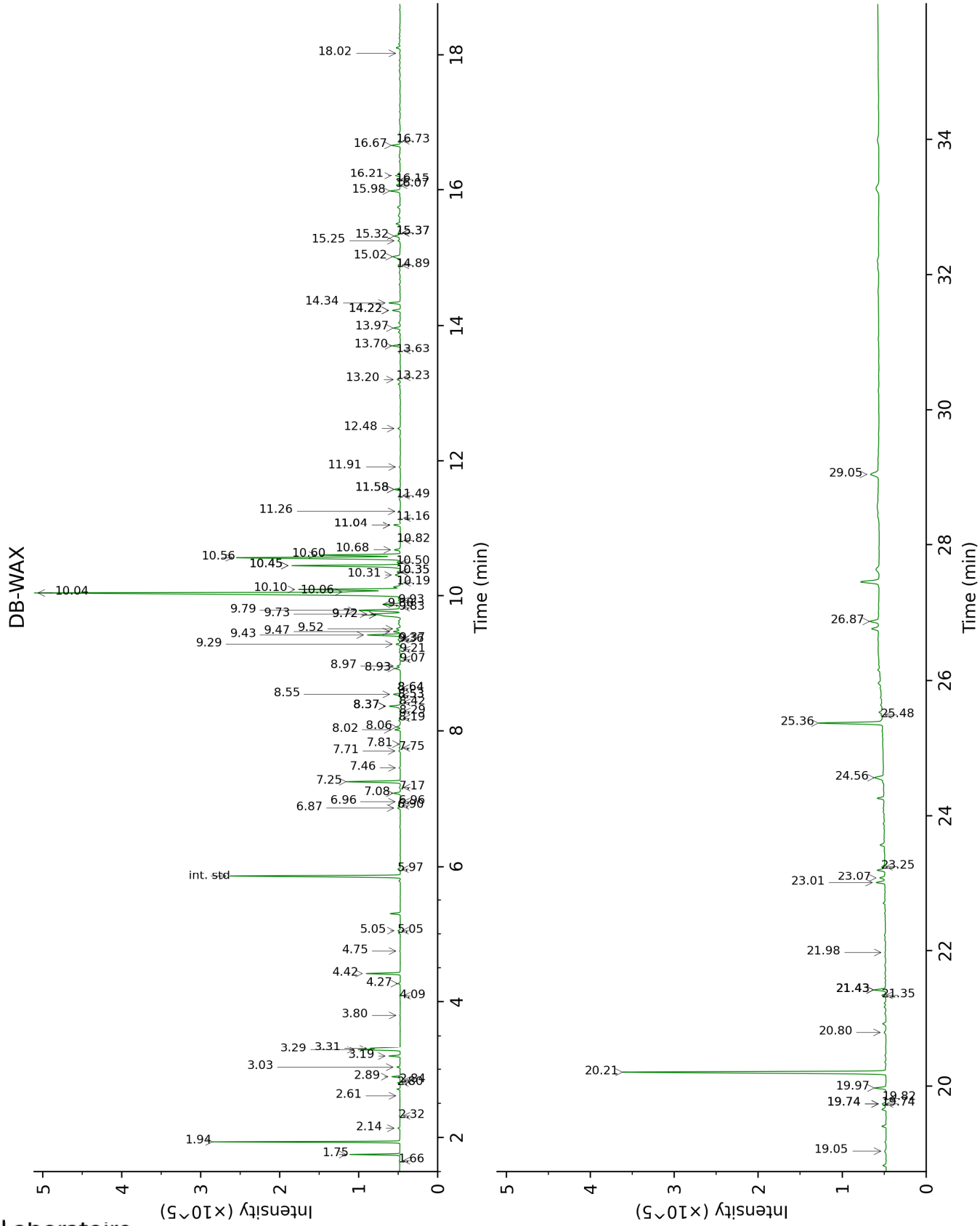
**About "consolidated" data:** The table above presents the breakdown of the sample volatile constituents after applying an algorithm to collapse data acquired from the multi-columns system of PhytoChemia into a single set of consolidated contents. In case of discrepancies between columns, the algorithm 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.



628 Boulevard du Saguenay, Saguenay (Qc) G7J 1H4 | www.phytochemia.com


DB-5
Intensity (×10^5)
Time (min)
int. std


DB-WAX
Intensity (×10^5)
Time (min)
int. std

*FULL ANALYSIS DATA*

| Identification | Column DB-5 | | | Column DB-WAX | | |
|---|---|---|---|---|---|---|
| | R.T | R.I | mg/g | R.T | R.I | mg/g |
| Hexanal | 1.47 | 808 | 35.75 | 1.94 | 1051 | 36.24 |
| 2-Heptanone | 2.47 | 894 | 0.69 | 3.03 | 1147 | 0.81 |
| 2-Heptanol | 2.60 | 905 | 0.07 | 5.05* | 1297 | 0.66 |
| α-Pinene | 3.01 | 932 | 2.55 | 1.44 | 1002 | 2.53 |
| α-Fenchene | 3.20* | 945 | 7.53 | 1.66 | 1024 | 0.09 |
| Camphene | 3.20* | 945 | [7.53] | 1.75 | 1033 | 7.63 |
| β-Pinene | 3.60* | 973 | 0.52 | 2.14 | 1072 | 0.42 |
| Sabinene | 3.60* | 973 | [0.52] | 2.32 | 1090 | 0.13 |
| 6-Methyl-5-hepten-2-one | 3.83 | 988 | 0.66 | 5.05* | 1297 | [0.67] |
| Myrcene | 3.91 | 994 | 1.56 | 2.89 | 1136 | 1.67 |
| Pseudolimonene | 4.05*† | 1003 | 7.39 | 2.84 | 1132 | 0.08 |
| α-Phellandrene | 4.05*† | 1003 | [7.39] | 2.80 | 1128 | 0.51 |
| Octanal | 4.07† | 1004 | [8.63] | 4.42 | 1251 | 8.14 |
| Δ3-Carene | 4.13 | 1008 | 0.14 | 2.61 | 1114 | 0.12 |
| para-Cymene | 4.36 | 1023 | 0.15 | 4.09 | 1227 | 0.17 |
| 1,8-Cineole | 4.41*† | 1026 | 18.75 | 3.31 | 1168 | 6.25 |
| β-Phellandrene | 4.41*† | 1026 | [16.50] | 3.29 | 1167 | 9.01 |
| Limonene | 4.41*† | 1026 | [16.50] | 3.19 | 1159 | 2.32 |
| γ-Terpinene | 4.90 | 1058 | 0.13 | 3.80 | 1206 | 0.12 |
| Terpinolene | 5.36 | 1087 | 0.51 | 4.27 | 1240 | 0.51 |
| Unknown [m/z 96, 109 (55), 79 (41), 67 (38), 41 (36)... 150 (3)] | 5.48 | 1094 | 1.04 | 8.64* | 1564 | 1.07 |
| Rosefuran | 5.55 | 1099 | 0.69 | 5.97 | 1363 | 0.72 |
| Linalool | 5.60 | 1102 | 1.44 | 8.06 | 1519 | 1.17 |
| 2-Nonanol | 5.65 | 1106 | 0.35 | 7.75 | 1495 | 0.32 |
| (*E*)-4,8-Dimethylnona-1,3,7-triene | 5.83 | 1117 | 0.18 | 4.75 | 1275 | 0.16 |
| Unknown [m/z 83, 43 (99), 97 (75), 59 (44)...] | 6.08 | 1134 | 0.18 | | | |
| Camphor | 6.14 | 1138 | 0.46 | 7.17 | 1452 | 0.33 |
| Camphene hydrate | 6.22 | 1143 | 0.35 | 8.42 | 1547 | 0.22 |
| exo-Isocitral | 6.27 | 1146 | 0.35 | 7.46 | 1473 | 0.32 |
| Citronellal | 6.38 | 1154 | 0.15 | 6.96* | 1436 | 0.42 |
| Borneol | 6.53 | 1163 | 4.69 | 9.72*† | 1650 | 13.73 |
| Isoneral | 6.58 | 1167 | 0.41 | 7.81 | 1500 | 0.19 |
| Rosefuran oxide | 6.71* | 1175 | 0.56 | 8.53*† | 1556 | 2.96 |
| Terpinen-4-ol | 6.71* | 1175 | [0.46] | 8.53*† | 1556 | [2.46] |
| para-Cymen-8-ol | 6.86 | 1185 | 0.48 | 11.49 | 1798 | 0.48 |
| Myrtenal | 6.93* | 1190 | 2.74 | 8.64* | 1564 | [0.97] |
| α-Terpineol | 6.93* | 1190 | [2.63] | 9.72*† | 1650 | [13.73] |
| Myrtenol | 7.03 | 1196 | 0.60 | 10.82 | 1741 | 0.16 |
| Decanal | 7.22 | 1209 | 13.91 | 7.25 | 1458 | 13.50 |
| 2,3-Epoxyneral? | 7.45 | 1224 | 0.26 | | | |
| Citronellol | 7.59 | 1234 | 1.75 | 10.68 | 1730 | 1.88 |
| Neral | 7.70 | 1242 | 8.99 | 9.42 | 1626 | 9.05 |



628 Boulevard du Saguenay, Saguenay (Qc) G7J 1H4 | www.phytochemia.com

| | | | | | | |
|---|---|---|---|---|---|---|
| Unknown [m/z 109, 119 (84), 91 (81), 134 (55)... 137 (27)...] | 7.84 | 1251 | 0.61 | 11.26 | 1778 | 0.57 |
| Geraniol | 7.97 | 1260 | 1.55 | 11.58* | 1806 | 1.77 |
| Geranial | 8.16 | 1273 | 14.55 | 10.06† | 1678 | [143.69] |
| Bornyl acetate | 8.36 | 1287 | 0.48 | 8.19 | 1529 | 0.41 |
| 2-Undecanone | 8.53 | 1300 | 1.51 | 8.55† | 1557 | [2.37] |
| 2-Undecanol | 8.67 | 1305 | 0.30 | 10.19 | 1689 | 0.28 |
| δ-Elemene | 9.12 | 1336 | 0.33 | 6.90 | 1432 | 0.64 |
| Citronellyl acetate | 9.40 | 1356 | 0.32 | 9.37† | 1622 | [1.29] |
| Cyclosativene I | 9.45 | 1360 | 0.67 | 6.87 | 1429 | 0.69 |
| Cyclosativene II | 9.49 | 1363 | 0.28 | 6.96* | 1436 | [0.36] |
| α-Copaene | 9.63 | 1373 | 1.73 | 7.08 | 1445 | 1.66 |
| Geranyl acetate | 9.82* | 1386 | 1.16 | 10.50 | 1714 | 0.98 |
| β-Cubebene | 9.82* | 1386 | [0.91] | 7.71 | 1492 | 0.40 |
| β-Elemene | 9.87 | 1390 | 2.49 | 8.37* | 1543 | 3.18 |
| Sesquithujene | 10.10 | 1407 | 0.92 | 8.02 | 1516 | 1.17 |
| Dodecanal | 10.14 | 1410 | 0.64 | 9.93 | 1668 | 0.59 |
| β-Caryophyllene | 10.20 | 1414 | 0.50 | 8.37* | 1543 | [3.18] |
| β-Copaene | 10.34 | 1424 | 0.26 | 8.29 | 1537 | 0.22 |
| γ-Elemene | 10.43 | 1432 | 0.78 | 8.97 | 1589 | 0.76 |
| *trans*-α-Bergamotene | 10.48* | 1435 | 0.88 | 8.37* | 1543 | [3.18] |
| Nerylacetone? | 10.48* | 1435 | [0.99] | 11.58* | 1806 | [1.71] |
| Sesquisabinene A | 10.58 | 1442 | 0.21 | 9.07 | 1597 | 0.17 |
| Unknown [m/z 139, 69 (43), 91 (42), 41 (36), 81 (36), 43 (36)... 204 (5)] | 10.62 | 1446 | 0.84 | 14.22* | 2048 | 2.74 |
| α-Humulene | 10.65 | 1448 | 0.25 | 9.21 | 1609 | 0.25 |
| allo-Aromadendrene | 10.75* | 1456 | 2.36 | 8.93 | 1586 | 1.40 |
| Sesquisabinene B | 10.75* | 1456 | [2.36] | 9.29 | 1615 | 1.14 |
| (*E*)-β-Farnesene | 10.81 | 1460 | 1.53 | 9.48 | 1630 | 1.68 |
| Selina-4,11-diene | 10.97 | 1472 | 0.59 | 9.36† | 1621 | 1.01 |
| γ-Muurolene | 10.99 | 1474 | 0.61 | 9.52 | 1634 | 1.17 |
| Germacrene D | 11.03 | 1476 | 5.73 | 9.73† | 1651 | [11.87] |
| ar-Curcumene | 11.11* | 1482 | 19.11 | 10.60 | 1723 | 17.46 |
| β-Selinene | 11.11* | 1482 | [20.30] | 9.83 | 1659 | 0.35 |
| Unknown [m/z 161, 91 (100), 105 (93), 79 (89), 93 (89), 107 (79)... 204 (34)] | 11.17 | 1487 | 5.38 | 9.88 | 1663 | 5.93 |
| epi-Cubebol | 11.24* | 1492 | 12.00 | 11.91 | 1836 | 0.37 |
| 2-Tridecanone | 11.24* | 1492 | [11.94] | 11.04* | 1760 | 1.86 |
| Bicyclosesquiphellandrene? | 11.24* | 1492 | [11.00] | 9.79 | 1656 | 10.87 |
| α-Zingiberene | 11.31 | 1498 | 109.02 | 10.04† | 1676 | 121.67 |
| γ-Cadinene | 11.46*† | 1509 | 50.92 | 10.31 | 1698 | 1.54 |
| Cubebol | 11.46*† | 1509 | [55.53] | 12.48 | 1885 | 0.72 |
| β-Bisabolene | 11.46*† | 1509 | [50.92] | 10.10 | 1680 | 22.04 |
| 7-epi-α-Selinene | 11.49*† | 1512 | [50.92] | 10.35* | 1702 | 0.85 |
| (3*E*,6*E*)-α-Farnesene | 11.49*† | 1512 | [50.92] | 10.45* | 1710 | 26.94 |
| δ-Cadinene | 11.55* | 1516 | 0.42 | 10.35* | 1702 | [0.85] |
| *trans*-Calamenene | 11.55* | 1516 | [0.40] | 11.16 | 1770 | 0.12 |
| β-Sesquiphellandrene | 11.65 | 1524 | 44.89 | 10.56 | 1720 | 44.45 |
| (*E*)-γ-Bisabolene | 11.74* | 1531 | 2.02 | 10.45* | 1710 | [26.94] |



628 Boulevard du Saguenay, Saguenay (Qc) G7J 1H4 | www.phytochemia.com

| | | | | | | |
|---|---|---|---|---|---|---|
| Unknown [m/z 177, 159 (67), 41 (43), 91 (43), 43 (41)... 220 (t)] | 11.74* | 1531 | [2.69] | 13.23 | 1955 | 0.22 |
| α-Elemol | 11.93 | 1546 | 1.73 | 13.97 | 2024 | 1.97 |
| Germacrene B | 11.98 | 1551 | 1.68 | 11.04* | 1760 | [1.72] |
| *cis*-Sesquisabinene hydrate | 12.01 | 1553 | 0.98 | 13.20 | 1952 | 0.88 |
| (*E*)-Nerolidol | 12.17 | 1565 | 2.06 | 13.70 | 1999 | 2.26 |
| 1'-Hydroxyeugenol | 12.29 | 1575 | 0.22 | 19.82 | 2648 | 0.35 |
| ar-Turmerol | 12.33 | 1578 | 0.24 | 15.37* | 2161 | 0.71 |
| *trans*-Sesquisabinene hydrate | 12.46 | 1588 | 2.19 | 14.22* | 2048 | [2.25] |
| Unknown [m/z 132, 118 (89), 145 (85), 119 (79), 117 (60)...] | 12.49 | 1591 | 0.31 | 13.63 | 1991 | 0.24 |
| *cis*-Zingiberenol | 12.76 | 1612 | 3.47 | 14.34 | 2059 | 3.18 |
| Unknown [m/z 119, 85 (92), 105 (37), 120 (36), 91 (28)... 218 (6)] | 12.84 | 1619 | 1.70 | 16.15 | 2241 | 1.36 |
| γ-Eudesmol | 12.90 | 1624 | 0.51 | 14.89 | 2113 | 0.69 |
| *trans*-Zingiberenol | 12.97 | 1630 | 1.59 | 15.02 | 2126 | 3.44 |
| Zingerone | 13.14* | 1644 | 94.95 | 20.21 | 2694 | 92.80 |
| β-Eudesmol | 13.14* | 1644 | [74.80] | 15.32 | 2156 | 1.90 |
| α-Eudesmol | 13.17 | 1647 | 1.23 | 15.25 | 2149 | 0.74 |
| (3*E*,5*E*)-7-Hydroxyfarnesene | 13.33 | 1660 | 0.87 | 16.22 | 2247 | 1.54 |
| Zingerone methyl ether | 13.61* | 1683 | 2.15 | 19.05 | 2557 | 0.94 |
| α-Bisabolol | 13.61* | 1683 | [1.75] | 15.37* | 2161 | [0.74] |
| Unknown [m/z 137, 119 (70), 84 (69), 41 (68), 69 (53), 55 (45), 109 (38)... 222 (2)] | 13.66 | 1688 | 3.53 | 15.98 | 2223 | 3.87 |
| Unknown [m/z 69, 41 (59), 118 (33), 43 (32), 55 (31)... 234? (t)] | 13.72 | 1693 | 2.82 | 16.67 | 2294 | 2.90 |
| Unknown [m/z 119, 91 (31), 105 (29), 41 (25), 133 (23), 158 (21)...] | 14.06 | 1722 | 1.63 | 16.73 | 2301 | 0.59 |
| Oplopanone | 14.15 | 1730 | 0.24 | 18.02 | 2441 | 0.30 |
| Xanthorizzhol? | 14.33 | 1746 | 1.45 | 19.74* | 2638 | 1.73 |
| Unknown [m/z 82, 43 (85), 91 (67), 93 (66), 41 (66), 69 (59), 106 (47)... 218 (5)...] | 14.42 | 1753 | 0.81 | | | |
| Unknown [m/z 43, 82 (100), 41 (86), 69 (76), 93 (72), 91 (72)... 218 (4)...] | 14.49 | 1759 | 0.81 | | | |
| Unknown [m/z 79, 41 (77), 135 (75), 69 (74), 43 (70)... 220 (9)] | 14.58 | 1768 | 0.96 | | | |
| Unknown [m/z 69, 43 (95), 41 (84), 109 (78), 95 (54), 93 (49)... 177 (36), 220 (2)...] | 15.00* | 1804 | 4.56 | 19.97 | 2666 | 4.16 |
| Cryptomeridiol | 15.00* | 1804 | [4.04] | 19.74* | 2638 | [1.97] |



628 Boulevard du Saguenay, Saguenay (Qc) G7J 1H4 | www.phytochemia.com

| | | | | | | |
|---|---|---|---|---|---|---|
| Unknown [m/z 109, 69 (58), 43 (56), 41 (42), 135 (37), 55 (27)... 220 (5)] | 15.66 | 1864 | 1.32 | 21.42* | 2844 | 4.64 |
| Unknown [m/z 137, 218 (84), 119 (72), 69 (64), 175 (61), 41 (60), 93 (58)] | 15.71 | 1869 | 0.93 | 20.80 | 2766 | 0.95 |
| Unknown [m/z 125, 41 (88), 109 (76), 69 (76), 151 (68), 55 (45), 95 (36)... 236 (21)] | 15.92 | 1888 | 0.53 | 21.42* | 2844 | [4.64] |
| Unknown [m/z 43, 109 (89), 69 (71), 41 (63), 94 (53), 79 (47), 93 (44)...] | 15.97 | 1893 | 0.50 | 21.35 | 2835 | 1.60 |
| Unknown [m/z 125, 41 (86), 151 (78), 109 (67), 69 (63)... 236 (22)] | 16.12 | 1906 | 0.19 | 21.98 | 2915 | 0.39 |
| Geranyl-para-cymene | 16.61 | 1954 | 1.21 | 16.07 | 2232 | 1.09 |
| Palmitic acid | 16.78 | 1970 | 2.60 | 21.42* | 2844 | [4.01] |
| [4]-Shogaol | 17.84 | 2074 | 0.54 | | | |
| Unknown [m/z 135, 150 (34), 77 (13), 163 (11)... 262 (2)] | 17.98 | 2088 | 0.33 | | | |
| Unknown [m/z 137, 203 (15), 138 (11), 105 (11), 41 (9)... 274 (7), 286? (1)] | 18.14 | 2105 | 0.73 | | | |
| Unknown [m/z 69, 41 (44), 121 (37), 107 (36), 81 (33)... 272 (2)] | 18.29 | 2120 | 0.40 | | | |
| Linoleic acid | 18.46 | 2138 | 1.08 | 23.25 | 3084 | 1.36 |
| Oleic acid | 18.53 | 2145 | 3.26 | 23.01 | 3051 | 2.96 |
| *cis*-Vaccenic acid? | 18.58 | 2150 | 1.07 | 23.07 | 3060 | 1.85 |
| [4]-Gingerol | 18.70 | 2163 | 1.16 | | | |
| [4]-Isogingerol? | 18.77 | 2170 | 2.38 | | | |
| [6]-Isoshogaol? | 19.14 | 2209 | 4.66 | 24.56 | 3266 | 4.77 |
| [6]-Paradol | 19.24 | 2220 | 2.20 | | | |
| Methyl [6]-isoshogaol? | 19.28 | 2224 | 0.28 | | | |
| [6]-Dihydroparadol? | 19.73 | 2272 | 0.39 | 25.48 | 3400 | 0.34 |
| [6]-Shogaol | 19.81 | 2281 | 22.63 | 25.36 | 3383 | 21.20 |
| Methyl [6]-shogaol | 20.11 | 2315 | 0.80 | | | |
| Acetoxy-[6]-dihydroparadol | 20.17 | 2321 | 0.30 | | | |
| Diacetoxy-[4]-gingerdiol | 20.34 | 2341 | 0.72 | | | |
| Geranyl laurate | 20.43 | 2350 | 0.52 | 19.74* | 2638 | [1.84] |
| [6]-Gingerol | 20.63 | 2373 | 7.19 | | | |
| [6]-Isogingerol? | 20.82 | 2394 | 0.17 | | | |
| [8]-Isoshogaol | 20.88* | 2402 | 0.26 | | | |
| Unknown [m/z 137, 138 (9), 316 (6), 122 (5)] | 20.88* | 2402 | [0.29] | | | |
| Methyl [6]-gingerol | 20.94 | 2408 | 0.51 | | | |
| 1-(4'-Hydroxy-3'-methoxyphenyl)-7-dodecen-3-one? | 21.00 | 2415 | 0.87 | | | |
| [8]-Paradol | 21.13 | 2430 | 0.54 | | | |
| Acetoxy-[6]-gingerol | 21.30 | 2450 | 0.23 | | | |



628 Boulevard du Saguenay, Saguenay (Qc) G7J 1H4 | www.phytochemia.com

| | | | | | | |
|---|---|---|---|---|---|---|
| Unknown [m/z 137, 316 (31), 109 (24), 179 (21), 150 (20)] | 21.34 | 2455 | 0.37 | | | |
| [6]-Gingerdiol isomer I | 21.44 | 2467 | 3.27 | | | |
| [6]-Gingerdiol isomer II | 21.50 | 2473 | 1.50 | | | |
| [8]-Shogaol | 21.63 | 2488 | 4.80 | 26.87 | 3593 | 4.01 |
| 5-Acetoxy-[6]-gingerdiol | 21.67 | 2494 | 0.73 | | | |
| Methyl 5-acetoxy-[6]-gingerdiol | 21.77 | 2506 | 0.46 | | | |
| Diacetoxy-[6]-gingerdiol | 21.84 | 2513 | 10.53 | | | |
| [8]-Gingerdione | 21.87 | 2518 | 3.92 | | | |
| 1-Dehydro-[6]-gingerdione | 22.13 | 2549 | 1.21 | | | |
| [10]-Isoshogaol | 22.44 | 2586 | 0.75 | | | |
| [10]-Paradol | 22.73 | 2623 | 1.78 | | | |
| Unknown [m/z 137, 109 (24), 207 (24), 43 (24)... 344 (14)] | 22.90 | 2643 | 0.41 | | | |
| Unknown [m/z 137, 55 (23), 41 (21), 69 (18), 150 (17), 135 (14)... 330 (12)] | 23.27 | 2690 | 0.41 | | | |
| [10]-Shogaol | 23.35 | 2700 | 5.79 | 29.05 | 3804 | 5.47 |
| Unknown [m/z 137, 205 (13), 332 (9), 122 (7)] | 23.39 | 2705 | 0.47 | | | |
| 1-Dehydro-[8]-gingerdione | 23.74 | 2751 | 0.26 | | | |
| [12]-Isoshogaol? | 23.95 | 2778 | 1.45 | | | |
| [12]-Shogaol | 24.95 | 2912 | 0.30 | | | |
| [6]-Gingerdiol geranial acetal | 26.20 | 3086 | 1.86 | | | |

*: 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

Individual compounds contents were corrected following the method of Cachet et al., 2016 (Flavour and Fragrance Journal guidelines).
Unknown compounds are expressed in equivalents of internal standard without correction.
R.T.: Retention time (minutes)
R.I.: Retention index



628 Boulevard du Saguenay, Saguenay (Qc) G7J 1H4 | www.phytochemia.com