# GC/MS BATCH NUMBER: EE0102

**ESSENTIAL OIL**: ELEMI
**BOTANICAL NAME**: CANARIUM LUZONICUM
**ORIGIN**: PHILIPPINES

| KEY CONSTITUENTS PRESENT IN THIS BATCH OF ELEMI OIL | % |
|---|---|
| LIMONENE | 48.1 |
| α-PHELLANDRENE | 14.2 |
| SABINENE | 4.3 |
| ELEMICIN | 3.9 |
| TERPINOLENE | 2.6 |
| α-TERPINEOL | 2.4 |
| β-PHELLANDRENE + 1,8-CINEOLE | 2.3 |
| p-CYMENE | 2.1 |

Comments from Robert Tisserand: Beautiful lemony fresh-herb odor profile characteristic of this resinous oil. All six key ISO constituents are within range.

*CERTIFICATE OF ANALYSIS – GC PROFILING*

*SAMPLE IDENTIFICATION*

**Internal code :** 18H23-PTH2-1-CC
**Customer identification :** Elemi - Philippines - EE010283R
**Type :** Essential oil
**Source :** *Canarium luzonicum*
**Customer :** Plant Therapy

*ANALYSIS*

**Method:** PC-PA-014-17J19 - Analysis of the composition of an essential oil, or other volatile liquid, by FAST GC-FID (in French); identifications validated by GC-MS.
**Analyst :** Lindsay Girard, B. Sc.
**Analysis date :** August 27, 2018

Checked and approved by :

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

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*This report is digitally signed, it is only considered valid if the digital signature is intact.*

**Laboratoire PhytoChemia**

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*PHYSICOCHEMICAL DATA*

**Physical aspect:** Faintly yellow liquid
**Refractive index:** 1.4793 ± 0.0003 (20 ℃)

*CONCLUSION*

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

*ANALYSIS SUMMARY*

| Identification | DB-5 (%) | DB-WAX (%) | Classe |
|---|---|---|---|
| Toluene | 0.01 | 0.01 | Simple phenolic |
| α-Thujene | 0.13 | 0.12 | Monoterpene |
| α-Pinene | 0.57 | 0.56 | Monoterpene |
| α-Fenchene | 0.02* | | Monoterpene |
| Camphene | [0.02]* | 0.02 | Monoterpene |
| β-Pinene | 4.52* | 0.20 | Monoterpene |
| Sabinene | [4.52]* | 4.33 | Monoterpene |
| 3-Methyl-3-cyclohexenone | 0.05 | 0.04 | Aliphatic ketone |
| 6-Methyl-5-hepten-2-one | 0.01 | | Aliphatic ketone |
| Myrcene | 0.55 | 0.56 | Monoterpene |
| α-Phellandrene | 14.17 | 14.20 | Monoterpene |
| Δ3-Carene | 0.05 | 0.04 | Monoterpene |
| α-Terpinene | 0.39 | 0.38 | Monoterpene |
| para-Cymene | 2.06 | 2.10 | Monoterpene |
| Limonene | 50.35* | 48.13 | Monoterpene |
| β-Phellandrene | [50.35]* | 2.26* | Monoterpene |
| 1,8-Cineole | [50.35]* | [2.26]* | Monoterpenic ether |
| (Z)-β-Ocimene | 0.27 | 0.28 | Monoterpene |
| (E)-β-Ocimene | 0.18 | 0.18 | Monoterpene |
| γ-Terpinene | 0.31 | 0.30 | Monoterpene |
| cis-Sabinene hydrate | 0.11 | 0.11 | Monoterpenic alcohol |
| para-Cymenene | 2.75* | 0.12 | Monoterpene |
| Terpinolene | [2.75]* | 2.62 | Monoterpene |
| Linalool | 0.02 | 0.01 | Monoterpenic alcohol |
| Unknown | 0.02 | 0.01 | Monoterpenic alcohol |
| trans-para-Mentha-2,8-dien-1-ol | 0.09* | 0.03 | Monoterpenic alcohol |
| cis-para-Menth-2-en-1-ol | [0.09]* | 0.06 | Monoterpenic alcohol |
| Limona ketone | tr | tr | Normonoterpenic ketone |
| allo-Ocimene | 0.02* | tr | Monoterpene |
| cis-Limonene oxide | [0.02]* | tr | Monoterpenic ether |
| cis-para-Mentha-2,8-dien-1-ol | 0.04 | 0.04 | Monoterpenic alcohol |
| Camphor | 0.08* | 0.04 | Monoterpenic ketone |
| trans-para-Menth-2-en-1-ol | [0.08]* | 0.03 | Monoterpenic alcohol |
| Epoxyterpinolene | 0.04 | 0.02 | Monoterpenic ether |
| Unknown | 0.05 | 0.08 | Oxygenated monoterpene |
| Unknown | 0.12 | 0.10 | Oxygenated monoterpene |
| Unknown | 0.18 | 0.18 | Oxygenated monoterpene |
| Terpinen-4-ol | 0.62 | 0.58 | Monoterpenic alcohol |
| Unknown | 0.05 | | Oxygenated monoterpene |
| para-Cymen-8-ol | 0.27 | 0.28 | Monoterpenic alcohol |
| α-Terpineol | 2.37 | 2.55 | Monoterpenic alcohol |
| α-Phellandrene epoxide | 0.29 | 0.28 | Monoterpenic ether |
| trans-Piperitol | 0.03 | 0.01 | Monoterpenic alcohol |
| trans-Carveol | 0.10 | 0.07 | Monoterpenic alcohol |
| cis-Carveol | 0.06 | 0.05 | Monoterpenic alcohol |
| Carvone | 0.08 | 0.07 | Monoterpenic ketone |
| Carvotanacetone | 0.03 | 0.03 | Monoterpenic ketone |
| Unknown | 0.25* | 0.12 | Unknown |

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*Plus que des analyses... des conseils*

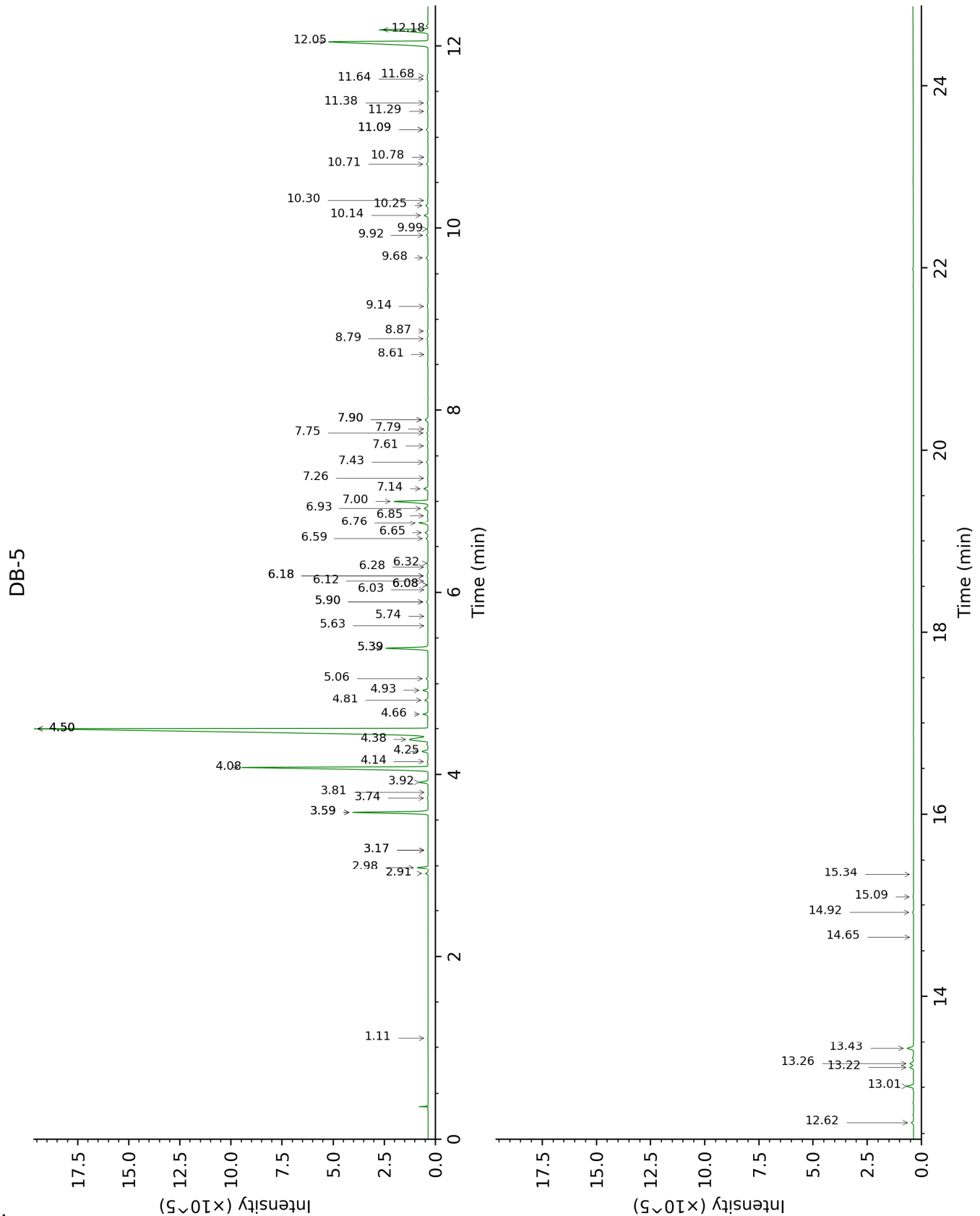| | | | |
|---|---|---|---|
| Piperitone | [0.25]* | 0.14 | Monoterpenic ketone |
| Thymol | 0.02 | 0.02 | Monoterpenic alcohol |
| Carvacrol | 0.07 | 0.06 | Monoterpenic alcohol |
| Unknown | 0.06 | 0.06 | Unknown |
| δ-Elemene isomer | 0.04 | 0.02 | Sesquiterpene |
| α-Copaene | 0.13 | 0.13 | Sesquiterpene |
| β-Elemene | 0.09 | 0.10 | Sesquiterpene |
| Unknown | 0.05 | 0.02 | Unknown |
| Methyleugenol | 0.25 | 0.28 | Phenylpropanoid |
| β-Caryophyllene | 0.15 | 0.16 | Sesquiterpene |
| (*trans*?)-6-Hydroxypiperitone | 0.04 | 0.06 | Monoterpenic alcohol |
| α-Humulene | 0.10 | 0.10 | Sesquiterpene |
| Unknown | 0.02 | | Unknown |
| Germacrene D | 0.13* | 0.02 | Sesquiterpene |
| Unknown | [0.13]* | | Oxygenated sesquiterpene |
| Viridiflorene | 0.05 | 0.03 | Sesquiterpene |
| α-Muurolene | 0.06 | 0.05 | Sesquiterpene |
| epi-Elemol? | 0.07 | 0.07 | Sesquiterpenic alcohol |
| δ-Cadinene | 0.06 | 0.07 | Sesquiterpene |
| α-Elemol | 9.90 | 9.96 | Sesquiterpenic alcohol |
| Elemicin | 3.92 | 4.10 | Phenylpropanoid |
| Guaiol | 0.15 | 0.19 | Sesquiterpenic alcohol |
| γ-Eudesmol | 0.46 | 0.45 | Sesquiterpenic alcohol |
| β-Eudesmol | 0.27 | 0.29 | Sesquiterpenic alcohol |
| α-Eudesmol | 0.26 | 0.24 | Sesquiterpenic alcohol |
| Bulnesol | 0.48 | | Sesquiterpenic alcohol |
| Cryptomeridiol analog | 0.01 | 0.03 | Sesquiterpenic alcohol |
| α-Phellandrene dimer II | 0.07 | 0.07 | Diterpene |
| Cryptomeridiol | 0.04 | 0.04 | Sesquiterpenic alcohol |
| α-Phellandrene dimer IV | 0.01 | 0.02 | Diterpene |
| **Total identified** | **97.71%** | **97.41%** | |

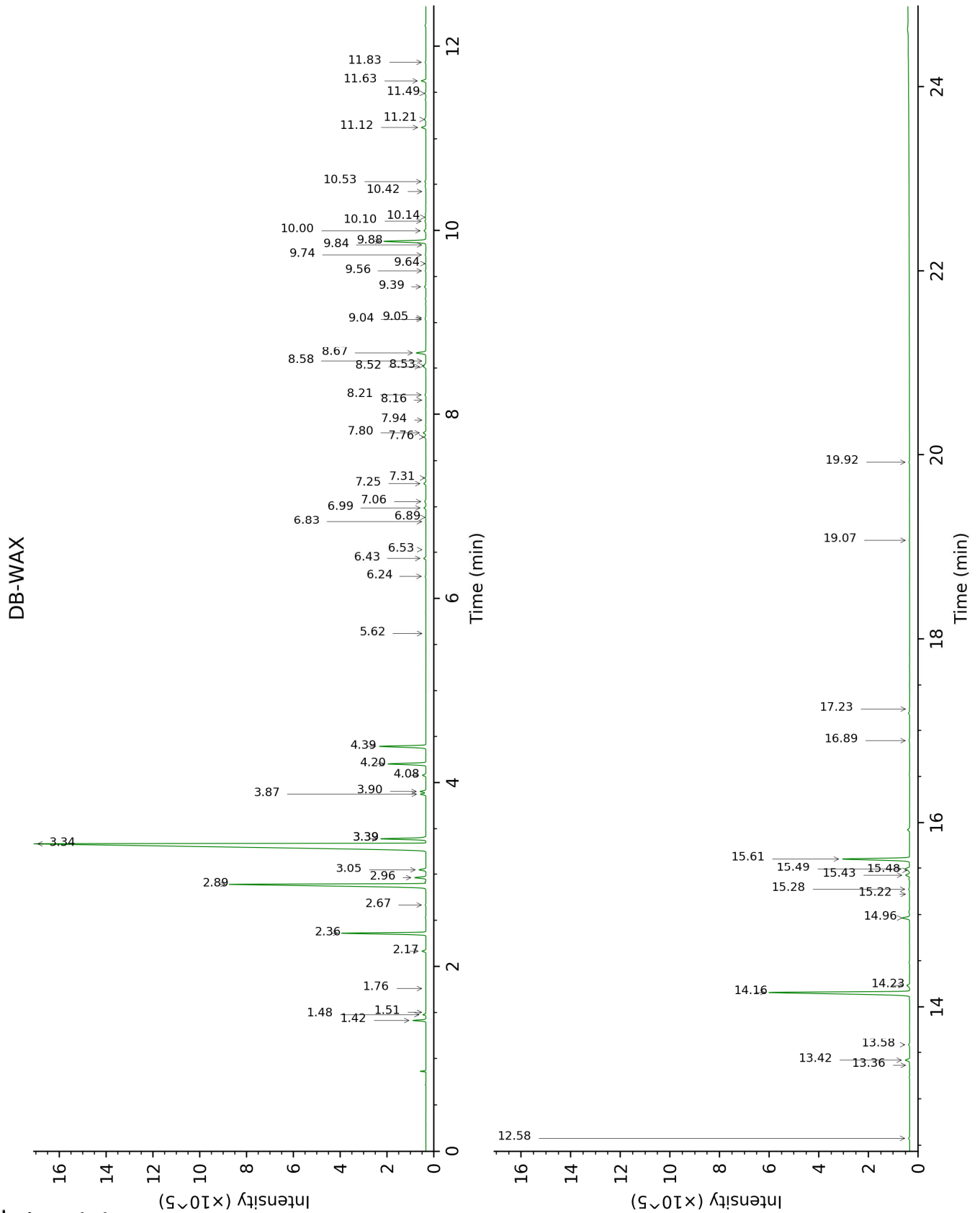*: Two or more compounds are coeluting on this column

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

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

Note: no correction factor was applied

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*Plus que des analyses... des conseils*

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DB-5



Time (min)

Intensity (×10^5)

Intensity (×10^5)

Time (min)

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DB-WAX

Time (min)

Intensity (×10^5)

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*FULL ANALYSIS DATA*

| Identification | Column DB-5 | | | Column DB-WAX | | |
|---|---|---|---|---|---|---|
| | R.T | R.I | % | R.T | R.I | % |
| Toluene | 1.11 | 755 | 0.01 | 1.51 | 1005 | 0.01 |
| α-Thujene | 2.91 | 923 | 0.13 | 1.48 | 1002 | 0.12 |
| α-Pinene | 2.98 | 928 | 0.57 | 1.42 | 996 | 0.56 |
| α-Fenchene | 3.17* | 941 | 0.02 | | | |
| Camphene | 3.17* | 941 | [0.02] | 1.76 | 1030 | 0.02 |
| β-Pinene | 3.59* | 969 | 4.52 | 2.17 | 1070 | 0.20 |
| Sabinene | 3.59* | 969 | [4.52] | 2.36 | 1090 | 4.33 |
| 3-Methyl-3-cyclohexenone | 3.74 | 979 | 0.05 | 6.24 | 1377 | 0.04 |
| 6-Methyl-5-hepten-2-one | 3.80 | 983 | 0.01 | | | |
| Myrcene | 3.92 | 991 | 0.55 | 2.96 | 1140 | 0.56 |
| α-Phellandrene | 4.08 | 1002 | 14.17 | 2.89 | 1134 | 14.20 |
| Δ3-Carene | 4.14 | 1006 | 0.05 | 2.67 | 1117 | 0.04 |
| α-Terpinene | 4.25 | 1013 | 0.39 | 3.05 | 1146 | 0.38 |
| para-Cymene | 4.38 | 1021 | 2.06 | 4.20 | 1232 | 2.10 |
| Limonene | 4.50* | 1028 | 50.35 | 3.34 | 1168 | 48.13 |
| β-Phellandrene | 4.50* | 1028 | [50.35] | 3.39* | 1172 | 2.26 |
| 1,8-Cineole | 4.50* | 1028 | [50.35] | 3.39* | 1172 | [2.26] |
| (Z)-β-Ocimene | 4.66 | 1038 | 0.27 | 3.87 | 1208 | 0.28 |
| (E)-β-Ocimene | 4.81 | 1048 | 0.18 | 4.08 | 1223 | 0.18 |
| γ-Terpinene | 4.93 | 1055 | 0.31 | 3.90 | 1211 | 0.30 |
| cis-Sabinene hydrate | 5.06 | 1063 | 0.11 | 6.99 | 1432 | 0.11 |
| para-Cymenene | 5.39* | 1084 | 2.75 | 6.44 | 1391 | 0.12 |
| Terpinolene | 5.39* | 1084 | [2.75] | 4.39 | 1245 | 2.62 |
| Linalool | 5.64 | 1100 | 0.02 | 8.16 | 1519 | 0.01 |
| Unknown [m/z 119, 109 (94), 43 (61), 95 (56), 91 (48), 77 (32), 152 (32), 137 (31), 134 (24)] | 5.74 | 1106 | 0.02 | 8.58 | 1551 | 0.01 |
| trans-para-Mentha-2,8-dien-1-ol | 5.90* | 1117 | 0.09 | 9.04 | 1587 | 0.03 |
| cis-para-Menth-2-en-1-ol | 5.90* | 1117 | [0.09] | 8.21 | 1523 | 0.06 |
| Limona ketone | 6.03 | 1125 | tr | 7.94 | 1502 | tr |
| allo-Ocimene | 6.08* | 1128 | 0.02 | 5.62 | 1333 | tr |
| cis-Limonene oxide | 6.08* | 1128 | [0.02] | 6.53 | 1398 | tr |
| cis-para-Mentha-2,8-dien-1-ol | 6.12 | 1131 | 0.04 | 9.56 | 1629 | 0.04 |
| Camphor | 6.18* | 1135 | 0.08 | 7.31 | 1456 | 0.04 |
| trans-para-Menth-2-en-1-ol | 6.18* | 1135 | [0.08] | 9.06 | 1588 | 0.03 |
| Epoxyterpinolene | 6.28 | 1141 | 0.04 | 6.83 | 1420 | 0.02 |

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| Compound | | | | | | |
|---|---|---|---|---|---|---|
| Unknown [m/z 95, 43 (74), 109 (72), 82 (62), 110 (50)... 152 (14)] | 6.32 | 1144 | 0.05 | 7.06 | 1437 | 0.08 |
| Unknown [m/z 95, 110 (38), 81 (21), 79 (16)... 152 (7)] | 6.59 | 1161 | 0.12 | 7.76 | 1488 | 0.10 |
| Unknown [m/z 95, 110 (43), 81 (28), 41 (15)... 152 (8)] | 6.65 | 1165 | 0.18 | 7.80 | 1492 | 0.18 |
| Terpinen-4-ol | 6.76 | 1172 | 0.62 | 8.67 | 1558 | 0.58 |
| Unknown [m/z 109, 82 (77), 41 (56), 119 (55), 91 (54)... 152 (17)] | 6.85 | 1178 | 0.05 | | | |
| para-Cymen-8-ol | 6.93 | 1183 | 0.27 | 11.63 | 1801 | 0.28 |
| α-Terpineol | 7.00 | 1188 | 2.37 | 9.88 | 1655 | 2.55 |
| α-Phellandrene epoxide | 7.14 | 1196 | 0.29 | 11.12 | 1758 | 0.28 |
| *trans*-Piperitol | 7.26 | 1204 | 0.03 | 10.42 | 1698 | 0.01 |
| *trans*-Carveol | 7.43 | 1216 | 0.10 | 11.49 | 1789 | 0.07 |
| *cis*-Carveol | 7.61 | 1228 | 0.06 | 11.83 | 1818 | 0.05 |
| Carvone | 7.75 | 1237 | 0.08 | 10.10 | 1672 | 0.07 |
| Carvotanacetone | 7.80 | 1240 | 0.03 | 9.64 | 1635 | 0.03 |
| Unknown [m/z 43, 97 (69), 107 (46), 41 (28), 55 (21), 109 (20)...] | 7.90* | 1247 | 0.25 | 11.21 | 1765 | 0.12 |
| Piperitone | 7.90* | 1247 | [0.25] | 10.00 | 1664 | 0.14 |
| Thymol | 8.61 | 1295 | 0.02 | 15.22 | 2136 | 0.02 |
| Carvacrol | 8.79 | 1307 | 0.07 | 15.48 | 2162 | 0.06 |
| Unknown [m/z 111, 126 (93), 43 (90), 71 (60)...] | 8.87 | 1313 | 0.06 | 15.28 | 2141 | 0.06 |
| δ-Elemene isomer | 9.14 | 1332 | 0.04 | 6.89 | 1424 | 0.02 |
| α-Copaene | 9.68 | 1370 | 0.13 | 7.25 | 1451 | 0.13 |
| β-Elemene | 9.92 | 1387 | 0.09 | 8.53 | 1548 | 0.10 |
| Unknown [m/z 71, 100 (92), 111 (79), 69 (46), 109 (45)...] | 9.99 | 1392 | 0.05 | 17.23 | 2345 | 0.02 |
| Methyleugenol | 10.14 | 1402 | 0.25 | 13.42 | 1962 | 0.28 |
| β-Caryophyllene | 10.25 | 1410 | 0.15 | 8.52 | 1547 | 0.16 |
| (*trans*?)-6-Hydroxypiperitone | 10.30 | 1414 | 0.04 | 16.89 | 2308 | 0.06 |
| α-Humulene | 10.71 | 1445 | 0.10 | 9.39 | 1615 | 0.10 |
| Unknown [m/z 109, 110 (33), 43 (30), 95 (23), 71 (20), 41 (19)...] | 10.78 | 1450 | 0.02 | | | |
| Germacrene D | 11.09* | 1473 | 0.13 | 9.84 | 1652 | 0.02 |
| Unknown [m/z 149, 205 (84), 177 | 11.09* | 1473 | [0.13] | | | |

| | | | | | | |
|---|---|---|---|---|---|---|
| (78), 220 (54)] | | | | | | |
| Viridiflorene | 11.29 | 1488 | 0.05 | 9.74 | 1643 | 0.03 |
| α-Muurolene | 11.38 | 1494 | 0.06 | 10.14 | 1676 | 0.05 |
| epi-Elemol? | 11.64 | 1515 | 0.07 | 13.58 | 1977 | 0.07 |
| δ-Cadinene | 11.68 | 1518 | 0.06 | 10.53 | 1708 | 0.07 |
| α-Elemol | 12.05 | 1547 | 9.90 | 14.16 | 2032 | 9.96 |
| Elemicin | 12.18 | 1557 | 3.92 | 15.61 | 2175 | 4.10 |
| Guaiol | 12.62 | 1592 | 0.15 | 14.23 | 2039 | 0.19 |
| γ-Eudesmol | 13.01 | 1624 | 0.46 | 14.96 | 2110 | 0.45 |
| β-Eudesmol | 13.22 | 1641 | 0.27 | 15.49 | 2163 | 0.29 |
| α-Eudesmol | 13.26 | 1644 | 0.26 | 15.43 | 2156 | 0.24 |
| Bulnesol | 13.43 | 1658 | 0.48 | | | |
| Cryptomeridiol analog | 14.65 | 1762 | 0.01 | 19.07 | 2550 | 0.03 |
| α-Phellandrene dimer II | 14.92 | 1785 | 0.07 | 12.58 | 1885 | 0.07 |
| Cryptomeridiol | 15.09 | 1800 | 0.04 | 19.92 | 2652 | 0.04 |
| α-Phellandrene dimer IV | 15.34 | 1822 | 0.01 | 13.36 | 1957 | 0.02 |
| **Total identified** | | **97.71%** | | | **97.41%** | |
| **Total reported** | | **98.28%** | | | **97.99%** | |

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

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

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

Note: no correction factor was applied
R.T.: Retention time (minutes)
R.I.: Retention index