

**Date :** 2026-09-17

**CERTIFICATE OF ANALYSIS - GC PROFILING**

**SAMPLE IDENTIFICATION**

**Internal code :** 26D29-PTH05

**Customer Identification :** Black Pepper - India - B40115

**Type :** Essential Oil

**Source :** *Piper nigrum*

**Customer :** Plant Therapy

Checked and approved by:

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Sylvain Mercier, M. Sc., Chimiste 2014-005

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*This report is an update of the version first issued on 2026-05-01 to make a modification in the sample identification section.*

## *GAS CHROMATOGRAPHIC ANALYSIS*

**Method :** PC-MAT-014 - Analysis of the composition of an essential oil or other volatile liquide by FAST GC-FID

**✖ISO**

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

**Analyst :** Jean-Christophe Fortin, M. Sc.

**Date :** 2026-04-30

## *PHYSICOCHEMICAL DATA*

**Refractive index :**  $1.4844 \pm 0.0003$  (20 °C)

**Method :** PC-MAT-016 - Measure of the refractive index of a liquid.

**Analyst :** Cindy Caron B. Sc.

**Date :** 2026-04-29

## *CONCLUSION*

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

## ANALYSIS SUMMARY - CONSOLIDATED CONTENTS

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

| Identification                          | %     | Class                |
|-----------------------------------------|-------|----------------------|
| Isovaleral                              | tr    | Aliphatic aldehyde   |
| 2-Methylbutyral                         | tr    | Aliphatic aldehyde   |
| Toluene                                 | 0.01  | Simple phenolic      |
| $\alpha$ -Thujene                       | 0.74  | Monoterpene          |
| $\alpha$ -Pinene                        | 7.06  | Monoterpene          |
| Camphene                                | 0.17  | Monoterpene          |
| $\alpha$ -Fenchene                      | 0.01  | Monoterpene          |
| Thuja-2,4(10)-diene                     | tr    | Monoterpene          |
| 3,7,7-Trimethylcyclohepta-1,3,5-triene  | 0.03  | Monoterpene          |
| Sabinene                                | 5.70  | Monoterpene          |
| $\beta$ -Pinene                         | 9.69  | Monoterpene          |
| Dehydro-1,8-cineole                     | tr    | Monoterpenic ether   |
| Myrcene                                 | 1.53  | Monoterpene          |
| 2-Carene                                | 0.01  | Monoterpene          |
| $\alpha$ -Phellandrene                  | 1.43  | Monoterpene          |
| Pseudolimonene                          | 0.04  | Monoterpene          |
| $\Delta^3$ -Carene                      | 9.42  | Monoterpene          |
| $\alpha$ -Terpinene                     | 0.09  | Monoterpene          |
| <i>meta</i> -Cymene                     | 0.04  | Monoterpene          |
| <i>para</i> -Cymene                     | 0.64  | Monoterpene          |
| 1,8-Cineole                             | 0.03  | Monoterpenic ether   |
| $\beta$ -Phellandrene                   | 0.92  | Monoterpene          |
| Limonene                                | 14.86 | Monoterpene          |
| (Z)- $\beta$ -Ocimene                   | 0.01  | Monoterpene          |
| (E)- $\beta$ -Ocimene                   | 0.08  | Monoterpene          |
| Unknown                                 | 0.02  | Monoterpene          |
| $\gamma$ -Terpinene                     | 0.18  | Monoterpene          |
| <i>cis</i> -Sabinene hydrate            | 0.10  | Monoterpenic alcohol |
| Isoterpinolene                          | 0.13  | Monoterpene          |
| <i>para</i> -Cymenene                   | 0.02  | Monoterpene          |
| Terpinolene                             | 0.37  | Monoterpene          |
| <i>trans</i> -Sabinene hydrate          | 0.06  | Monoterpenic alcohol |
| Unknown                                 | 0.01  | Unknown              |
| Linalool                                | 0.37  | Monoterpenic alcohol |
| Verbenol analog?                        | 0.01  | Monoterpenic alcohol |
| <i>trans-para</i> -Mentha-2,8-dien-1-ol | 0.03  | Monoterpenic alcohol |
| <i>cis</i> -Limonene oxide              | 0.01  | Monoterpenic ether   |
| <i>trans</i> -Limonene oxide            | 0.01  | Monoterpenic ether   |
| <i>cis-para</i> -Mentha-2,8-dien-1-ol   | 0.04  | Monoterpenic alcohol |
| <i>trans-para</i> -Menth-2-en-1-ol      | 0.03  | Monoterpenic alcohol |

|                                                         |        |                        |
|---------------------------------------------------------|--------|------------------------|
| <i>trans</i> -Verbenol                                  | 0.01   | Monoterpenic alcohol   |
| <i>meta</i> -Mentha-4,6-dien-8-ol                       | 0.01   | Monoterpenic alcohol   |
| Pinocarvone                                             | 0.03   | Monoterpenic ketone    |
| <i>cis</i> -Sabinol                                     | 0.01   | Monoterpenic alcohol   |
| Terpinen-4-ol                                           | 0.24   | Monoterpenic alcohol   |
| <i>meta</i> -Cymen-8-ol                                 | 0.02   | Monoterpenic alcohol   |
| <i>para</i> -Cymen-8-ol                                 | 0.02   | Monoterpenic alcohol   |
| $\alpha$ -Terpineol                                     | 0.04   | Monoterpenic alcohol   |
| Myrtenal                                                | 0.04   | Monoterpenic aldehyde  |
| Myrtenol                                                | 0.02   | Monoterpenic alcohol   |
| <i>cis</i> - $\alpha$ -Phellandrene epoxide (iPr vs Me) | 0.03   | Monoterpenic ether     |
| Unknown                                                 | 0.02   | Oxygenated monoterpene |
| Verbenone                                               | 0.01   | Monoterpenic ketone    |
| Car-2-en-4-one?                                         | 0.02   | Monoterpenic ketone    |
| <i>trans</i> -Carveol                                   | 0.02   | Monoterpenic alcohol   |
| <i>cis</i> -Carveol                                     | 0.02   | Monoterpenic alcohol   |
| Cuminal                                                 | 0.02   | Monoterpenic aldehyde  |
| Carvone                                                 | 0.01   | Monoterpenic ketone    |
| Car-3-en-2-one                                          | 0.01   | Monoterpenic ketone    |
| Unknown                                                 | 0.02   | Unknown                |
| Methyl citronellate                                     | 0.01   | Monoterpenic ester     |
| Bornyl acetate                                          | 0.01   | Monoterpenic ester     |
| Cuminol                                                 | 0.01   | Monoterpenic alcohol   |
| Unknown                                                 | 0.01   | Oxygenated monoterpene |
| Car-3-en-5-one                                          | 0.02   | Monoterpenic ketone    |
| <i>para</i> -Menth-5-en-1,2-diol isomer III             | 0.04   | Monoterpenic alcohol   |
| Bicycloelemene                                          | 0.03   | Sesquiterpene          |
| $\delta$ -Elemene isomer                                | 0.02   | Sesquiterpene          |
| $\delta$ -Elemene                                       | 2.25   | Sesquiterpene          |
| $\alpha$ -Cubebene                                      | 0.31   | Sesquiterpene          |
| Cyclosativene I                                         | 0.09   | Sesquiterpene          |
| Cyclosativene II                                        | 0.06   | Sesquiterpene          |
| $\alpha$ -Copaene                                       | 3.38   | Sesquiterpene          |
| $\beta$ -Bourbonene                                     | 0.04   | Sesquiterpene          |
| $\beta$ -Cubebene                                       | 0.30   | Sesquiterpene          |
| $\beta$ -Elemene                                        | 0.92   | Sesquiterpene          |
| Isocaryophyllene                                        | 0.03   | Sesquiterpene          |
| $\alpha$ -Gurjunene                                     | 0.18   | Sesquiterpene          |
| Unknown                                                 | 0.03   | Sesquiterpene          |
| <i>cis</i> - $\alpha$ -Bergamotene                      | 0.01   | Sesquiterpene          |
| $\beta$ -Caryophyllene                                  | 26.76  | Sesquiterpene          |
| $\beta$ -Copaene                                        | 0.16   | Sesquiterpene          |
| $\gamma$ -Elemene                                       | 0.02   | Sesquiterpene          |
| <i>trans</i> - $\alpha$ -Bergamotene                    | [0.22] | Sesquiterpene          |
| $\alpha$ -Guaiane                                       | [0.22] | Sesquiterpene          |

|                                     |      |                          |
|-------------------------------------|------|--------------------------|
| Unknown                             | 0.02 | Unknown                  |
| Unknown                             | 0.01 | Sesquiterpene            |
| <i>trans</i> -Muurolo-3,5-diene     | 0.05 | Sesquiterpene            |
| $\alpha$ -Humulene                  | 1.49 | Sesquiterpene            |
| allo-Aromadendrene                  | 0.02 | Sesquiterpene            |
| $\beta$ -Santalene                  | 0.04 | Sesquiterpene            |
| ( <i>E</i> )- $\beta$ -Farnesene    | 0.15 | Sesquiterpene            |
| $\gamma$ -Gurjunene                 | 0.03 | Sesquiterpene            |
| <i>trans</i> -Cadina-1(6),4-diene   | 0.04 | Sesquiterpene            |
| $\gamma$ -Muurolole                 | 0.06 | Sesquiterpene            |
| $\alpha$ -Amorphene                 | 0.08 | Sesquiterpene            |
| Germacrene D                        | 0.46 | Sesquiterpene            |
| ar-Curcumene                        | 0.07 | Sesquiterpene            |
| $\beta$ -Selinene                   | 1.00 | Sesquiterpene            |
| <i>trans</i> -Muurolo-4(15),5-diene | 0.06 | Sesquiterpene            |
| $\alpha$ -Selinene                  | 0.70 | Sesquiterpene            |
| Bicyclogermacrene                   | 0.12 | Sesquiterpene            |
| Viridiflorene                       | 0.10 | Sesquiterpene            |
| epi-Cubebol                         | 0.10 | Sesquiterpenic alcohol   |
| Epizonarene                         | 0.08 | Sesquiterpene            |
| Germacrene A                        | 0.12 | Sesquiterpene            |
| $\alpha$ -Muurolole                 | 0.28 | Sesquiterpene            |
| $\beta$ -Bisabolene                 | 1.91 | Sesquiterpene            |
| Cubebol                             | 0.13 | Sesquiterpenic alcohol   |
| $\gamma$ -Cadinene                  | 0.07 | Sesquiterpene            |
| 7-epi- $\alpha$ -Selinene           | 0.03 | Sesquiterpene            |
| <i>trans</i> -Calamenene            | 0.07 | Sesquiterpene            |
| $\delta$ -Cadinene                  | 1.11 | Sesquiterpene            |
| ( <i>E</i> )- $\gamma$ -Bisabolene  | 0.05 | Sesquiterpene            |
| $\alpha$ -Calacorene                | 0.01 | Sesquiterpene            |
| ( <i>E</i> )- $\alpha$ -Bisabolene  | 0.03 | Sesquiterpene            |
| $\alpha$ -Elemol                    | 0.01 | Sesquiterpenic alcohol   |
| Isocaryophyllene epoxide B          | 0.03 | Sesquiterpenic ether     |
| Germacrene B                        | 0.07 | Sesquiterpene            |
| ( <i>E</i> )-Nerolidol              | 0.02 | Sesquiterpenic alcohol   |
| Spathulenol                         | 0.05 | Sesquiterpenic alcohol   |
| Caryophyllene oxide isomer          | 0.15 | Sesquiterpenic ether     |
| Caryophyllene oxide                 | 0.70 | Sesquiterpenic ether     |
| Unknown                             | 0.01 | Oxygenated sesquiterpene |
| Humulene epoxide I                  | 0.03 | Sesquiterpenic ether     |
| Humulene epoxide II                 | 0.05 | Sesquiterpenic ether     |
| $\alpha$ -Corocalene                | 0.01 | Sesquiterpene            |
| Alismol                             | 0.16 | Sesquiterpenic alcohol   |
| Caryophylladienol II                | 0.03 | Sesquiterpenic alcohol   |
| $\tau$ -Muurolol                    | 0.04 | Sesquiterpenic alcohol   |

|                                                      |              |                        |
|------------------------------------------------------|--------------|------------------------|
| $\alpha$ -Muurolol                                   | 0.11         | Sesquiterpenic alcohol |
| <i>cis</i> -Calamenen-10-ol                          | 0.01         | Sesquiterpenic alcohol |
| <i>trans</i> -Calamenen-10-ol                        | 0.01         | Sesquiterpenic alcohol |
| (3 <i>Z</i> )-Caryophylla-3,8(13)-dien-5 $\beta$ -ol | 0.02         | Sesquiterpenic alcohol |
| <i>meta</i> -Camphorene                              | 0.02         | Diterpene              |
| <b>Consolidated total</b>                            | <b>99.44</b> |                        |

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

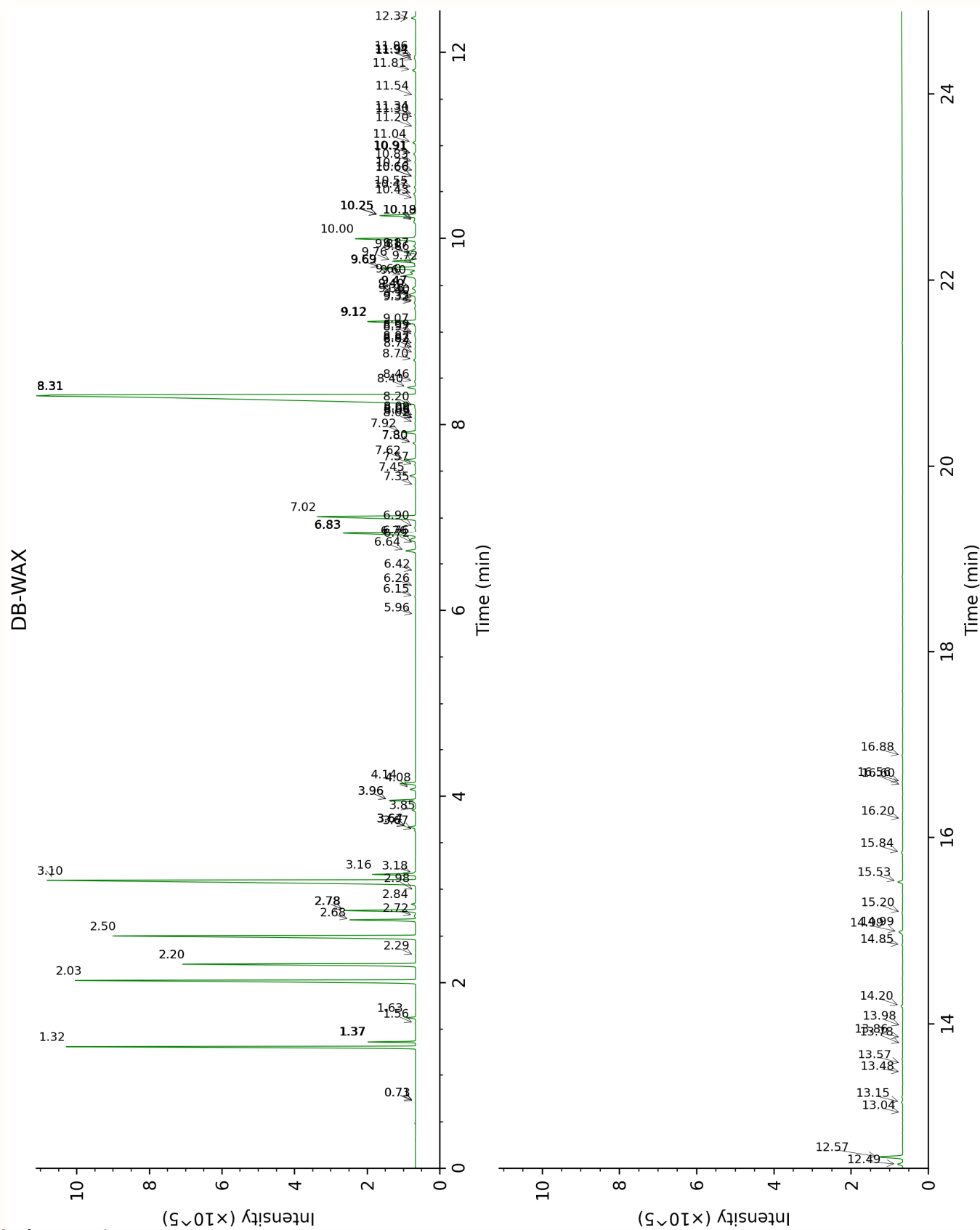
Note: no correction factor was applied

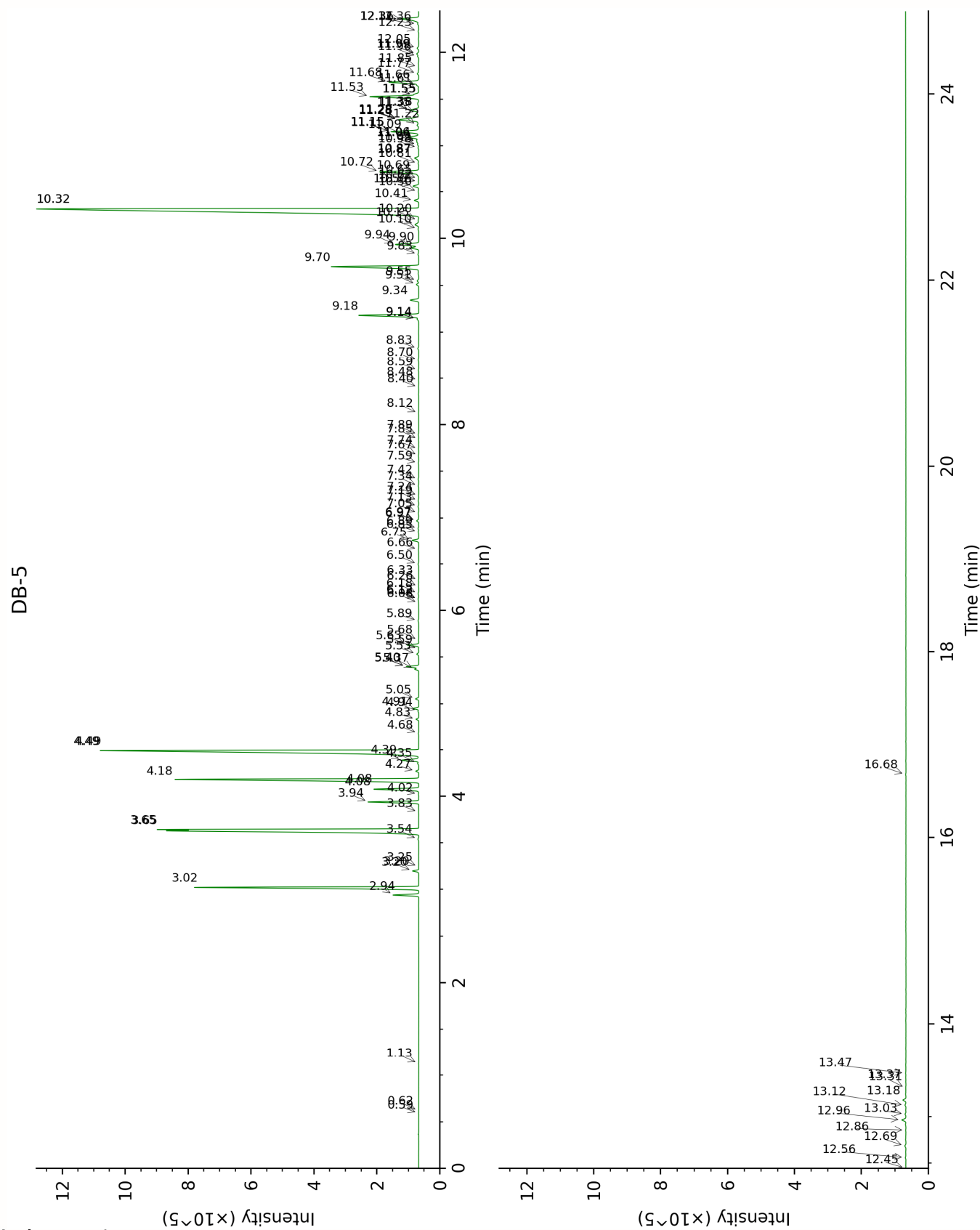
**About "consolidated" data:** The table above presents the breakdown of the sample volatile constituents after applying an algorithm to collapse data acquired from the multi-columns system of PhytoChemia into a single set of consolidated contents. In case of discrepancies between columns, the algorithm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

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

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FULL ANALYSIS DATA

| Isovaleral                                                                                | Column DB-WAX |        |        | Column DB-5 |        |         |
|-------------------------------------------------------------------------------------------|---------------|--------|--------|-------------|--------|---------|
|                                                                                           | 0.73          | 885.9  | tr     | 0.59        | 643.4  | tr      |
| 2-Methylbutyral                                                                           | 0.71          | 880.3  | tr     | 0.62        | 654.0  | tr      |
| Toluene                                                                                   | 1.37*         | 1000.9 | [0.74] | 1.13        | 759.4  | 0.01    |
| $\alpha$ -Thujene                                                                         | 1.37*         | 1000.9 | [0.74] | 2.94        | 926.7  | 0.74    |
| $\alpha$ -Pinene                                                                          | 1.32          | 992.7  | 7.05   | 3.02        | 932.2  | 7.06    |
| Camphene                                                                                  | 1.63          | 1028.6 | 0.17   | 3.20*       | 944.0  | [0.18]  |
| $\alpha$ -Fenchene                                                                        | 1.56          | 1022.6 | 0.01   | 3.20*       | 944.0  | [0.18]  |
| Thuja-2,4(10)-diene                                                                       | 2.20*         | 1085.3 | [5.63] | 3.24        | 947.0  | tr      |
| 3,7,7-Trimethylcyclohepta-1,3,5-triene                                                    | 2.78*         | 1134.7 | [1.55] | 3.54        | 966.9  | 0.03    |
| Sabinene                                                                                  | 2.20*         | 1085.3 | [5.63] | 3.64*       | 973.9  | [15.39] |
| $\beta$ -Pinene                                                                           | 2.03          | 1068.1 | 9.69   | 3.64*       | 973.9  | [15.39] |
| Dehydro-1,8-cineole                                                                       | 2.98          | 1150.9 | tr     | 3.83        | 986.5  | tr      |
| Myrcene                                                                                   | 2.78*         | 1134.7 | [1.55] | 3.94        | 993.8  | 1.53    |
| 2-Carene                                                                                  | 2.29          | 1094.3 | 0.01   | 4.02        | 999.3  | 0.01    |
| $\alpha$ -Phellandrene                                                                    | 2.68          | 1126.8 | 1.43   | 4.08*       | 1003.0 | [1.46]  |
| Pseudolimonene                                                                            | 2.72          | 1130.0 | 0.04   | 4.08*       | 1003.0 | [1.46]  |
| $\Delta$ 3-Carene                                                                         | 2.50          | 1113.4 | 9.40   | 4.18        | 1009.9 | 9.42    |
| $\alpha$ -Terpinene                                                                       | 2.84          | 1140.0 | 0.09   | 4.27        | 1015.4 | 0.09    |
| <i>meta</i> -Cymene                                                                       | 3.96*         | 1226.3 | [0.66] | 4.35        | 1020.7 | 0.04    |
| <i>para</i> -Cymene                                                                       | 3.96*         | 1226.3 | [0.66] | 4.39        | 1022.9 | 0.64    |
| 1,8-Cineole                                                                               | 3.18          | 1166.3 | 0.03   | 4.49*       | 1029.5 | [15.88] |
| $\beta$ -Phellandrene                                                                     | 3.16          | 1165.1 | 0.92   | 4.49*       | 1029.5 | [15.88] |
| Limonene                                                                                  | 3.10          | 1160.1 | 14.86  | 4.49*       | 1029.5 | [15.88] |
| (Z)- $\beta$ -Ocimene                                                                     | 3.64          | 1202.3 | 0.02   | 4.68        | 1041.2 | 0.01    |
| (E)- $\beta$ -Ocimene                                                                     | 3.85          | 1218.7 | 0.08   | 4.83        | 1050.9 | 0.08    |
| Unknown CUSE I<br>[m/z 93, 91 (54), 92 (31), 77 (29), 79 (17), 43 (13), 41 (10), 136 (9)] | 3.67*         | 1205.1 | [0.19] | 4.91        | 1056.3 | 0.02    |
| $\gamma$ -Terpinene                                                                       | 3.67*         | 1205.1 | [0.19] | 4.94        | 1058.2 | 0.18    |
| <i>cis</i> -Sabinene hydrate                                                              | 6.76*         | 1428.2 | [0.25] | 5.05        | 1065.3 | 0.10    |
| Isoterpinolene                                                                            | 4.08          | 1235.0 | 0.13   | 5.37        | 1085.6 | 0.13    |
| <i>para</i> -Cymenene                                                                     | 6.15          | 1383.1 | 0.02   | 5.40*       | 1087.3 | [0.41]  |
| Terpinolene                                                                               | 4.14          | 1239.6 | 0.37   | 5.40*       | 1087.3 | [0.41]  |
| <i>trans</i> -Sabinene hydrate                                                            | 7.80*         | 1507.2 | [0.07] | 5.53        | 1095.9 | 0.06    |
| Unknown PINI III<br>[m/z 109, 43 (65), 95 (54), 119 (50), 91 (47)... 149 (8)...]          | 5.96          | 1368.9 | 0.01   | 5.59        | 1099.2 | 0.01    |

|                                                                                                 |        |        |        |       |        |        |
|-------------------------------------------------------------------------------------------------|--------|--------|--------|-------|--------|--------|
| Linalool                                                                                        | 7.92   | 1516.4 | 0.37   | 5.63  | 1102.1 | 0.37   |
| Verbenol analog?                                                                                | 8.20   | 1537.9 | 0.04   | 5.68  | 1105.5 | 0.01   |
| <i>trans-para</i> -Mentha-2,8-dien-1-ol                                                         | 8.77   | 1583.2 | 0.02   | 5.89  | 1119.1 | 0.03   |
| <i>cis</i> -Limonene oxide                                                                      | 6.26   | 1391.0 | 0.01   | 6.08  | 1131.3 | 0.01   |
| <i>trans</i> -Limonene oxide                                                                    | 6.42   | 1402.9 | 0.01   | 6.12* | 1134.1 | [0.04] |
| <i>cis-para</i> -Mentha-2,8-dien-1-ol                                                           | 9.32   | 1626.9 | 0.04   | 6.12* | 1134.1 | [0.04] |
| <i>trans-para</i> -Menth-2-en-1-ol                                                              | 8.82*  | 1587.2 | [0.02] | 6.18  | 1137.8 | 0.03   |
| <i>trans</i> -Verbenol                                                                          | 9.36   | 1630.6 | 0.02   | 6.26  | 1142.7 | 0.01   |
| <i>meta</i> -Mentha-4,6-dien-8-ol                                                               | 9.12*  | 1610.3 | [1.53] | 6.32  | 1147.1 | 0.01   |
| Pinocarvone                                                                                     | 7.80*  | 1507.2 | [0.07] | 6.50  | 1158.4 | 0.03   |
| <i>cis</i> -Sabinol                                                                             | 10.66* | 1738.7 | [0.04] | 6.66  | 1168.8 | 0.01   |
| Terpinen-4-ol                                                                                   | 8.40   | 1554.1 | 0.23   | 6.75  | 1175.1 | 0.24   |
| <i>meta</i> -Cymen-8-ol                                                                         | 11.34  | 1796.5 | 0.03   | 6.85  | 1181.4 | 0.02   |
| <i>para</i> -Cymen-8-ol                                                                         | 11.30  | 1793.7 | 0.01   | 6.89  | 1184.0 | 0.02   |
| $\alpha$ -Terpineol                                                                             | 9.60*  | 1650.4 | [0.50] | 6.97* | 1189.3 | [0.08] |
| Myrtenal                                                                                        | 8.46   | 1559.0 | 0.04   | 6.97* | 1189.3 | [0.08] |
| Myrtenol                                                                                        | 10.73  | 1744.5 | 0.01   | 7.05  | 1194.4 | 0.02   |
| <i>cis</i> - $\alpha$ -Phellandrene epoxide (iPr vs Me)                                         | 10.83  | 1753.1 | 0.03   | 7.13  | 1199.4 | 0.03   |
| Unknown PINI IV<br>[m/z 109, 91 (100), 81 (88), 94 (75), 119 (74), 96 (73), 41 (63)... 150 (2)] | 10.66* | 1738.7 | [0.04] | 7.19  | 1203.3 | 0.02   |
| Verbenone                                                                                       | 9.47*  | 1639.3 | [0.13] | 7.24  | 1207.0 | 0.01   |
| Car-2-en-4-one?                                                                                 | 9.33   | 1628.0 | 0.01   | 7.34  | 1214.0 | 0.02   |
| <i>trans</i> -Carveol                                                                           | 11.20  | 1784.8 | 0.02   | 7.42  | 1218.9 | 0.02   |
| <i>cis</i> -Carveol                                                                             | 11.54  | 1813.9 | 0.02   | 7.59  | 1230.9 | 0.02   |
| Cuminal                                                                                         | 10.42  | 1718.4 | 0.01   | 7.67  | 1236.3 | 0.02   |
| Carvone                                                                                         | 9.81   | 1667.3 | 0.02   | 7.74  | 1241.3 | 0.01   |
| Car-3-en-2-one                                                                                  | 10.19  | 1699.0 | 0.04   | 7.85  | 1248.4 | 0.01   |
| Unknown CALU IV<br>[m/z 43, 97 (69), 107 (46), 41 (28), 55 (21), 109 (20)...]                   | 10.91* | 1760.4 | [0.07] | 7.90  | 1251.7 | 0.02   |
| Methyl citronellate                                                                             | 8.06*  | 1527.5 | [0.02] | 8.12  | 1267.5 | 0.01   |
| Bornyl acetate                                                                                  | 8.09   | 1529.9 | 0.02   | 8.40  | 1286.7 | 0.01   |
| Cuminol                                                                                         | 13.98  | 2038.7 | 0.01   | 8.48  | 1291.8 | 0.01   |
| Unknown MISC IX<br>[m/z 43, 93 (66), 91                                                         |        |        |        | 8.59  | 1299.3 | 0.01   |

|                                                                                              |        |        |         |        |        |         |
|----------------------------------------------------------------------------------------------|--------|--------|---------|--------|--------|---------|
| (44), 41 (38), 69 (35)...<br>152? (1)]                                                       |        |        |         |        |        |         |
| Car-3-en-5-one                                                                               | 11.94  | 1849.9 | 0.04    | 8.70   | 1306.8 | 0.02    |
| <i>para</i> -Menth-5-en-<br>1,2-diol isomer III                                              | 14.99* | 2138.4 | [0.15]  | 8.83   | 1312.4 | 0.04    |
| Bicycloelemene                                                                               | 6.90   | 1438.8 | 0.03    | 9.14*  | 1334.9 | [0.06]  |
| $\delta$ -Elemene isomer                                                                     | 6.72   | 1425.1 | 0.02    | 9.14*  | 1334.9 | [0.06]  |
| $\delta$ -Elemene                                                                            | 6.83*  | 1433.9 | [2.28]  | 9.18   | 1337.7 | 2.25    |
| $\alpha$ -Cubebene                                                                           | 6.64   | 1419.5 | 0.29    | 9.34   | 1349.3 | 0.31    |
| Cyclosativene I                                                                              | 6.76*  | 1428.2 | [0.25]  | 9.51   | 1361.1 | 0.09    |
| Cyclosativene II                                                                             | 6.83*  | 1433.9 | [2.28]  | 9.55   | 1363.9 | 0.06    |
| $\alpha$ -Copaene                                                                            | 7.02   | 1447.8 | 3.41    | 9.70   | 1374.7 | 3.38    |
| $\beta$ -Bourbonene                                                                          | 7.35   | 1473.0 | 0.01    | 9.83   | 1384.0 | 0.04    |
| $\beta$ -Cubebene                                                                            | 7.62   | 1493.5 | 0.31    | 9.90   | 1388.9 | 0.30    |
| $\beta$ -Elemene                                                                             | 8.31*  | 1547.2 | [28.10] | 9.94   | 1391.5 | 0.92    |
| Isocaryophyllene                                                                             | 8.02   | 1523.9 | 0.03    | 10.10  | 1403.3 | 0.03    |
| $\alpha$ -Gurjunene                                                                          | 7.45   | 1480.7 | 0.18    | 10.15  | 1406.6 | 0.18    |
| Unknown NAJA V<br>[m/z 105, 161 (84), 91<br>(80), 204 (75), 119<br>(69), 189 (64)]           | 7.57   | 1489.3 | 0.03    | 10.20  | 1410.0 | 0.03    |
| <i>cis</i> - $\alpha$ -Bergamotene                                                           | 8.06*  | 1527.5 | [0.02]  | 10.32* | 1419.2 | [26.77] |
| $\beta$ -Caryophyllene                                                                       | 8.31*  | 1547.2 | [28.10] | 10.32* | 1419.2 | [26.77] |
| $\beta$ -Copaene                                                                             | 8.31*  | 1547.2 | [28.10] | 10.41  | 1426.0 | 0.16    |
| $\gamma$ -Elemene                                                                            | 8.87   | 1591.2 | 0.03    | 10.50  | 1433.0 | 0.02    |
| <i>trans</i> - $\alpha$ -<br>Bergamotene                                                     | 8.31*  | 1547.2 | [28.10] | 10.56* | 1437.5 | [0.22]  |
| $\alpha$ -Guaiene                                                                            | 8.31*  | 1547.2 | [28.10] | 10.56* | 1437.5 | [0.22]  |
| Unknown ZIOF XIV<br>[m/z 41, 97 (78), 69<br>(77), 43 (71), 125 (67),<br>55 (56)... 168 (39)] | 16.88  | 2334.8 | 0.02    | 10.62  | 1441.7 | 0.02    |
| Unknown ZIOF XV<br>[m/z 139, 69 (60), 41<br>(51), 43 (47), 119<br>(41)... 204 (1)]           |        |        |         | 10.65  | 1444.2 | 0.01    |
| <i>trans</i> -Muurolo-3,5-<br>diene                                                          | 8.70   | 1577.3 | 0.06    | 10.69  | 1447.5 | 0.05    |
| $\alpha$ -Humulene                                                                           | 9.12*  | 1610.3 | [1.53]  | 10.72  | 1449.5 | 1.49    |
| allo-Aromadendrene                                                                           | 8.82*  | 1587.2 | [0.02]  | 10.81  | 1456.3 | 0.02    |
| $\beta$ -Santalene                                                                           | 8.97   | 1598.8 | 0.04    | 10.87* | 1460.7 | [0.19]  |
| ( <i>E</i> )- $\beta$ -Farnesene                                                             | 9.40*  | 1633.9 | [0.26]  | 10.87* | 1460.7 | [0.19]  |
| $\gamma$ -Gurjunene                                                                          | 8.99   | 1600.4 | 0.03    | 10.98  | 1469.0 | 0.03    |
| <i>trans</i> -Cadina-1(6),4-<br>diene                                                        | 9.07   | 1607.0 | 0.03    | 11.02  | 1471.6 | 0.04    |

|                                                                                                 |        |        |        |        |        |        |
|-------------------------------------------------------------------------------------------------|--------|--------|--------|--------|--------|--------|
| $\gamma$ -Muurolene                                                                             | 9.40*  | 1633.9 | [0.26] | 11.04  | 1473.7 | 0.06   |
| $\alpha$ -Amorphene                                                                             | 9.40*  | 1633.9 | [0.26] | 11.06  | 1475.0 | 0.08   |
| Germacrene D                                                                                    | 9.60*  | 1650.4 | [0.50] | 11.09  | 1477.4 | 0.46   |
| $\alpha$ -Curcumene                                                                             | 10.48  | 1722.7 | 0.07   | 11.15* | 1481.9 | [1.07] |
| $\beta$ -Selinene                                                                               | 9.69*  | 1657.2 | [1.04] | 11.15* | 1481.9 | [1.07] |
| <i>trans</i> -Muurolo-4(15),5-diene                                                             | 9.69*  | 1657.2 | [1.04] | 11.22  | 1487.0 | 0.06   |
| $\alpha$ -Selinene                                                                              | 9.76   | 1663.3 | 0.70   | 11.28* | 1491.5 | [1.02] |
| Bicyclogermacrene                                                                               | 9.87   | 1672.1 | 0.12   | 11.28* | 1491.5 | [1.02] |
| Viridiflorene                                                                                   | 9.47*  | 1639.3 | [0.13] | 11.28* | 1491.5 | [1.02] |
| epi-Cubebol                                                                                     | 11.81  | 1838.6 | 0.10   | 11.28* | 1491.5 | [1.02] |
| Epizonarene                                                                                     | 9.72   | 1660.4 | 0.03   | 11.35  | 1496.6 | 0.08   |
| Germacrene A                                                                                    | 10.25* | 1703.4 | [1.07] | 11.38* | 1499.2 | [0.40] |
| $\alpha$ -Muurolene                                                                             | 9.86   | 1671.3 | 0.28   | 11.38* | 1499.2 | [0.40] |
| $\beta$ -Bisabolene                                                                             | 10.00  | 1683.1 | 1.86   | 11.53  | 1510.3 | 1.91   |
| Cubebol                                                                                         | 12.37  | 1888.8 | 0.13   | 11.55* | 1511.6 | [0.16] |
| $\gamma$ -Cadinene                                                                              | 10.18  | 1697.8 | 0.07   | 11.55* | 1511.6 | [0.16] |
| 7-epi- $\alpha$ -Selinene                                                                       | 10.25* | 1703.4 | [1.07] | 11.61  | 1516.9 | 0.03   |
| <i>trans</i> -Calamenene                                                                        | 11.04  | 1770.8 | 0.08   | 11.66  | 1520.6 | 0.07   |
| $\delta$ -Cadinene                                                                              | 10.25* | 1703.4 | [1.07] | 11.68  | 1522.5 | 1.11   |
| ( <i>E</i> )- $\gamma$ -Bisabolene                                                              | 10.25* | 1703.4 | [1.07] | 11.77  | 1529.7 | 0.05   |
| $\alpha$ -Calacorene                                                                            | 11.91  | 1847.3 | 0.01   | 11.85  | 1535.5 | 0.01   |
| ( <i>E</i> )- $\alpha$ -Bisabolene                                                              | 10.55  | 1729.0 | 0.05   | 11.96  | 1544.3 | 0.03   |
| $\alpha$ -Elemol                                                                                | 13.86  | 2026.9 | 0.01   | 11.99* | 1546.5 | [0.08] |
| Isocaryophyllene epoxide B                                                                      | 11.96  | 1851.7 | 0.03   | 11.99* | 1546.5 | [0.08] |
| Germacrene B                                                                                    | 10.91* | 1760.4 | [0.07] | 12.05  | 1551.4 | 0.07   |
| ( <i>E</i> )-Nerolidol                                                                          | 13.57  | 1999.8 | 0.01   | 12.23  | 1565.7 | 0.02   |
| Spathulenol                                                                                     | 14.20  | 2060.0 | 0.05   | 12.31  | 1572.0 | 0.05   |
| Caryophyllene oxide isomer                                                                      | 12.49  | 1899.4 | 0.15   | 12.36* | 1576.2 | [0.86] |
| Caryophyllene oxide                                                                             | 12.57  | 1906.3 | 0.70   | 12.36* | 1576.2 | [0.86] |
| Unknown MECA III [m/z 161, 105 (84), 43 (80), 119 (72), 93 (62), 121 (54)... 204 (38), 222 (2)] | 13.78  | 2019.9 | 0.01   | 12.45  | 1582.8 | 0.01   |
| Humulene epoxide I                                                                              | 13.04  | 1950.0 | 0.01   | 12.56  | 1591.8 | 0.03   |
| Humulene epoxide II                                                                             | 13.15  | 1960.8 | 0.03   | 12.69  | 1601.7 | 0.05   |
| $\alpha$ -Corocalene                                                                            | 13.48  | 1991.0 | 0.01   | 12.86  | 1615.6 | 0.01   |
| Alismol                                                                                         | 15.53  | 2192.6 | 0.14   | 12.96  | 1624.7 | 0.16   |
| Caryophylladienol II                                                                            | 15.84  | 2224.8 | 0.04   | 13.03  | 1629.9 | 0.03   |
| $\tau$ -Muurolol                                                                                | 14.85  | 2124.4 | 0.03   | 13.12  | 1637.8 | 0.04   |
| $\alpha$ -Muurolol                                                                              | 14.99* | 2138.4 | [0.15] | 13.18  | 1642.4 | 0.11   |
| <i>cis</i> -Calamenen-10-ol                                                                     | 16.20  | 2262.5 | 0.01   | 13.31  | 1653.1 | 0.01   |

|                                                      |        |        |      |        |        |      |
|------------------------------------------------------|--------|--------|------|--------|--------|------|
| <i>trans</i> -Calamenen-10-ol                        | 16.60  | 2304.6 | 0.02 | 13.37  | 1658.5 | 0.01 |
| (3 <i>Z</i> )-Caryophylla-3,8(13)-dien-5 $\beta$ -ol | 16.56  | 2300.1 | 0.02 | 13.47  | 1666.3 | 0.02 |
| <i>meta</i> -Camphorene                              | 15.20  | 2159.2 | 0.02 | 16.68  | 1952.9 | 0.02 |
| Total reported                                       | 99.00% |        |      | 99.52% |        |      |
|                                                      |        |        |      |        |        |      |

\*: 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.

Note: no correction factor was applied

R.T.: Retention time (minutes)

R.I.: Retention index