SUPPLEMENTARY MATERIALS

Morphological, anatomical, and phytochemical studies of *Carlina acaulis* L. cypsela

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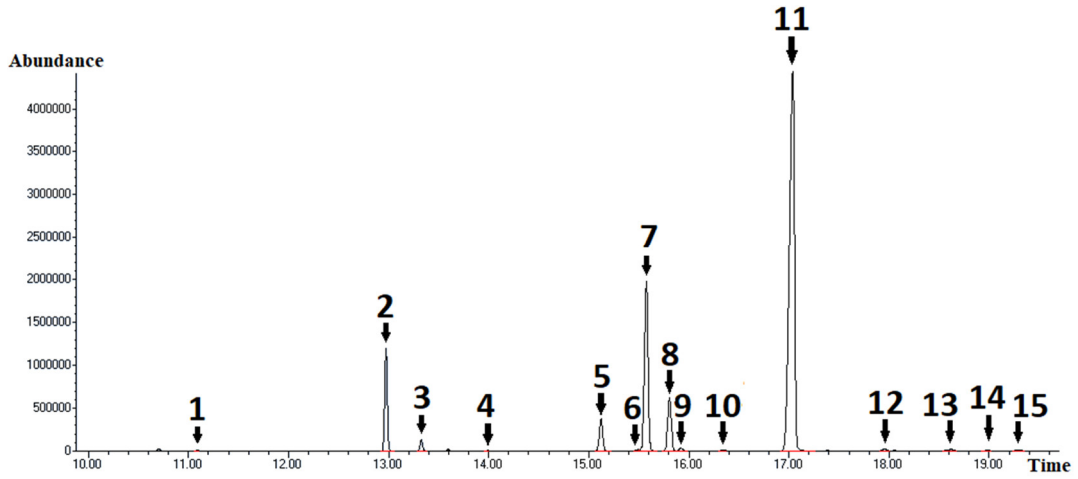


Figure 1. Example of a GC-MS chromatogram of *Carlina acaulis* cypsela oil. 1 – Myristic acid, 2 – Palmitic acid, 3 – cis-5-hexadecenoic acid ?, 4 – Margaric acid, 5 – Stearic acid, 6 – Unidentified compound, 7 – 5-Octadecenoic acid, 8 – Oleic acid, 9 – 8-Octadecenoic acid or 11- Octadecenoic acid, 10 – 9,12-Octadecadienoic acid, 11 – Linoleic acid, 12 – Arachidic acid, 13 – alpha-Linolenic acid, 14 – 11,14,17-Eicosadienoic acid or 9,12-Octadecadienoic acid, 15 – Mangiferic acid. HP-88 Agilent capillary column (60 m × 0.25 mm; 0.20 μm film thickness). The oven temperature was programmed from 110 °C to 190 °C with 8 °C/min, hold for 2 min at 110 °C and 13 min at 190 °C. The temperature of the injector was 250 °C. Helium was used as a carrier gas at a flow rate of 1.2 mL/min A quadrupole mass spectrometer with electron ionization (EI) at 70 eV and with a full scan type acquisition mode (50 m/z to 500 m/z) was used as a detector connected with the GC. The temperature of the MS source and the MS quadrupole was set to 230 °C and 150 °C, respectively.

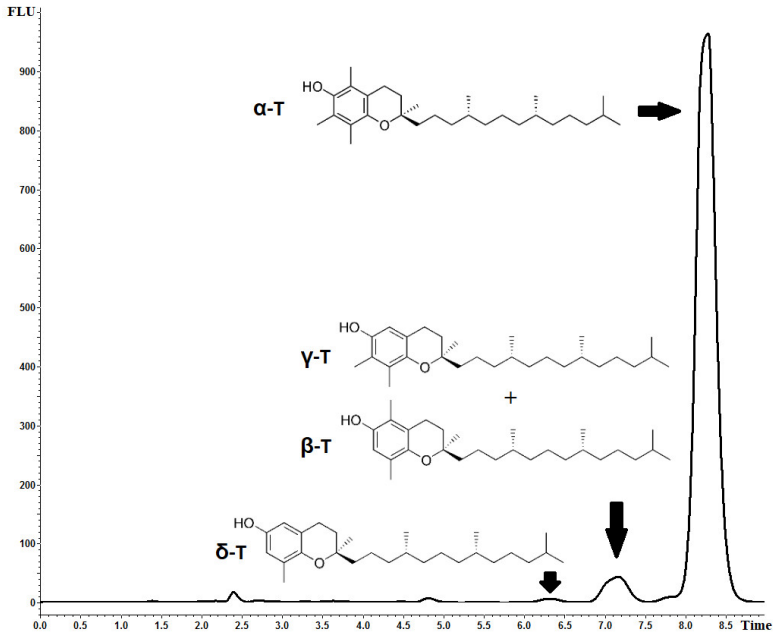
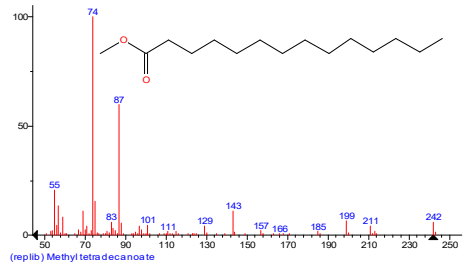
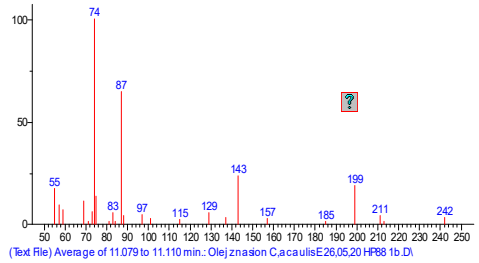
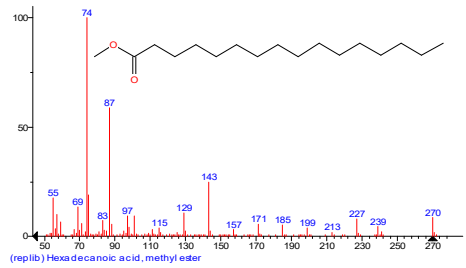
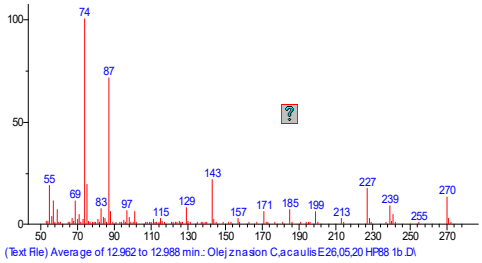
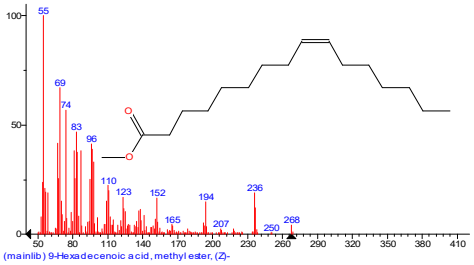
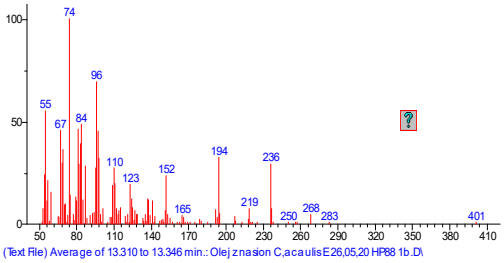
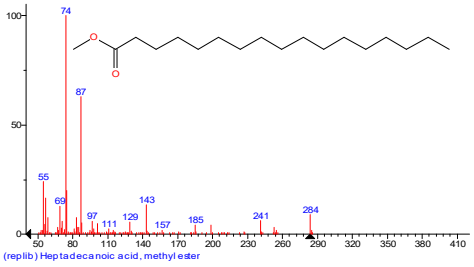
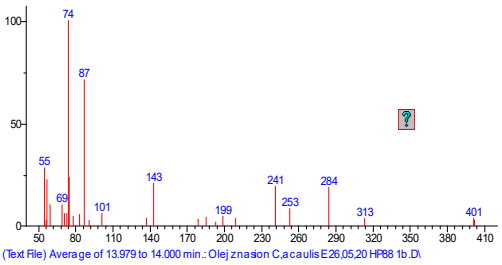


Figure 2. Example of an HPLC-FLD chromatogram of *Carlina acaulis* cypsela oil. The analysis was performed on an RP18e LiChrospher 100 column (25 cm x 4.0 mm i.d., 5 µm particle size). The column temperature was set to 30 °C. Acetonitrile and methanol (5:95 v/v) at a flow rate of 1.2 mL/min were used as eluent. λex=296 nm, λem=330 nm. α-T – alpha-Tocopherol, β-T – beta-Tocopherol, γ-T – gamma-Tocopherol, δ-T – delta-Tocopherol.

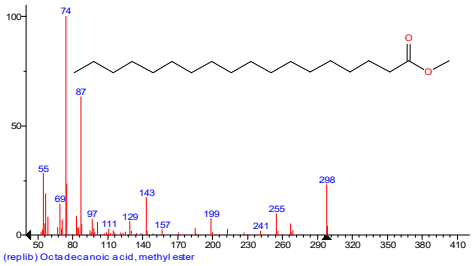
Table 1. Mass spectra for standards (based on the NIST database) and investigated fatty acids.

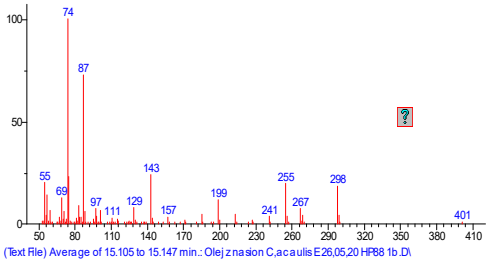
Spectra of standards substances	Spectra of investigated compounds
 (replib) Methyl tetradecanoate Myristic acid methyl ester	 (Text File) Average of 11.079 to 11.110 min.: Olej znasion C,acaulisE26,05,20 HP88 1b.D\
 (replib) Hexadecanoic acid, methyl ester Palmitic acid methyl ester	 (Text File) Average of 12.962 to 12.988 min.: Olej znasion C,acaulisE26,05,20 HP88 1b.D\
 (mainlib) 9-Hexadecenoic acid, methyl ester, (Z)- Palmitoleic acid methyl ester	 (Text File) Average of 13.310 to 13.346 min.: Olej znasion C,acaulisE26,05,20 HP88 1b.D\ cis-5-hexadecenoic acid ?



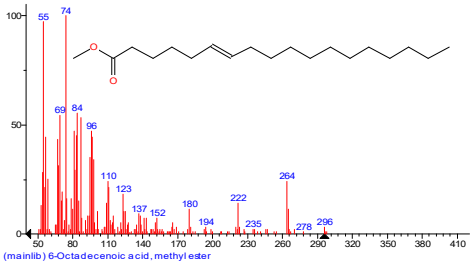


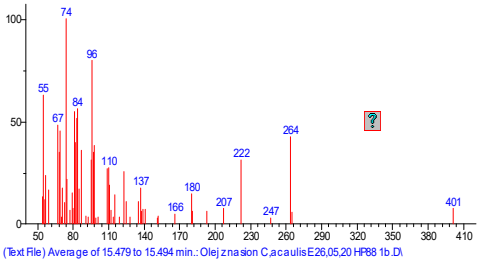
Margaric acid methyl ester



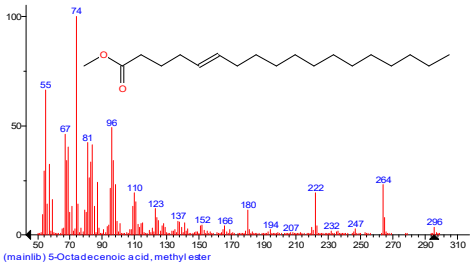


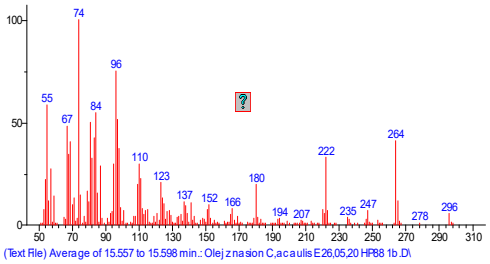
Stearic acid methyl ester



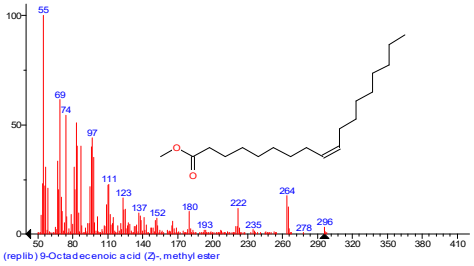


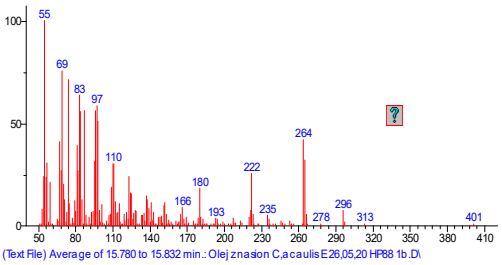
6-Octadecenoic acid methyl ester



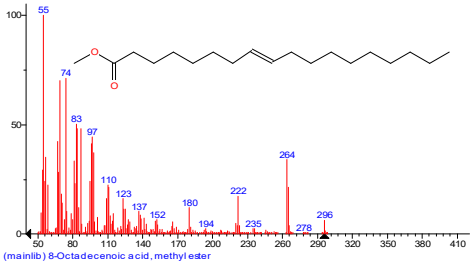


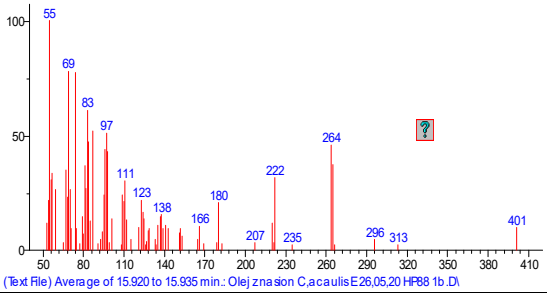
5-Octadecenoic acid methyl ester



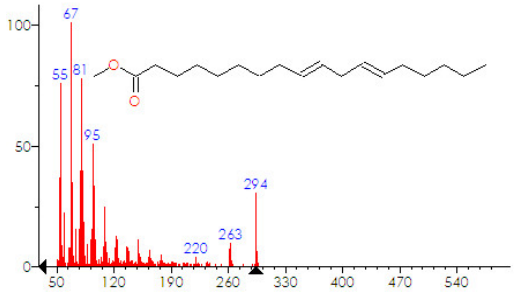


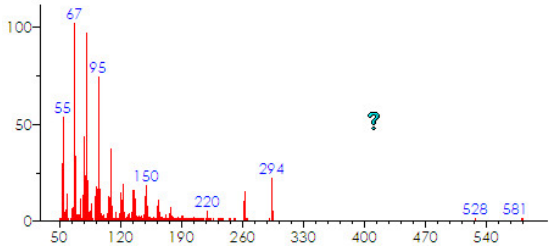
Oleic acid methyl ester



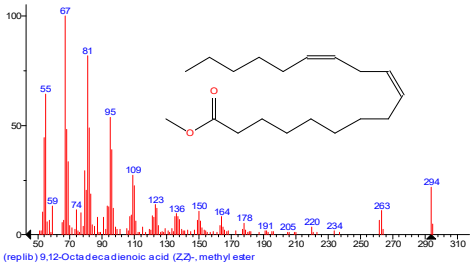


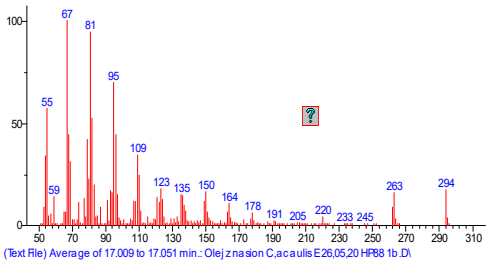
8-Octadecenoic acid methyl ester



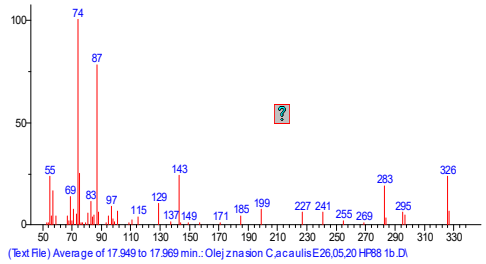


9,12-Octadecadienoic acid methyl ester

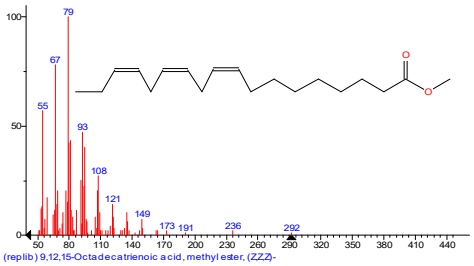


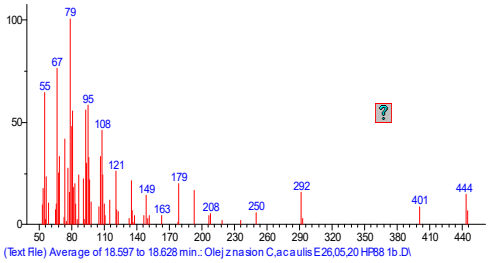


Linoleic acid methyl ester

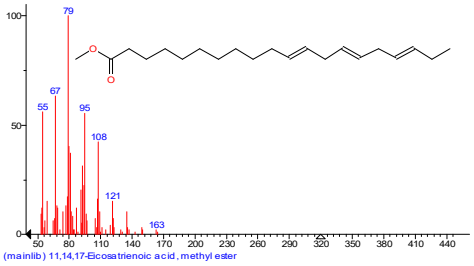


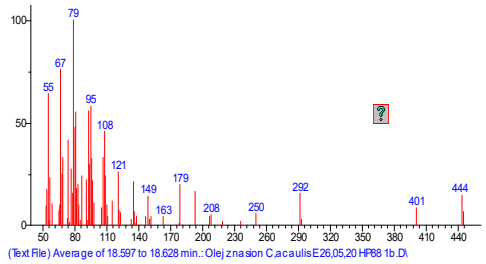
Arachidic acid methyl ester



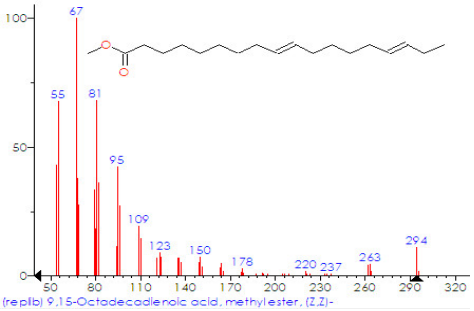


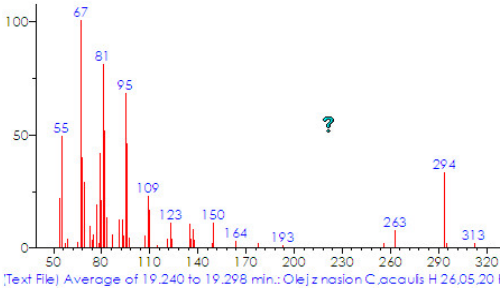
alpha-Linolenic acid methyl ester





11,14,17-Eicosatrienoic acid methyl ester





Mangiferic acid methyl ester

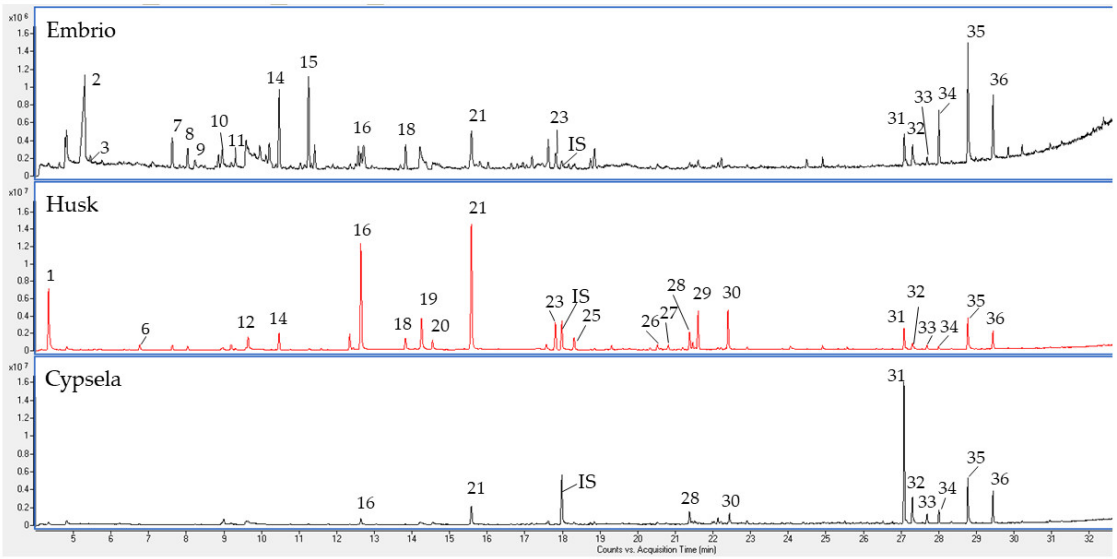
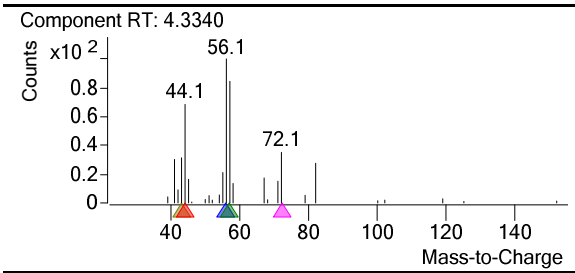
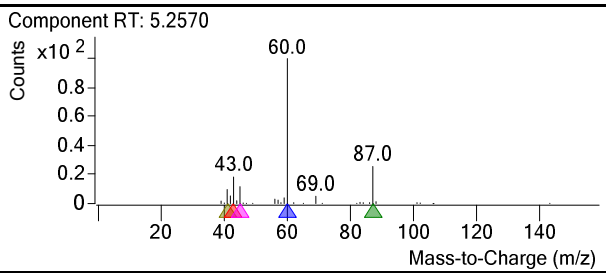
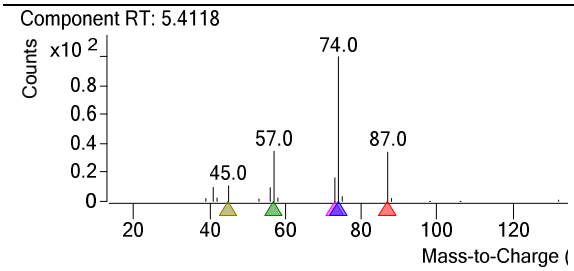


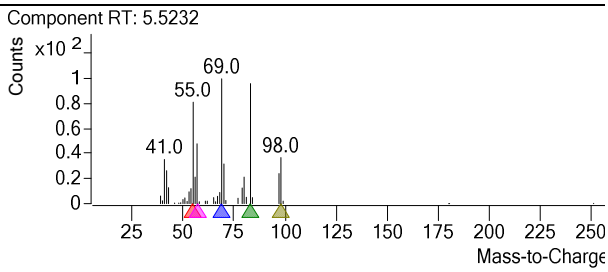
Figure 3. Example of a GC-MS chromatogram of volatile compounds in *Carlina acaulis* cypselae. 1 – hexanal, 2- 3-Methylbutanoic acid, 3 - 2-Methylbutanoic acid, 4 – 2-Hexenal, 5 - Pentanoic acid, 6 – Heptanal, 7 – α-Thujene, 8 – Camphene, 9 – γ-Valerolactone, 10 – Hexanoic acid, 11 – 2-Pentylofurane, 12 – Octanal, 13 – Limonene, 14 – Eucalyptol, 15 – 4,5-Dimethylnonane, 16 – Nonanal, 17 – 2-Ethylhexanoic, 18 – Camphor, 19 – 2-Nonenal, 20 – Octanoic acid, 21 – Decanal, 22 – Nonanoic acid, 23 – Bornyl acetate, IS – 2-Undecanone (internal standard), 25 – Undecanal, 26 – Tertadecane, 27 – Dodecanal, 28 – trans-Geranylactone, 29 – Alloaromadendrene, 30 – Tridecanal, 31 – Isopropyl myristate, 32 – Farnesyl acetaldehyde, 33 – Phtalic acid, hept-4-yl isobutyl ester, 34 – Nonandecane, 35 – 2-Ethylhexyl octadecyl carbonate, 36 – Isopropyl palmitate, 37 – Heneicosane, 38 – 2-Ethylhexyl 4-methoxycinnamate. The analysis was performed using Agilent 7890B GC coupled with the 7000GC/TQ system (Agilent Technologies, Paolo Alto, CA). Separation was carried out on an HP-5 MS column; 30m × 0.25 mm × 0.25 μm (J&W, Agilent Technologies, Palo Alto, CA) at a constant helium flow of 1 mL/min. The injector temperature was set at 250°C and the sample was applied in a split mode (20:1). The temperature program was 50°C for 1 min, followed by 4°C/min to 130°C, 10°C/min to 280°C, and held isothermal for 2 min. The MS source was set at 230°C, the transfer line was 320°C, and the quadrupole temperature was 150°C. The electron ionization energy was set at 70 eV, scan range, m/z 30-400.

Table 2. Mass spectra of investigated volatile compounds.

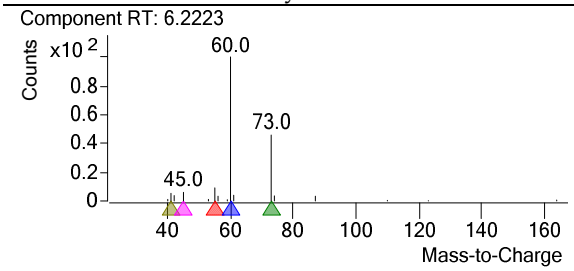
	
1. Hexanal	2. 3-Methylbutanoic acid



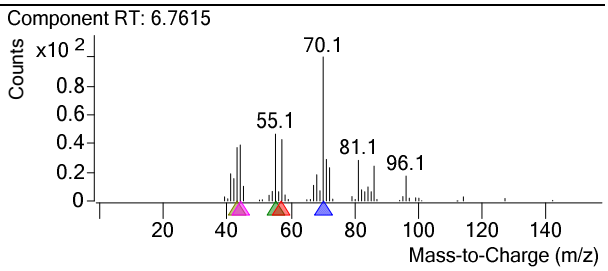
3. 2-Methylbutanoic acid



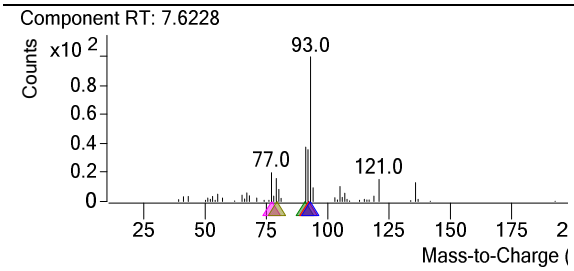
4. 2-Hexenal



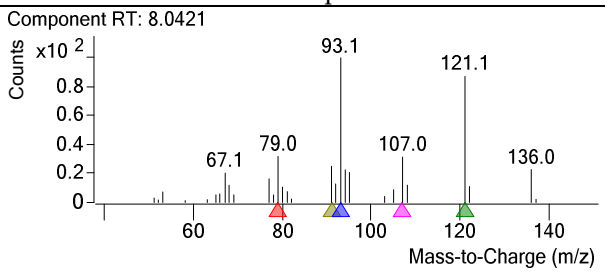
5. Pentanoic acid



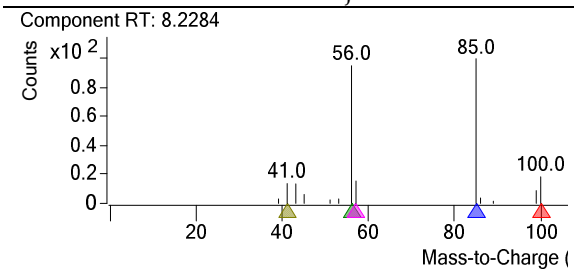
6. Heptanal



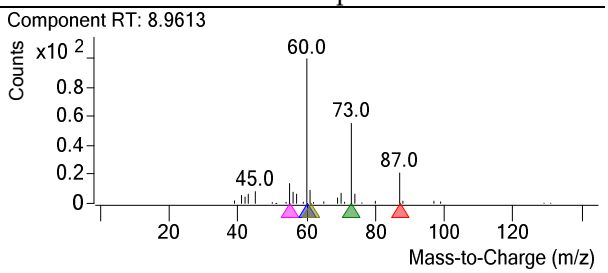
7. α-Thujene



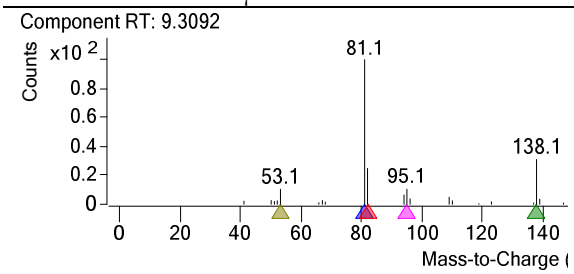
8. Camphene



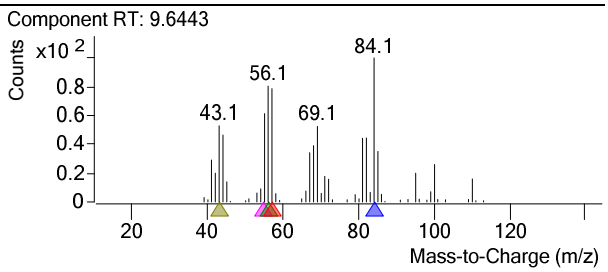
9. γ-Valerolactone



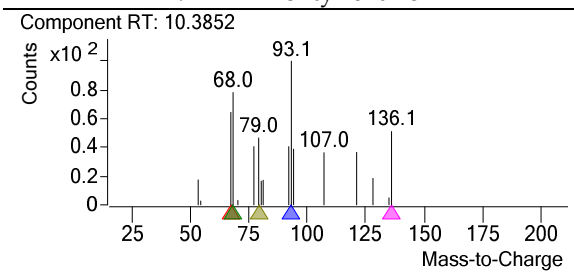
10. Hexanoic acid



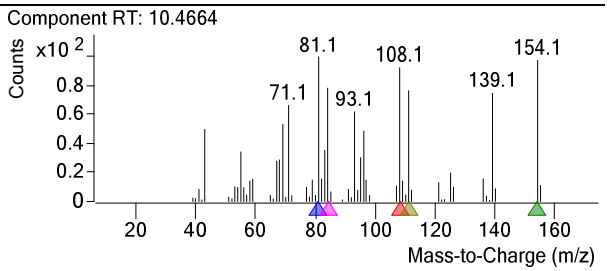
11. 2-Pentylfurane



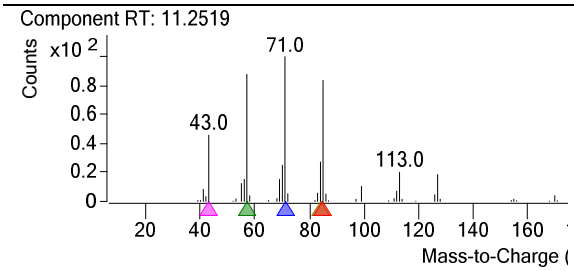
12. Octanal



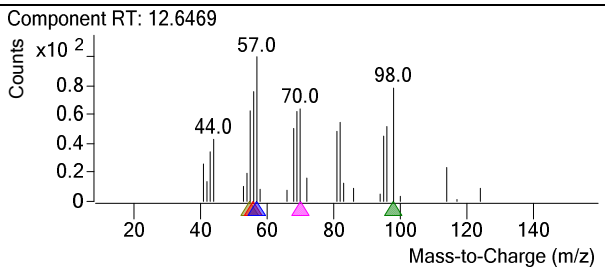
13. Limonene



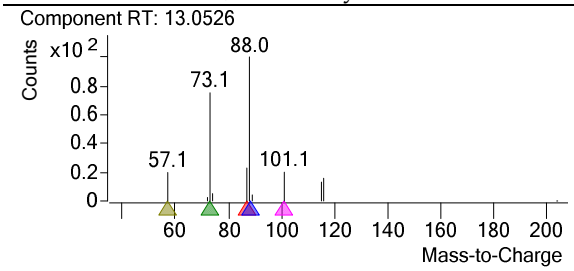
14. Eucalyptol



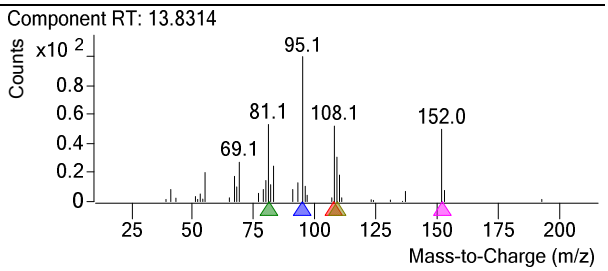
15. 4,5-Dimethylnonane



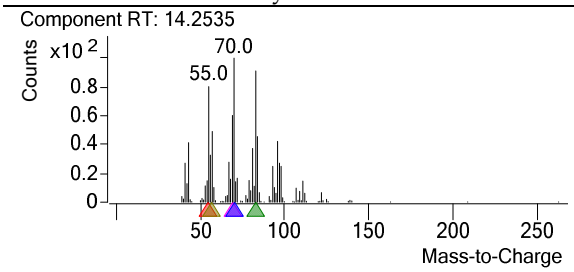
16. Nonanal



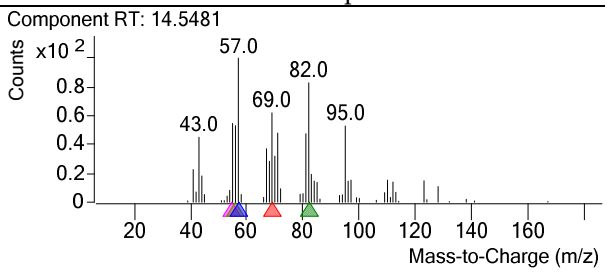
17. 2-Ethylhexanoic acid



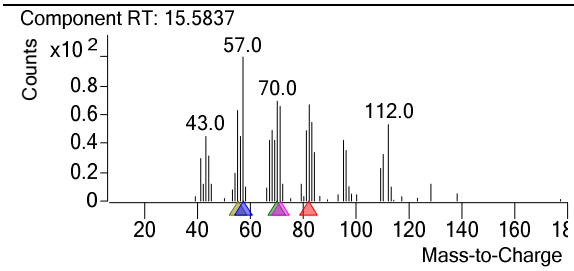
18. Camphor



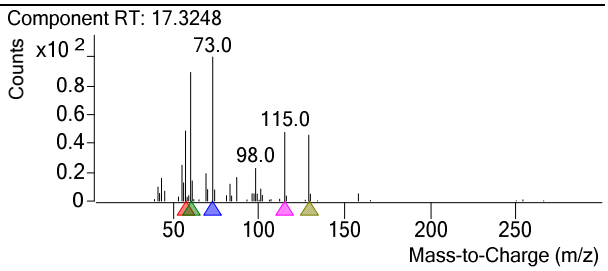
19. 2-Nonenal



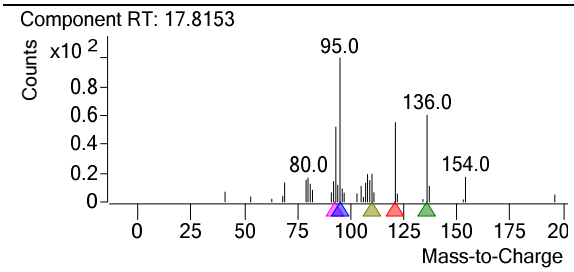
20. Octanoic acid



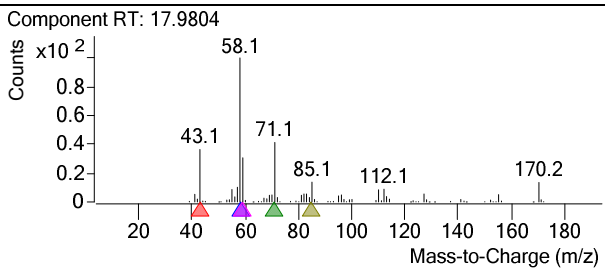
21. Decanal



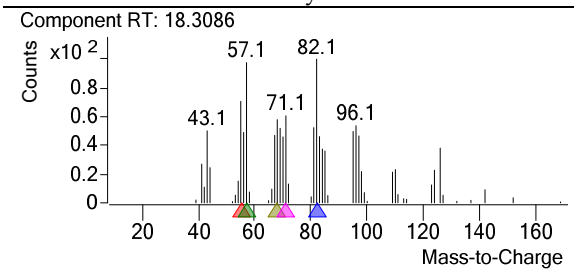
22. Nonanoic acid



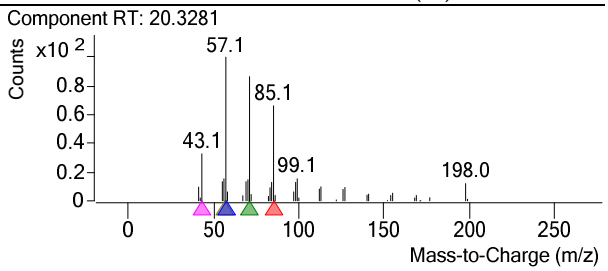
23. Bornyl acetate



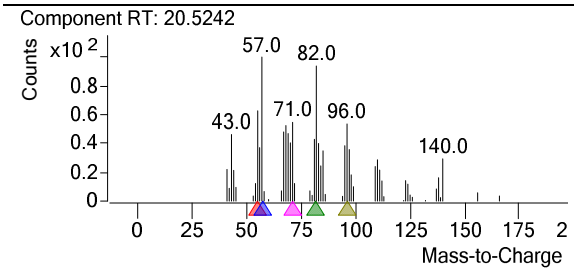
24. 2-Undecanone (IS)



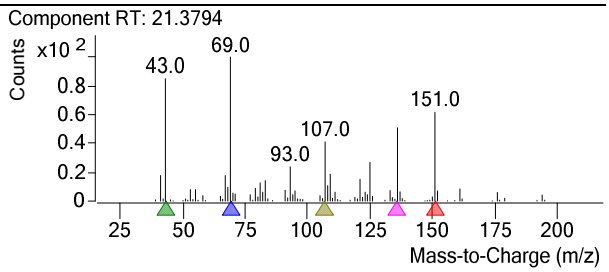
25. Undecanal



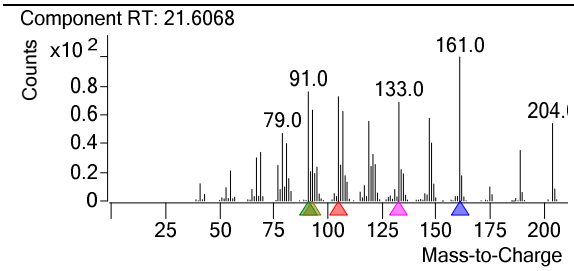
26. Tertadecane



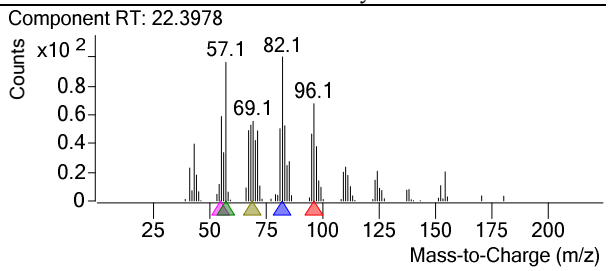
27. Dodecanal



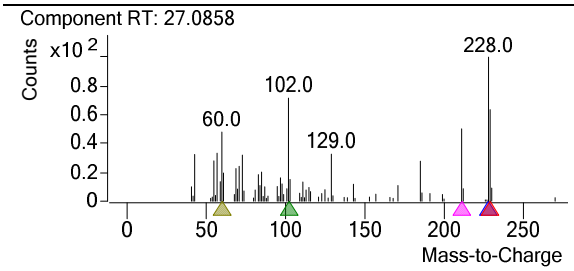
28. trans-Geranylacetone



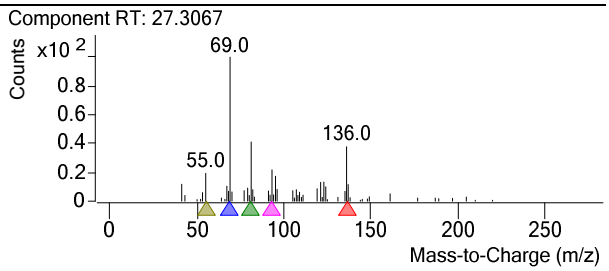
29. Alloaromadendrene



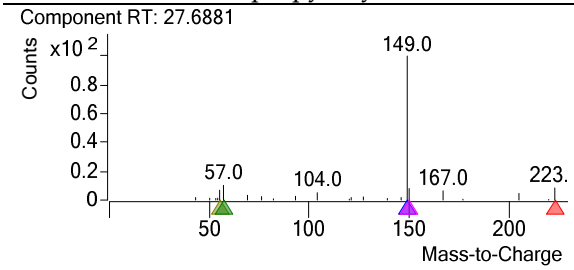
30. Tridecanal



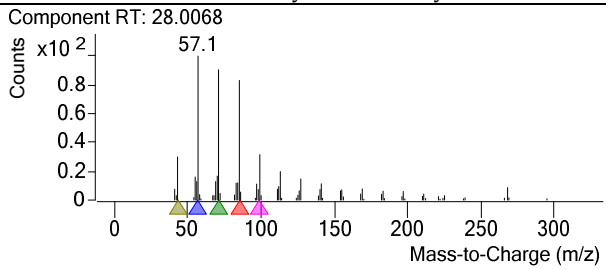
31. Isopropyl myristate



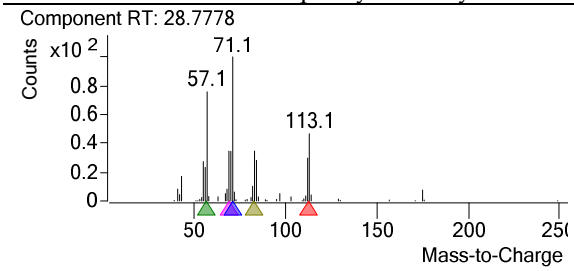
32. Farnesyl acetaldehyde



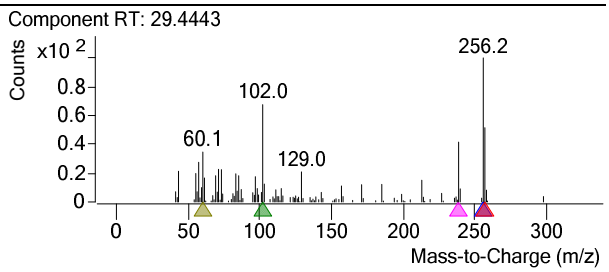
33. Phtalic acid, hept-4-yl isobutyl ester



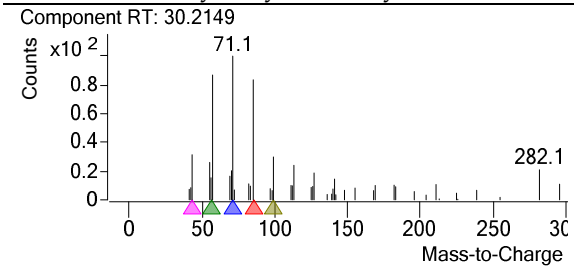
34. Nonadecane



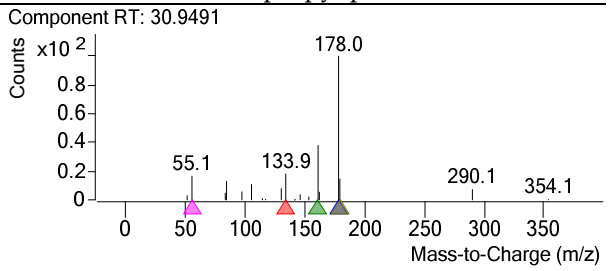
35. 2-Ethylhexyl octadecyl carbonate



36. Isopropyl palmitate



37. Heneicosane



38. 2-Ethylhexyl 4-methoxycinnamate