

Organic valuables from Moss: From Paliducultured plants to important ingredients for Industry.

Pius Kairigo Project Researcher,
TURBITS seminar, 28.04.2026



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Outline

- Organic valuables
- Moss as a resource?
- Untargeted profiling approach
- Results and compound classes
- Highlighted valuable compounds
- Summary



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Organic valuables

Compounds with potential for industrial, pharmaceutical, or bioactive applications

Mostly secondary plant metabolites

Defense- signalling- Stress relief

What defines the value?

- Biological activity
- Extractability
- Abundance
- Novelty/specificity- uniqueness



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Why moss?

- High stress tolerance → rich metabolome, Unique metabolites
- Grown on rewetted peatlands → no competition with food crops
- Supports → carbon sequestration, Land restoration and sustainable biomass production



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Moss species

Sphangnum
Angustifolium (SA)



Sphangnum
Cuspidatum (SC)

Sphangnum
Fuscum (SF)



Sphangnum
Medium (SM)



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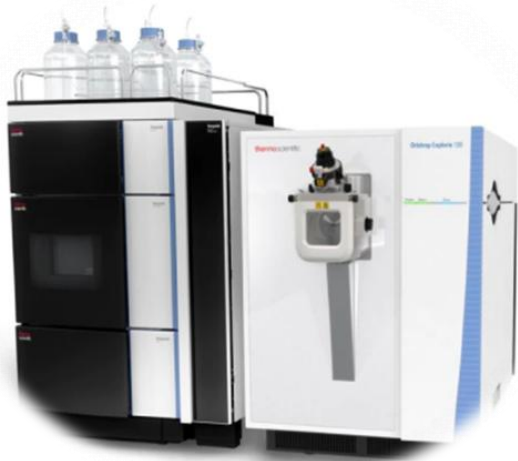


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What is untargeted profiling?

Detect all measurable compounds, not predefined targets

Polar and semi-polar compounds



UHPLC-Orbitrap HRMS

Information we get from untargeted mapping

- I. Which compounds are present
- II. Relative abundance of the compounds
- III. Distribution → species, plant parts, solvent, polarity

Untargeted profiling maps the chemical landscape of moss



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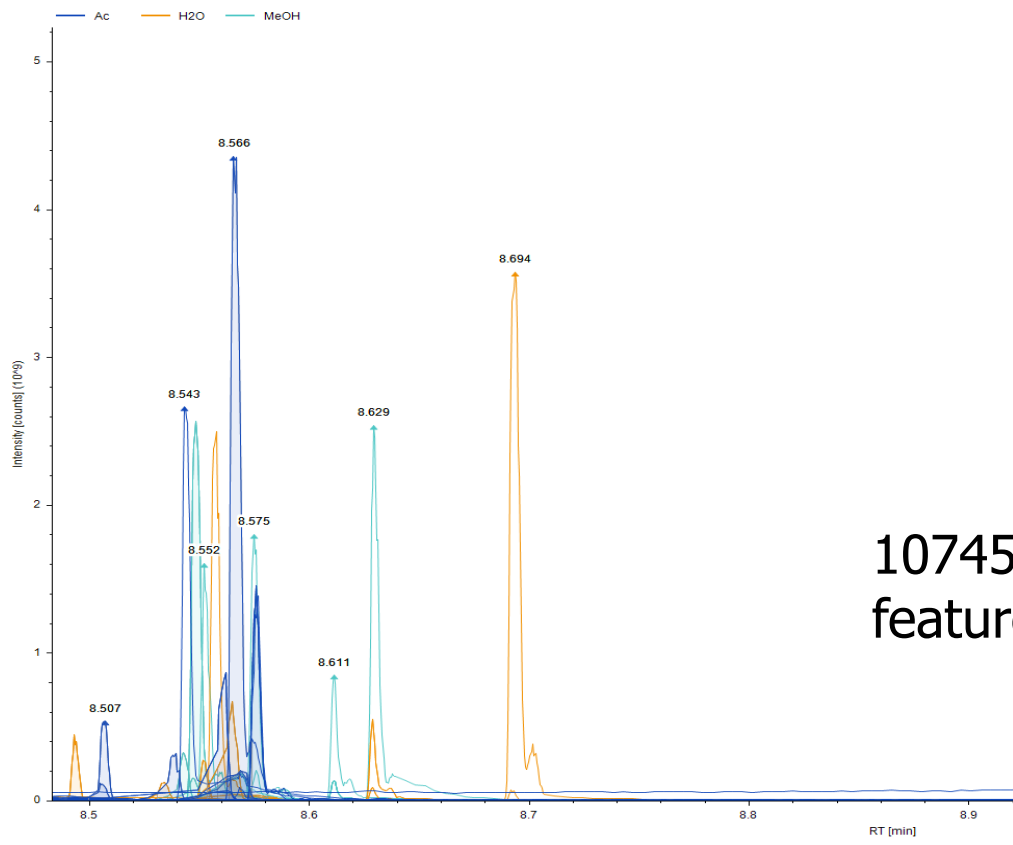


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Results



Data analysis filters



10745
features

Annotation (level 2)

144
compounds

chromatogram



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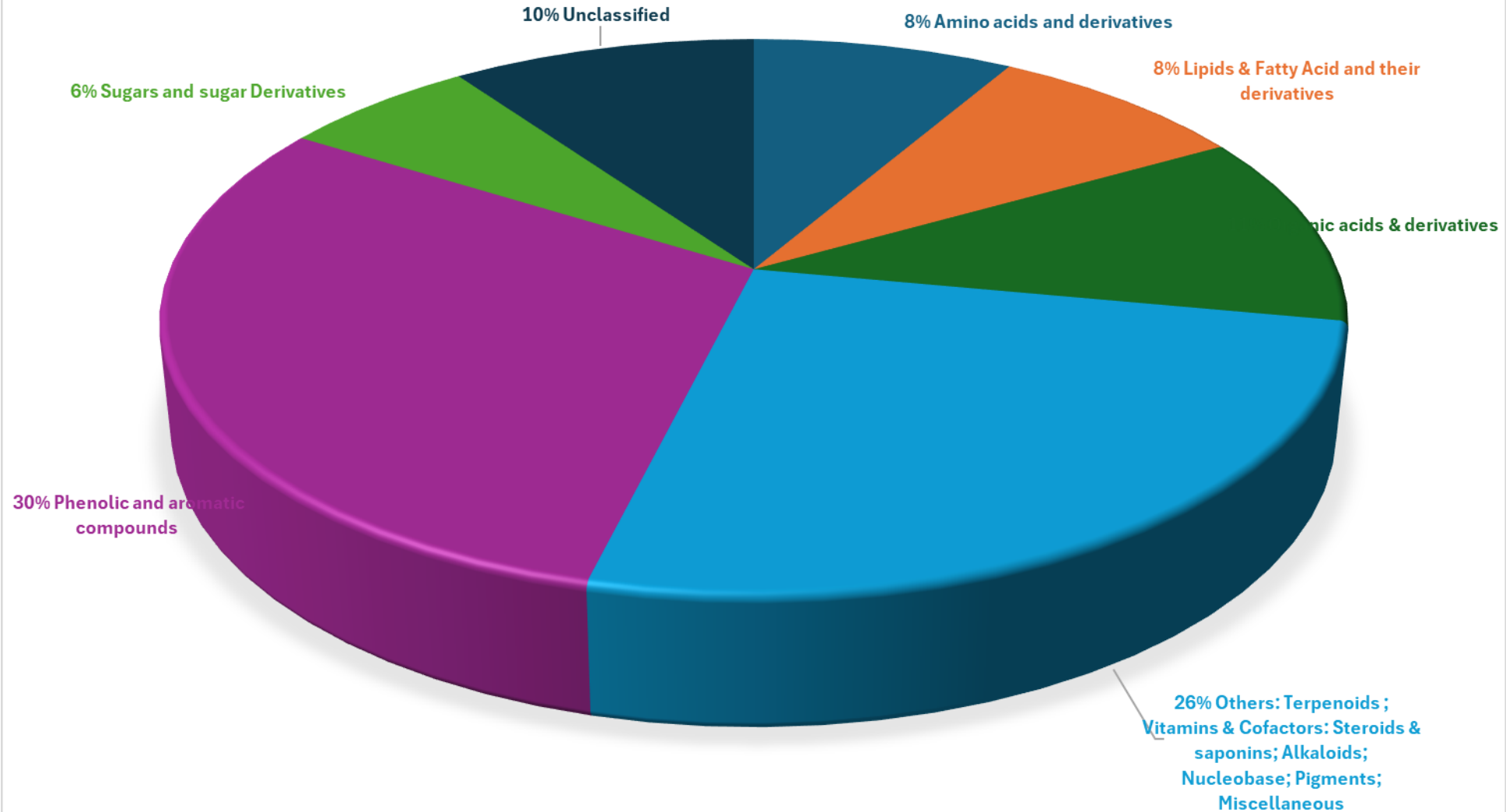


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Classification



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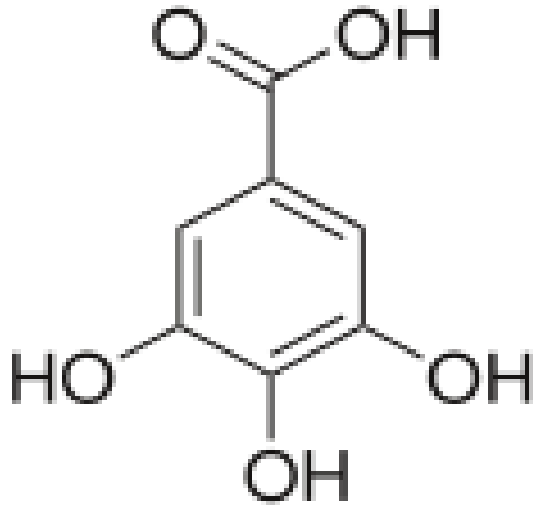
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Valuable compounds

Gallic acid



Source:

Water, SA and SC



Industrial applications

Nutraceuticals and Cosmeceuticals

Preservative in functional foods

Water-soluble, green binders



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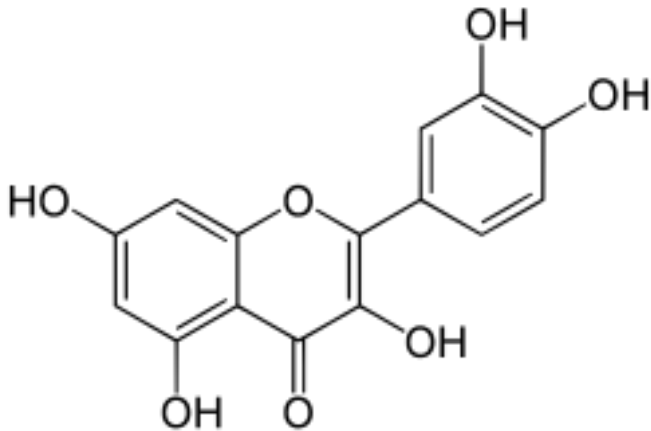
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Valuable compounds

Quercetin



Flavonoid

Source

SC- MeOH



Industrial Applications

- Active & Intelligent Food Packaging
- Functional Foods & Nutraceuticals
- Sustainable Cosmetics & Skincare
- Eco-friendly Biopolymer Stabilizers



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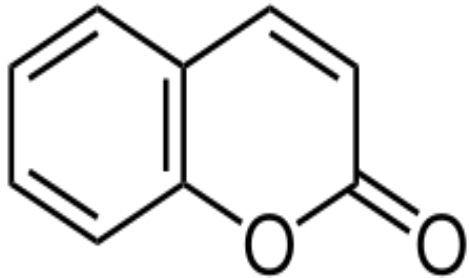
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Valuable compounds

Coumarin



Source:

MeoH and SC

Defense compound

Industrial Applications



Fragrances and cosmetics



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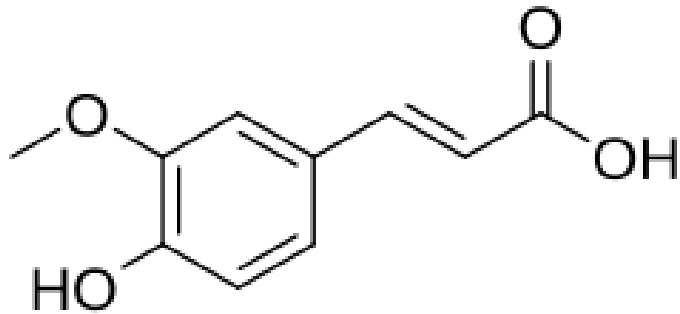
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Valuable Compounds

Ferulic acid acid

Source

Ac, SA



Phenolic acid



Industrial applications

Nutraceuticals and cosmeceuticals

Preservative in functional foods



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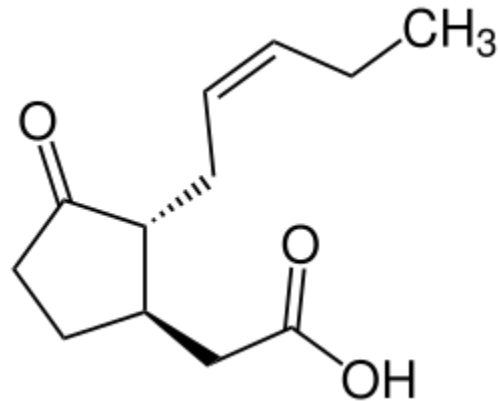
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Valuable Compounds

Jasmonic acid



Source

Ac, SM



Defense compound

Stress resistance

Industrial applications

Agriculture & Seed treatment

Pharmaceutical production

Fragrance and flavours



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Summary

- Moss is chemically rich
- Valuable source for a blend of functional ingredients
- Potential novel organic compounds



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Research group for Organic Analytics for Circular Economy

<https://www.jyu.fi/en/research-groups/organic-analytics-for-circular-economy>



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