

Date : 2024-03-18

CERTIFICATE OF ANALYSIS - GC PROFILING

SAMPLE IDENTIFICATION

**Internal code** : 24C04-PTH10

**Customer Identification** : Organic Ginger Root Co2 - Nigeria - GL0102R

**Type** : CO2 Extract

**Source** : *Zingiber officinale*

**Customer** : Plant Therapy

Checked and approved by:

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

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## *GAS CHROMATOGRAPHIC ANALYSIS*

**Method :** PC-MAT-004 - Terpenes and volatiles profiling by response factor

**Results :** See analysis summary (next page)

**Analyst :** Sylvain Mercier, M. Sc., Chimiste 2014-005

**Date :** 2024-03-12

## *PHYSICOCHEMICAL DATA*

## *CONCLUSION*

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

## ANALYSIS SUMMARY

| Identification                             | mg/g   | % m/m | Class                  |
|--|--------|-------|------------------------|
| Hexanal                                    | 36.28  | 3.63  | Aliphatic aldehyde     |
| Biomarker                                  | 0.13   | 0.01  | Aliphatic aldehyde     |
| 2-Heptanol                                 | 0.11   | 0.01  | Aliphatic alcohol      |
| $\alpha$ -Pinene                           | 2.79   | 0.28  | Monoterpene            |
| Camphene                                   | 8.52   | 0.85  | Monoterpene            |
| $\alpha$ -Fenchene                         | 0.09   | 0.01  | Monoterpene            |
| Sabinene                                   | 0.09   | 0.01  | Monoterpene            |
| $\beta$ -Pinene                            | 0.48   | 0.05  | Monoterpene            |
| 6-Methyl-5-hepten-2-one                    | 0.67   | 0.07  | Aliphatic ketone       |
| Myrcene                                    | 1.66   | 0.17  | Monoterpene            |
| $\alpha$ -Phellandrene                     | 0.54   | 0.05  | Monoterpene            |
| $\Delta^3$ -Carene                         | 0.10   | 0.01  | Monoterpene            |
| Biomarker                                  | 8.98   | 0.9   | Aliphatic aldehyde     |
| <i>para</i> -Cymene                        | 0.21   | 0.02  | Monoterpene            |
| $\beta$ -Phellandrene                      | 9.40   | 0.94  | Monoterpene            |
| Limonene                                   | 2.40   | 0.24  | Monoterpene            |
| 1,8-Cineole                                | 7.05   | 0.7   | Monoterpenic ether     |
| ( <i>E</i> )- $\beta$ -Ocimene             | 0.02   | 0.0   | Monoterpene            |
| $\gamma$ -Terpinene                        | 0.10   | 0.01  | Monoterpene            |
| <i>cis</i> -Sabinene hydrate               | 0.03   | 0.0   | Monoterpenic alcohol   |
| Terpinolene                                | 0.50   | 0.05  | Monoterpene            |
| Unknown                                    | 1.09   | 0.11  | Oxygenated monoterpene |
| Rosefuran                                  | 0.87   | 0.09  | Monoterpenic ether     |
| Linalool                                   | 1.69   | 0.17  | Monoterpenic alcohol   |
| 2-Nonanol                                  | 0.22   | 0.02  | Aliphatic alcohol      |
| ( <i>E</i> )-4,8-Dimethyl-1,3,7-nonatriene | 0.17   | 0.02  | Monoterpene            |
| Bornyl methyl ether                        | 0.14   | 0.01  | Monoterpenic ether     |
| <i>trans</i> -Pinene hydrate               | 0.14   | 0.01  | Monoterpenic alcohol   |
| Camphor                                    | 0.63   | 0.06  | Monoterpenic ketone    |
| Camphene hydrate                           | 0.37   | 0.04  | Monoterpenic alcohol   |
| <i>exo</i> -Isocitral                      | 0.32   | 0.03  | Monoterpenic aldehyde  |
| Citronellal                                | 0.29   | 0.03  | Monoterpenic aldehyde  |
| Borneol                                    | 5.11   | 0.51  | Monoterpenic alcohol   |
| Unknown                                    | 0.11   | 0.01  | Oxygenated monoterpene |
| Isoneral                                   | 0.32   | 0.03  | Monoterpenic aldehyde  |
| Rosefuran oxide                            | [1.71] | 0.17  | Monoterpenic ether     |
| Terpinen-4-ol                              | [1.42] | 0.14  | Monoterpenic alcohol   |
| Isogeranial                                | 0.10   | 0.01  | Monoterpenic aldehyde  |
| <i>para</i> -Cymen-8-ol                    | 0.41   | 0.04  | Monoterpenic alcohol   |
| $\alpha$ -Terpineol                        | 2.82   | 0.28  | Monoterpenic alcohol   |
| Myrtenal                                   | 0.07   | 0.01  | Monoterpenic aldehyde  |

|  |        |       |                        |
|--|--------|-------|------------------------|
| Myrtenol                                       | 0.43   | 0.04  | Monoterpenic alcohol   |
| Decanal  | 13.51  | 1.35  | Aliphatic aldehyde     |
| 2,3-Epoxyneral?                                | 0.27   | 0.03  | Monoterpenic aldehyde  |
| Citronellol                                    | 1.77   | 0.18  | Monoterpenic alcohol   |
| Neral  | 7.52   | 0.75  | Monoterpenic aldehyde  |
| Unknown  | 0.61   | 0.06  | Oxygenated monoterpene |
| Geraniol                                       | 1.57   | 0.16  | Monoterpenic alcohol   |
| Geranial                                       | 11.96  | 1.2   | Monoterpenic aldehyde  |
| Bornyl acetate                                 | 0.70   | 0.07  | Monoterpenic ester     |
| 2-Undecanone                                   | 1.51   | 0.15  | Aliphatic ketone       |
| 2-Undecanol                                    | 0.37   | 0.04  | Aliphatic alcohol      |
| $\delta$ -Elemene                              | 0.44   | 0.04  | Sesquiterpene          |
| $\alpha$ -Cubebene                             | 0.13   | 0.01  | Sesquiterpene          |
| Citronellyl acetate                            | 1.27   | 0.13  | Monoterpenic ester     |
| Cyclosativene II                               | 0.34   | 0.03  | Sesquiterpene          |
| $\alpha$ -Copaene                              | 2.04   | 0.2   | Sesquiterpene          |
| $\beta$ -Cubebene                              | 0.12   | 0.01  | Sesquiterpene          |
| Geranyl acetate                                | 1.06   | 0.11  | Monoterpenic ester     |
| $\beta$ -Elemene                               | 2.96   | 0.3   | Sesquiterpene          |
| Vanillin                                       | 0.27   | 0.03  | Simple phenolic        |
| $\gamma$ -4-Dimethylbenzenebutyral             | 0.28   | 0.03  | Simple phenolic        |
| Sesquithujene                                  | 1.01   | 0.1   | Sesquiterpene          |
| $\beta$ -Caryophyllene                         | 0.90   | 0.09  | Sesquiterpene          |
| $\beta$ -Copaene                               | 0.23   | 0.02  | Sesquiterpene          |
| $\gamma$ -Elemene                              | 0.73   | 0.07  | Sesquiterpene          |
| <i>trans</i> - $\alpha$ -Bergamotene           | 0.48   | 0.05  | Sesquiterpene          |
| Sesquisabinene A                               | 0.26   | 0.03  | Sesquiterpene          |
| $\alpha$ -Humulene                             | 0.28   | 0.03  | Sesquiterpene          |
| allo-Aromadendrene                             | 1.62   | 0.16  | Sesquiterpene          |
| Sesquisabinene B                               | 1.21   | 0.12  | Sesquiterpene          |
| ( <i>E</i> )- $\beta$ -Farnesene               | 1.75   | 0.17  | Sesquiterpene          |
| Selina-4,11-diene                              | 0.76   | 0.08  | Sesquiterpene          |
| $\gamma$ -Muurolene                            | 0.63   | 0.06  | Sesquiterpene          |
| Germacrene D                                   | 6.59   | 0.66  | Sesquiterpene          |
| $\beta$ -Selinene                              | 1.16   | 0.12  | Sesquiterpene          |
| ar-Curcumene                                   | 25.64  | 2.56  | Sesquiterpene          |
| Unknown  | 6.74   | 0.67  | Sesquiterpene          |
| Bicyclosesquiphellandrene?                     | 12.22  | 1.22  | Sesquiterpene          |
| epi-Cubebol                                    | 0.39   | 0.04  | Sesquiterpenic alcohol |
| 2-Tridecanone                                  | tr     | 0.0   | Aliphatic ketone       |
| $\alpha$ -Zingiberene                          | 123.40 | 12.34 | Sesquiterpene          |
| $\gamma$ -Cadinene                             | 1.82   | 0.18  | Sesquiterpene          |
| Cubebol  | 0.95   | 0.1   | Sesquiterpenic alcohol |
| $\beta$ -Bisabolene                            | 26.44  | 2.64  | Sesquiterpene          |
| (3 <i>E</i> ,6 <i>E</i> )- $\alpha$ -Farnesene | 29.07  | 2.91  | Sesquiterpene          |

|  |       |      |                          |
|--|-------|------|--------------------------|
| <i>trans</i> -Calamenene                     | 0.19  | 0.02 | Sesquiterpene            |
| $\delta$ -Cadinene                           | 1.01  | 0.1  | Sesquiterpene            |
| $\beta$ -Sesquiphellandrene                  | 52.15 | 5.21 | Sesquiterpene            |
| ( <i>E</i> )- $\gamma$ -Bisabolene           | 2.16  | 0.22 | Sesquiterpene            |
| Unknown                                      | 0.54  | 0.05 | Oxygenated sesquiterpene |
| $\alpha$ -Elemol                             | 1.94  | 0.19 | Sesquiterpenic alcohol   |
| Germacrene B                                 | 2.07  | 0.21 | Sesquiterpene            |
| <i>cis</i> -Sesquisabinene hydrate           | 1.05  | 0.11 | Sesquiterpenic alcohol   |
| $\beta$ -Calacorene                          | 0.03  | 0.0  | Sesquiterpene            |
| ( <i>E</i> )-Nerolidol                       | 2.65  | 0.27 | Sesquiterpenic alcohol   |
| 1'-Hydroxyeugenol                            | 1.92  | 0.19 | Phenylpropanoid          |
| ar-Turmerol                                  | 0.35  | 0.03 | Sesquiterpenic alcohol   |
| <i>trans</i> -Sesquisabinene hydrate         | 2.56  | 0.26 | Sesquiterpenic alcohol   |
| Unknown                                      | 0.46  | 0.05 | Oxygenated sesquiterpene |
| <i>cis</i> -Zingiberenol                     | 4.31  | 0.43 | Sesquiterpenic alcohol   |
| Unknown                                      | 0.24  | 0.02 | Oxygenated sesquiterpene |
| <i>trans</i> -Zingiberenol                   | 1.95  | 0.2  | Sesquiterpenic alcohol   |
| $\alpha$ -Eudesmol                           | 1.27  | 0.13 | Sesquiterpenic alcohol   |
| $\beta$ -Eudesmol                            | 4.48  | 0.45 | Sesquiterpenic alcohol   |
| Zingerone                                    | 95.96 | 9.6  | Phenylbutanoid           |
| (3 <i>E</i> ,5 <i>E</i> )-7-Hydroxyfarnesene | 0.97  | 0.1  | Sesquiterpenic alcohol   |
| Zingerone methyl ether                       | 0.37  | 0.04 | Simple phenolic          |
| $\alpha$ -Bisabolol                          | 1.45  | 0.14 | Sesquiterpenic alcohol   |
| Unknown                                      | 4.13  | 0.41 | Oxygenated sesquiterpene |
| Unknown                                      | 5.10  | 0.51 | Oxygenated sesquiterpene |
| Unknown                                      | 1.97  | 0.2  | Oxygenated sesquiterpene |
| Oplopanone                                   | 0.15  | 0.01 | Sesquiterpenic alcohol   |
| Xanthorizzhol?                               | 1.54  | 0.15 | Sesquiterpenic alcohol   |
| Unknown                                      | 0.33  | 0.03 | Oxygenated sesquiterpene |
| Unknown                                      | 0.64  | 0.06 | Oxygenated sesquiterpene |
| Unknown                                      | 0.73  | 0.07 | Oxygenated sesquiterpene |
| Unknown                                      | 5.33  | 0.53 | Oxygenated sesquiterpene |
| Unknown                                      | 1.78  | 0.18 | Oxygenated sesquiterpene |
| Unknown                                      | 0.64  | 0.06 | Oxygenated sesquiterpene |
| Geranyl- <i>para</i> -cymene                 | 1.56  | 0.16 | Diterpene                |
| Palmitic acid                                | 5.89  | 0.59 | Aliphatic acid           |
| ( <i>E,E</i> )-Geranylinalool                | 1.26  | 0.13 | Diterpenic alcohol       |
| [4]-Shogaol                                  | 0.76  | 0.08 | Gingerol derivative      |
| Unknown                                      | 0.31  | 0.03 | Gingerol derivative      |
| Unknown                                      | 0.98  | 0.1  | Gingerol derivative      |
| Unknown                                      | 0.43  | 0.04 | Oxygenated diterpene     |
| Linoleic acid                                | 1.40  | 0.14 | Aliphatic acid           |
| Oleic acid                                   | 3.06  | 0.31 | Aliphatic acid           |
| [4]-Gingerol                                 | 0.19  | 0.02 | Gingerol derivative      |
| [4]-Isogingerol?                             | 14.54 | 1.45 | Gingerol derivative      |

|  |               |              |                     |
|--|---------------|--------------|---------------------|
| [6]-Isoshogaol?                                  | 1.72          | 0.17         | Gingerol derivative |
| [6]-Paradol                                      | 3.11          | 0.31         | Gingerol derivative |
| Methyl [6]-isoshogaol?                           | 0.22          | 0.02         | Gingerol derivative |
| Methyl [6]-paradol?                              | 0.15          | 0.01         | Gingerol derivative |
| [6]-Dihydroparadol?                              | 0.39          | 0.04         | Gingerol derivative |
| [6]-Shogaol                                      | 30.94         | 3.09         | Gingerol derivative |
| Methyl [6]-shogaol                               | 1.97          | 0.2          | Gingerol derivative |
| Acetoxy-[6]-dihydroparadol                       | 0.43          | 0.04         | Gingerol derivative |
| Diacetoxy-[4]-gingerdiol                         | 0.56          | 0.06         | Gingerol derivative |
| Geranyl laurate                                  | 0.63          | 0.06         | Monoterpenic ester  |
| [6]-Gingerol                                     | 7.68          | 0.77         | Gingerol derivative |
| [6]-Isogingerol?                                 | 0.29          | 0.03         | Gingerol derivative |
| [8]-Isoshogaol                                   | 0.31          | 0.03         | Gingerol derivative |
| Methyl [6]-gingerol                              | 0.50          | 0.05         | Gingerol derivative |
| 1-(4'-Hydroxy-3'-methoxyphenyl)-7-dodecen-3-one? | 0.10          | 0.01         | Gingerol derivative |
| [8]-Paradol                                      | 0.46          | 0.05         | Gingerol derivative |
| Acetoxy-[6]-gingerol                             | 0.30          | 0.03         | Gingerol derivative |
| [6]-Gingerdiol isomer I                          | 1.25          | 0.12         | Gingerol derivative |
| [6]-Gingerdiol isomer II                         | 1.57          | 0.16         | Gingerol derivative |
| [8]-Shogaol                                      | 7.21          | 0.72         | Gingerol derivative |
| Methyl 5-acetoxy-[6]-gingerdiol                  | 10.66         | 1.07         | Gingerol derivative |
| Diacetoxy-[6]-gingerdiol                         | 0.38          | 0.04         | Gingerol derivative |
| [8]-Gingerdione                                  | 1.02          | 0.1          | Gingerol derivative |
| 1-Dehydro-[6]-gingerdione                        | 1.41          | 0.14         | Gingerol derivative |
| [8]-Gingerol                                     | 2.50          | 0.25         | Gingerol derivative |
| [10]-Isoshogaol                                  | 0.21          | 0.02         | Gingerol derivative |
| [10]-Paradol                                     | 1.08          | 0.11         | Gingerol derivative |
| [10]-Shogaol                                     | 8.65          | 0.86         | Gingerol derivative |
| [10]-Gingerdione                                 | 0.44          | 0.04         | Gingerol derivative |
| [12]-Isoshogaol?                                 | 1.63          | 0.16         | Gingerol derivative |
| [12]-Shogaol                                     | 0.41          | 0.04         | Gingerol derivative |
| [6]-Gingerdiol neral acetal?                     | 0.08          | 0.01         | Gingerol derivative |
| [6]-Gingerdiol geranial acetal                   | 1.89          | 0.19         | Gingerol derivative |
| <b>Consolidated total</b>                        | <b>712.79</b> | <b>71.28</b> |                     |

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

Note: Individual compounds contents were corrected following the method of Cachet et al., 2016 (Flavour and Fragrance Journal guidelines).

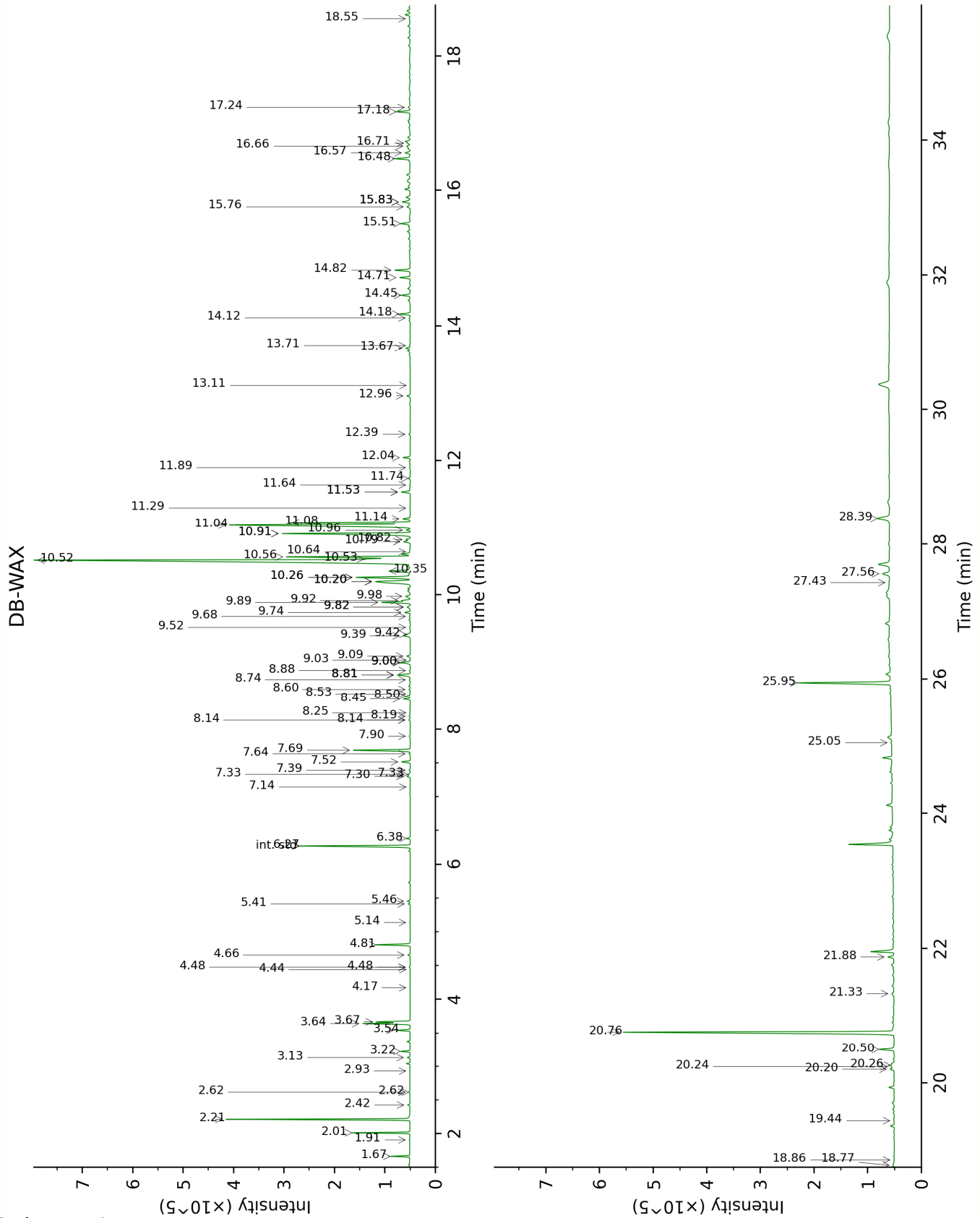
Unknown compounds are expressed in equivalents of internal standard without correction.

**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.

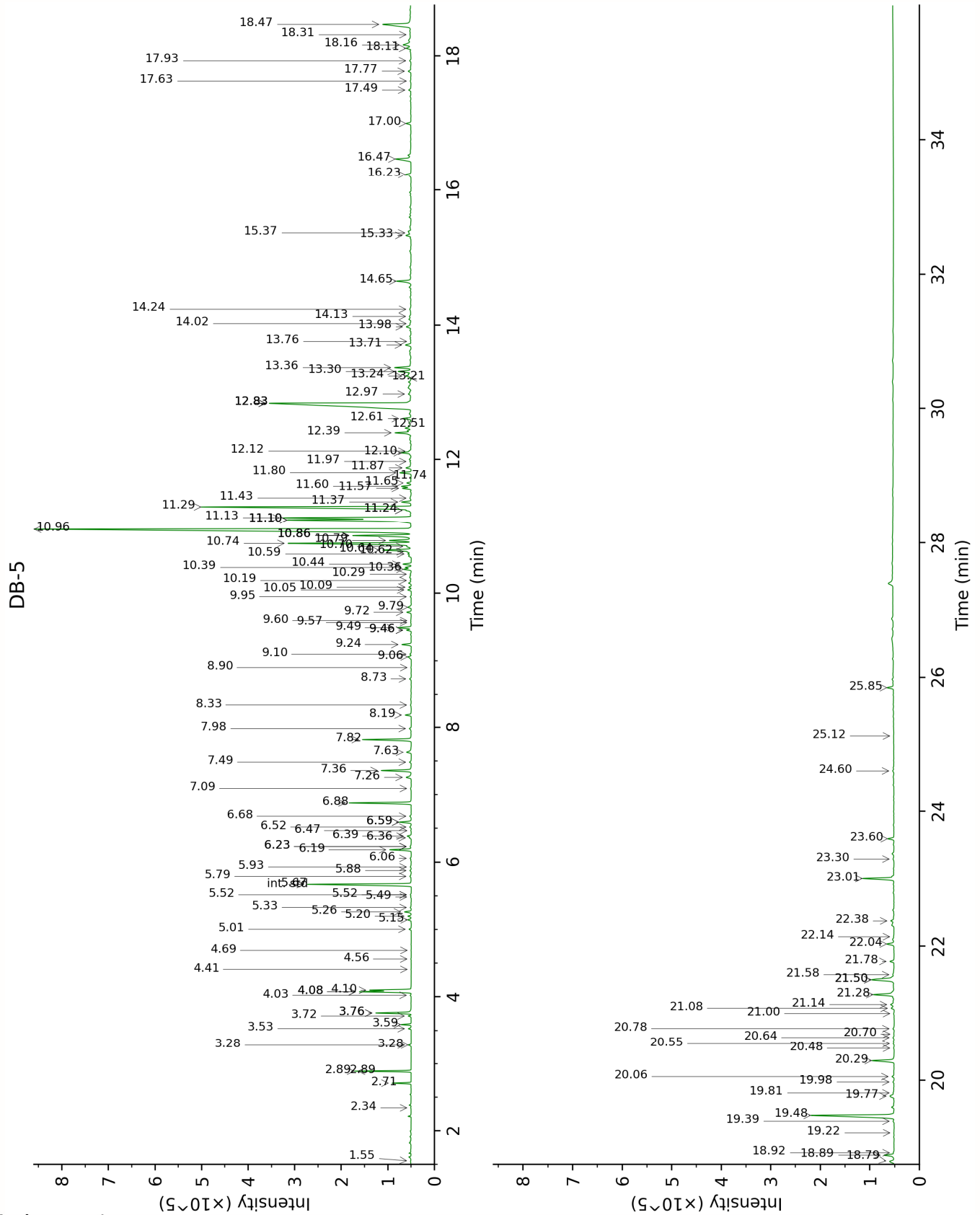
**Unknowns:** The occurrence of unknown compounds is to be expected in many samples, and does not denote particular problems unless noted otherwise in the conclusion.

**Bracketed value ( [xx] ): A bracketed percent value indicate that two or more compound percentage could not be solved due to coelution.**









FULL ANALYSIS DATA

| Hexanal  | Column DB-WAX |        |        | Column DB-5 |        |        |
|--|---------------|--------|--------|-------------|--------|--------|
|  | 2.21          | 1053.3 | 4.04   | 1.30        | 812.1  | 3.96   |
| Biomarker <i>Z. officinale</i> CO2, I                                    | 2.62*         | 1090.9 | [0.03] | 1.55        | 835.8  | 0.01   |
| 2-Heptanol   | 5.41          | 1299.2 | 0.05   | 2.34        | 908.3  | 0.01   |
| $\alpha$ -Pinene   | 1.66          | 1001.9 | 0.39   | 2.71        | 934.0  | 0.39   |
| Camphene   | 2.01          | 1034.6 | 1.18   | 2.89*       | 946.5  | [1.16] |
| $\alpha$ -Fenchene   | 1.91          | 1024.8 | 0.01   | 2.89*       | 946.5  | [1.16] |
| Sabinene   | 2.62*         | 1090.9 | [0.03] | 3.28*       | 973.9  | [0.08] |
| $\beta$ -Pinene  | 2.42          | 1073.0 | 0.07   | 3.28*       | 973.9  | [0.08] |
| 6-Methyl-5-hepten-2-one  | 5.46          | 1302.2 | 0.08   | 3.53        | 991.3  | 0.08   |
| Myrcene  | 3.22          | 1137.4 | 0.23   | 3.59        | 995.6  | 0.23   |
| $\alpha$ -Phellandrene   | 3.13          | 1130.5 | 0.07   | 3.72        | 1004.6 | 0.07   |
| $\Delta$ 3-Carene  | 2.93          | 1115.3 | 0.01   | 3.76*       | 1007.5 | [0.96] |
| Biomarker <i>Z. officinale</i> CO2, II                                   | 4.81          | 1253.6 | 0.95   | 3.76*       | 1007.5 | [0.96] |
| <i>para</i> -Cymene  | 4.48*         | 1230.0 | [0.02] | 4.03        | 1024.4 | 0.03   |
| $\beta$ -Phellandrene  | 3.64          | 1169.3 | 1.30   | 4.08*†      | 1027.8 | [1.40] |
| Limonene   | 3.54          | 1161.7 | 0.33   | 4.08*†      | 1027.8 | [1.40] |
| 1,8-Cineole  | 3.67          | 1171.2 | 0.86   | 4.10*†      | 1029.3 | [1.06] |
| ( <i>E</i> )- $\beta$ -Ocimene   | 4.44          | 1227.6 | tr     | 4.41        | 1049.2 | tr     |
| $\gamma$ -Terpinene  | 4.17          | 1208.5 | 0.01   | 4.56        | 1059.1 | 0.01   |
| <i>cis</i> -Sabinene hydrate   | 7.30          | 1433.3 | 0.11   | 4.69        | 1067.4 | tr     |
| Terpinolene  | 4.66          | 1242.9 | 0.07   | 5.01        | 1087.5 | 0.07   |
| Unknown ZIOF IX [m/z 96, 109 (55), 79 (41), 67 (38), 41 (36)... 150 (3)] | 9.09          | 1566.9 | 0.12   | 5.15        | 1096.5 | 0.11   |
| Rosefuran  | 6.38          | 1367.3 | 0.11   | 5.20        | 1100.0 | 0.10   |
| Linalool   | 8.45          | 1518.1 | 0.20   | 5.26        | 1104.1 | 0.21   |
| 2-Nonanol  | 8.14*         | 1494.1 | [0.07] | 5.33        | 1108.3 | 0.03   |
| ( <i>E</i> )-4,8-Dimethyl-1,3,7-nonatriene                               | 5.14          | 1277.1 | 0.02   | 5.48        | 1118.5 | 0.02   |
| Bornyl methyl ether  | 4.48*         | 1230.0 | [0.02] | 5.52*       | 1120.6 | [0.03] |
| <i>trans</i> -Pinene hydrate   | 8.25          | 1502.3 | 0.02   | 5.52*       | 1120.6 | [0.03] |
| Camphor  | 7.64          | 1457.5 | 0.04   | 5.79        | 1138.3 | 0.08   |
| Camphene hydrate   | 8.88          | 1550.6 | 0.03   | 5.88        | 1143.9 | 0.04   |
| <i>exo</i> -Isocitral  | 7.90          | 1476.6 | 0.04   | 5.93        | 1147.4 | 0.04   |
| Citronellal  | 7.39          | 1439.9 | 0.04   | 6.06        | 1155.7 | 0.04   |
| Borneol  | 10.20*        | 1653.7 | [1.91] | 6.19        | 1163.9 | 0.62   |
| Unknown AFGI I [m/z 109, 79 (18), 81 (15), 91 (12), 77 (10)... 152 (3)]  |               |        |        | 6.23*       | 1167.0 | [0.05] |
| Isoneral   | 8.19          | 1498.3 | 0.04   | 6.23*       | 1167.0 | [0.05] |
| Rosefuran oxide  | 9.00*         | 1559.6 | [0.34] | 6.36*†      | 1175.5 | [0.05] |

|  |         |        |        |        |        |        |
|--|---------|--------|--------|--------|--------|--------|
| Terpinen-4-ol  | 9.00*   | 1559.6 | [0.34] | 6.39*† | 1177.1 | [0.12] |
| Isogeranial  | 8.53    | 1524.1 | 0.02   | 6.47   | 1182.3 | 0.01   |
| <i>para</i> -Cymen-8-ol  | 11.90   | 1794.3 | 0.04   | 6.52   | 1185.8 | 0.05   |
| $\alpha$ -Terpineol  | 10.20*  | 1653.7 | [1.91] | 6.60*  | 1190.5 | [0.35] |
| Myrtenal   | 9.03    | 1562.3 | 0.01   | 6.60*  | 1190.5 | [0.35] |
| Myrtenol   | 11.30   | 1743.8 | 0.02   | 6.68   | 1196.2 | 0.05   |
| Decanal  | 7.69    | 1461.4 | 1.65   | 6.88   | 1209.2 | 1.68   |
| 2,3-Epoxyneral?  |         |        |        | 7.10   | 1223.6 | 0.03   |
| Citronellol  | 11.14   | 1730.5 | 0.24   | 7.26   | 1234.8 | 0.22   |
| Neral  | 9.89*†  | 1629.3 | [0.92] | 7.36   | 1241.6 | 0.89   |
| Unknown BODA V [m/z<br>109, 119 (84), 91 (81), 134<br>(55)... 137 (27)...] | 11.74   | 1780.6 | 0.06   | 7.48   | 1249.9 | 0.06   |
| Geraniol   | 12.04   | 1807.2 | 0.22   | 7.63   | 1259.9 | 0.19   |
| Geranial   | 10.53*† | 1680.3 | [0.88] | 7.82   | 1272.6 | 1.42   |
| Bornyl acetate   | 8.60    | 1529.1 | 0.05   | 7.98   | 1283.6 | 0.08   |
| 2-Undecanone   | 9.00*   | 1559.6 | [0.34] | 8.18   | 1297.2 | 0.19   |
| 2-Undecanol  | 10.64   | 1689.1 | 0.03   | 8.33   | 1307.3 | 0.05   |
| $\delta$ -Elemene  | 7.33*   | 1435.4 | [0.08] | 8.73   | 1335.6 | 0.06   |
| $\alpha$ -Cubebene   | 7.14    | 1421.8 | 0.02   | 8.90   | 1347.6 | 0.02   |
| Citronellyl acetate  | 9.82*   | 1623.6 | [0.13] | 9.06   | 1358.8 | 0.14   |
| Cyclosativene II   | 7.33*   | 1435.4 | [0.08] | 9.10   | 1361.7 | 0.05   |
| $\alpha$ -Copaene  | 7.52    | 1448.9 | 0.27   | 9.24   | 1371.8 | 0.29   |
| $\beta$ -Cubebene  | 8.14*   | 1494.1 | [0.07] | 9.46*  | 1387.0 | [0.13] |
| Geranyl acetate  | 10.96   | 1715.9 | 0.12   | 9.46*  | 1387.0 | [0.13] |
| $\beta$ -Elemene   | 8.81*   | 1545.6 | [0.50] | 9.49   | 1389.6 | 0.42   |
| Vanillin   | 18.77   | 2474.5 | 0.06   | 9.57   | 1394.9 | 0.02   |
| $\gamma$ -4-<br>Dimethylbenzenebutyral                                     |         |        |        | 9.60   | 1397.1 | 0.04   |
| Sesquithujene  | 8.50    | 1521.4 | 0.13   | 9.72   | 1405.9 | 0.14   |
| $\beta$ -Caryophyllene   | 8.81*   | 1545.6 | [0.50] | 9.80   | 1411.5 | 0.13   |
| $\beta$ -Copaene   | 8.74    | 1540.1 | 0.03   | 9.95   | 1423.2 | 0.03   |
| $\gamma$ -Elemene  | 9.42    | 1591.7 | 0.08   | 10.05  | 1430.8 | 0.10   |
| <i>trans</i> - $\alpha$ -Bergamotene                                       | 8.81*   | 1545.6 | [0.50] | 10.09  | 1433.9 | 0.07   |
| Sesquisabinene A   | 9.52    | 1599.7 | 0.03   | 10.19  | 1441.3 | 0.04   |
| $\alpha$ -Humulene   | 9.68    | 1612.6 | 0.04   | 10.29  | 1448.3 | 0.04   |
| allo-Aromadendrene   | 9.39    | 1589.8 | 0.26   | 10.36  | 1453.7 | 0.23   |
| Sesquisabinene B   | 9.74    | 1617.4 | 0.18   | 10.39  | 1455.8 | 0.17   |
| ( <i>E</i> )- $\beta$ -Farnesene   | 9.92*†  | 1631.3 | [0.22] | 10.44  | 1459.5 | 0.25   |
| Selina-4,11-diene  | 9.82*   | 1623.6 | [0.13] | 10.59  | 1470.8 | 0.11   |
| $\gamma$ -Murolene   | 9.98    | 1636.4 | 0.21   | 10.62  | 1473.3 | 0.09   |
| Germacrene D   | 10.20*  | 1653.7 | [1.91] | 10.64  | 1475.1 | 0.93   |
| $\beta$ -Selinene  | 10.26*  | 1658.7 | [1.89] | 10.70  | 1479.2 | 0.16   |
| ar-Curcumene   | 11.08   | 1725.6 | 3.76   | 10.74  | 1482.6 | 3.83   |
| Unknown ZIOF XVII [m/z]  | 10.35   | 1666.1 | 0.75   | 10.79  | 1485.7 | 0.71   |

|   |         |        |         |         |        |         |
|---|---------|--------|---------|---------|--------|---------|
| 161, 91 (100), 105 (93), 79 (89), 93 (89), 107 (79)... 204 (34)]                                  |         |        |         |         |        |         |
| Bicyclosquiphellandrene?  | 10.26*  | 1658.7 | [1.89]  | 10.86*  | 1491.3 | [1.89]  |
| epi-Cubebol   | 12.39   | 1837.5 | 0.05    | 10.86*  | 1491.3 | [1.89]  |
| 2-Tridecanone   | 11.53*  | 1763.6 | [0.29]  | 10.86*  | 1491.3 | [1.89]  |
| α-Zingiberene   | 10.52*† | 1679.1 | [17.97] | 10.96   | 1498.5 | 17.35   |
| γ-Cadinene  | 10.79   | 1701.4 | 0.26    | 11.10*† | 1509.3 | [4.28]  |
| Cubebol   | 12.96   | 1887.3 | 0.12    | 11.10*† | 1509.3 | [4.28]  |
| β-Bisabolene  | 10.56   | 1683.0 | 3.73    | 11.10*† | 1509.3 | [4.28]  |
| (3E,6E)-α-Farnesene   | 10.91*  | 1711.6 | [4.40]  | 11.13*† | 1512.0 | [4.20]  |
| trans-Calamenene  | 11.64   | 1772.4 | 0.03    | 11.24*  | 1520.8 | [0.15]  |
| δ-Cadinene  | 10.82   | 1704.2 | 0.14    | 11.24*  | 1520.8 | [0.15]  |
| β-Sesquiphellandrene  | 11.04   | 1722.3 | 7.46    | 11.29   | 1524.8 | 7.33    |
| (E)-γ-Bisabolene  | 10.91*  | 1711.6 | [4.40]  | 11.37   | 1530.6 | 0.30    |
| Unknown ZIOF XIX [m/z 177, 159 (67), 41 (43), 91 (43), 43 (41)... 220 (t)]                        | 13.71   | 1956.2 | 0.03    | 11.42   | 1535.2 | 0.06    |
| α-Elemol  | 14.45   | 2025.8 | 0.29    | 11.57   | 1546.7 | 0.25    |
| Germacrene B  | 11.53*  | 1763.6 | [0.29]  | 11.60   | 1549.0 | 0.29    |
| cis-Sesquisabinene hydrate  | 13.67   | 1952.7 | 0.14    | 11.65   | 1552.9 | 0.14    |
| β-Calacorene  | 13.11   | 1901.4 | 0.01    | 11.74   | 1559.7 | tr      |
| (E)-Nerolidol   | 14.18   | 1999.4 | 0.36    | 11.80   | 1564.9 | 0.34    |
| 1'-Hydroxyeugenol   | 20.20   | 2642.1 | 0.16    | 11.87   | 1570.6 | 0.19    |
| ar-Turmerol   | 15.83*  | 2160.2 | [0.34]  | 11.97   | 1578.1 | 0.05    |
| trans-Sesquisabinene hydrate  | 14.72   | 2050.7 | 0.35    | 12.10   | 1588.4 | 0.33    |
| Unknown ZIOF XXIII [m/z 132, 118 (89), 145 (85), 119 (79), 117 (60)...]                           | 14.12   | 1994.0 | 0.04    | 12.12   | 1590.1 | 0.05    |
| cis-Zingiberenol  | 14.82   | 2061.0 | 0.52    | 12.40   | 1612.1 | 0.56    |
| Unknown CULO XXV [m/z 119, 85 (92), 105 (37), 120 (36), 91 (28)... 218 (6)]                       | 16.66   | 2245.7 | 0.17    | 12.51   | 1621.6 | 0.03    |
| trans-Zingiberenol  | 15.51   | 2128.4 | 0.34    | 12.61   | 1629.6 | 0.25    |
| α-Eudesmol  | 15.76   | 2153.1 | 0.16    | 12.83*  | 1648.4 | [10.49] |
| β-Eudesmol  | 15.83*  | 2160.2 | [0.34]  | 12.83*  | 1648.4 | [10.49] |
| Zingerone   | 20.76   | 2709.9 | 9.77    | 12.83*  | 1648.4 | [10.49] |
| (3E,5E)-7-Hydroxyfarnesene  | 16.71   | 2250.3 | 0.08    | 12.97   | 1659.9 | 0.13    |
| Zingerone methyl ether  | 19.44   | 2551.5 | 0.02    | 13.21   | 1679.8 | 0.04    |
| α-Bisabolol   | 15.83*  | 2160.2 | [0.34]  | 13.24   | 1682.2 | 0.19    |
| Unknown ZIOF XXXVIII [m/z 137, 119 (70), 84 (69), 41 (68), 69 (53), 55 (45), 109 (38)... 222 (2)] | 16.48   | 2226.6 | 0.54    | 13.30   | 1687.7 | 0.44    |

|  |       |        |      |       |        |      |
|--|-------|--------|------|-------|--------|------|
| Unknown ZIOF XXVI [m/z<br>69, 41 (59), 118 (33), 43 (32),<br>55 (31)... 234? (t)]                          | 17.18 | 2299.1 | 0.46 | 13.36 | 1692.5 | 0.54 |
| Unknown ZIOF XXXIX [m/z<br>119, 91 (31), 105 (29), 41<br>(25), 133 (23), 158 (21)...]                      | 17.24 | 2305.8 | 0.09 | 13.71 | 1722.0 | 0.21 |
| Oplopanone   | 18.55 | 2449.7 | 0.04 | 13.76 | 1726.6 | 0.02 |
| Xanthorizzhol?   | 20.24 | 2646.7 | 0.09 | 13.98 | 1745.5 | 0.21 |
| Unknown ZIOF XXVII [m/z<br>82, 43 (85), 91 (67), 93 (66),<br>41 (66), 69 (59), 106 (47)...<br>218 (5)...]  |       |        |      | 14.02 | 1749.6 | 0.04 |
| Unknown ZIOF XXIX [m/z<br>43, 82 (100), 41 (86), 69 (76),<br>93 (72), 91 (72)... 218 (4)...]               |       |        |      | 14.13 | 1758.9 | 0.07 |
| Unknown ZIOF XXX [m/z<br>79, 41 (77), 135 (75), 69 (74),<br>43 (70)... 220 (9)]                            | 18.86 | 2484.1 | 0.02 | 14.24 | 1768.1 | 0.08 |
| Unknown AMBA XVIII [m/z<br>69, 43 (95), 41 (84), 109 (78),<br>95 (54), 93 (49)... 177 (36),<br>220 (2)...] | 20.50 | 2677.4 | 0.53 | 14.65 | 1804.4 | 0.56 |
| Unknown MOPE V [m/z<br>109, 69 (58), 43 (56), 41 (42),<br>135 (37), 55 (27)... 220 (5)]                    | 21.88 | 2850.3 | 0.22 | 15.33 | 1866.2 | 0.19 |
| Unknown ZIOF XL [m/z 137,<br>218 (84), 119 (72), 69 (64),<br>175 (61), 41 (60), 93 (58)]                   | 21.33 | 2780.8 | 0.12 | 15.36 | 1869.6 | 0.07 |
| Geranyl- <i>para</i> -cymene   | 16.57 | 2235.4 | 0.19 | 16.23 | 1951.0 | 0.23 |
| Palmitic acid  |       |        |      | 16.47 | 1973.4 | 0.72 |
| ( <i>E,E</i> )-Geranylinalool  |       |        |      | 17.00 | 2024.7 | 0.17 |
| [4]-Shogaol  |       |        |      | 17.49 | 2074.2 | 0.08 |
| Unknown ZIOF XLI [m/z<br>135, 150 (34), 77 (13), 163<br>(11)... 262 (2)]                                   |       |        |      | 17.63 | 2087.6 | 0.03 |
| Unknown ZIOF XLII [m/z<br>137, 203 (15), 138 (11), 105<br>(11), 41 (9)... 274 (7), 286?<br>(1)]            |       |        |      | 17.77 | 2102.2 | 0.10 |
| Unknown ZIOF XLIII [m/z<br>69, 41 (44), 121 (37), 107<br>(36), 81 (33)... 272 (2)]                         |       |        |      | 17.93 | 2118.3 | 0.05 |
| Linoleic acid  |       |        |      | 18.11 | 2137.5 | 0.17 |
| Oleic acid   |       |        |      | 18.16 | 2142.8 | 0.38 |
| [4]-Gingerol   |       |        |      | 18.31 | 2158.6 | 0.02 |

|  |       |        |      |        |        |        |
|--|-------|--------|------|--------|--------|--------|
| [4]-Isogingerol?                                 |       |        |      | 18.47  | 2174.4 | 1.50   |
| [6]-Isoshogaol?                                  | 25.05 | 3287.9 | 0.03 | 18.79  | 2208.6 | 0.20   |
| [6]-Paradol                                      |       |        |      | 18.89  | 2218.8 | 0.36   |
| Methyl [6]-isoshogaol?                           |       |        |      | 18.92  | 2222.7 | 0.03   |
| Methyl [6]-paradol?                              |       |        |      | 19.22  | 2254.7 | 0.02   |
| [6]-Dihydroparadol?                              |       |        |      | 19.39  | 2273.4 | 0.05   |
| [6]-Shogaol                                      | 25.94 | 3421.7 | 3.27 | 19.48  | 2282.9 | 3.56   |
| Methyl [6]-shogaol                               |       |        |      | 19.76  | 2314.2 | 0.23   |
| Acetoxy-[6]-dihydroparadol                       |       |        |      | 19.81  | 2319.6 | 0.05   |
| Diacetoxy-[4]-gingerdiol                         |       |        |      | 19.98  | 2337.9 | 0.05   |
| Geranyl laurate                                  | 20.26 | 2649.2 | 0.12 | 20.06  | 2347.0 | 0.08   |
| [6]-Gingerol                                     |       |        |      | 20.29  | 2373.8 | 0.83   |
| [6]-Isogingerol?                                 |       |        |      | 20.48  | 2394.8 | 0.03   |
| [8]-Isoshogaol                                   |       |        |      | 20.55  | 2402.4 | 0.04   |
| Methyl [6]-gingerol                              |       |        |      | 20.64  | 2413.4 | 0.06   |
| 1-(4'-Hydroxy-3'-methoxyphenyl)-7-dodecen-3-one? |       |        |      | 20.70  | 2419.6 | 0.01   |
| [8]-Paradol                                      |       |        |      | 20.78  | 2429.1 | 0.05   |
| Acetoxy-[6]-gingerol                             |       |        |      | 21.00  | 2455.5 | 0.03   |
| [6]-Gingerdiol isomer I                          |       |        |      | 21.08  | 2464.7 | 0.12   |
| [6]-Gingerdiol isomer II                         |       |        |      | 21.14  | 2471.1 | 0.17   |
| [8]-Shogaol                                      | 27.56 | 3626.1 | 0.39 | 21.28  | 2488.5 | 0.85   |
| Methyl 5-acetoxy-[6]-gingerdiol                  |       |        |      | 21.50* | 2514.6 | [1.17] |
| Diacetoxy-[6]-gingerdiol                         | 27.43 | 3612.5 | 0.04 | 21.50* | 2514.6 | [1.17] |
| [8]-Gingerdione                                  |       |        |      | 21.58  | 2523.8 | 0.11   |
| 1-Dehydro-[6]-gingerdione                        |       |        |      | 21.78  | 2547.7 | 0.15   |
| [8]-Gingerol                                     |       |        |      | 22.04  | 2579.1 | 0.28   |
| [10]-Isoshogaol                                  | 28.39 | 3707.9 | 0.79 | 22.14  | 2592.2 | 0.03   |
| [10]-Paradol                                     |       |        |      | 22.38  | 2621.3 | 0.13   |
| [10]-Shogaol                                     |       |        |      | 23.01  | 2700.4 | 1.05   |
| [10]-Gingerdione                                 |       |        |      | 23.30  | 2737.8 | 0.05   |
| [12]-Isoshogaol?                                 |       |        |      | 23.60  | 2777.0 | 0.20   |
| [12]-Shogaol                                     |       |        |      | 24.60  | 2911.4 | 0.05   |
| [6]-Gingerdiol neral acetal?                     |       |        |      | 25.12  | 2983.4 | 0.01   |
| [6]-Gingerdiol geranial acetal                   |       |        |      | 25.85  | 3086.9 | 0.23   |
| Total reported                                   |       | 83.14% |      |        | 92.78% |        |

\*: Two or more compounds are coeluting on this column

[xx]: Duplicate percentage due to coelutions, only the first one is 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.

CO2 Extract, *Zingiber officinale*  
Internal code: 24C04-PTH10

Organic Ginger Root Co2 - Nigeria - GL0102R

Report prepared for:  
Plant Therapy

Note: no correction factor was applied

R.T.: Retention time (minutes)

R.I.: Retention index