

# High-value compounds from trees and other plant materials

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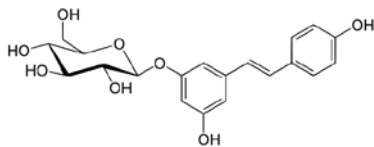
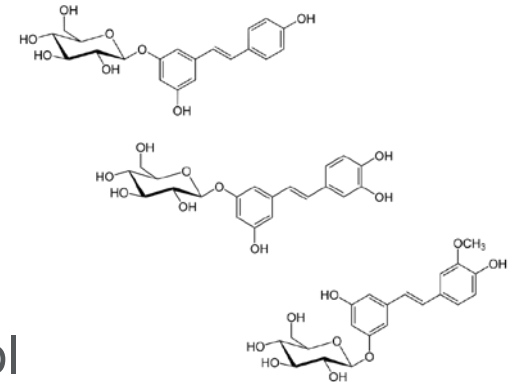
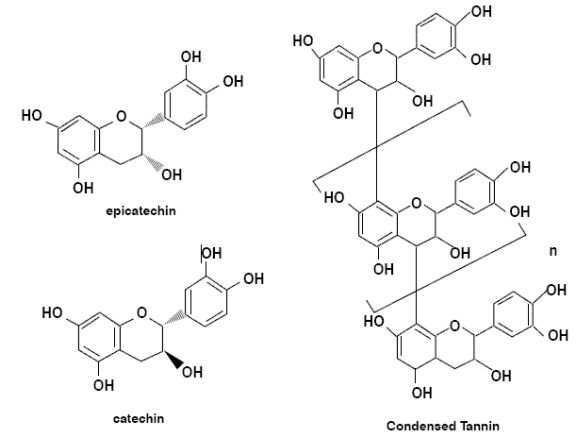
# Utilization of tree bark

- The volume of bark in roundwood is ~10%
- Roundwood consumption was 74 million m<sup>3</sup> in 2018
- 7.4 million m<sup>3</sup> bark sidestream was generated

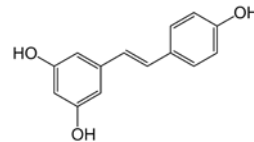


# Norway spruce bark

- **Outer bark (90% of bark)**
  - Contains e.g. tannins
  - Can be extracted using hot water
- **Inner bark (10% of bark)**
  - Contains e.g. stilbenes
  - Can be extracted using aqueous ethanol
  - Antioxidant preventing the growth of microbes and fungi, antitumor and anti-inflammatory properties



**Piceid** from spruce



**Resveratrol** from red wine



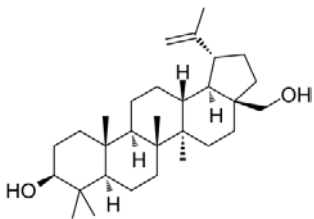
# Other materials from trees

## Birch outer bark



### Betulin and betulinic acid

Antiseptic, anti-inflammatory, antioxidant, antiviral, prevents melanoma



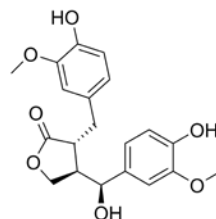
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## Softwood knotwood



### Lignans and stilbenes

Powerful antioxidant, prevents e.g. hot flashes related to menopause

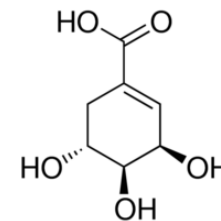


## Needles



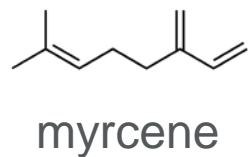
### Shikimic acid and quinic acid

Antioxidant, precursor of influenza medicine

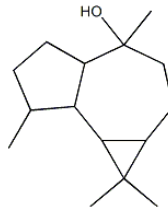


# From forest to wetlands

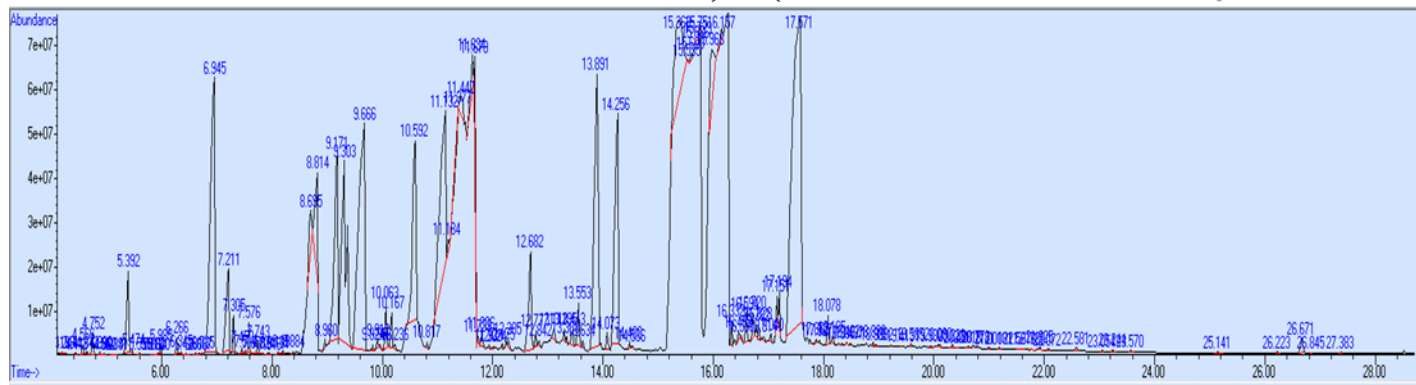
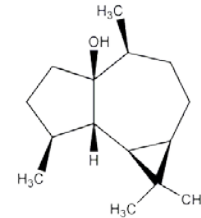
- Marsh Labrador tea (*Rhododendron tomentosum*)
- Bog-myrtle (*Myrica gale*)
  - Contain essential oils (steam distillation or SCCO)



ledol



palustrol



Chromatogram of Marsh Labrador tea - extract

- Can be used as insect repellent and antimicrobial / antifungal finishings in e.g. textiles

# Projects related to high-value compounds

- Futute Bio-Arctic Design
  - Susan Kunnas et al.
- Arctic FingerPrint
  - Susan Kunnas et al.
- Biopolyester based hydrophobic and antimicrobial coating of lignocellulosic materials
  - Risto Korpinen et al.
- Wood hydrocolloids
  - Petri Kilpeläinen et al.
- Tannins for waste water treatment
  - Hanna Brännström et al.
- Boosting the use of high-value substances from trees: innovating treatment techniques for improved usability in products (just ended)
  - Tuula Jyske et al.

Thank you!