Interreg Baltic Sea Region

Co-funded by the European Union

CIRCULAR ECONOMY CEforestry

Techno-economic feasibility of tannins

Susanna Forssell, Aalto University

Techno-economic feasibility of tannins

Susanna Forssell, Aalto University

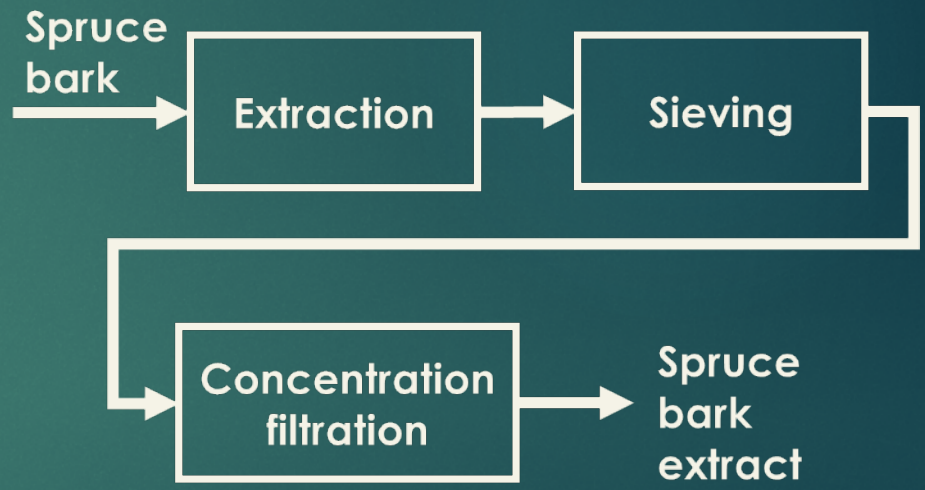
Interreg Baltic Sea Region
Co-funded by the European Union
CIRCULAR ECONOMY
CEforestry

Introduction

- Aalto University's role in the CEforestry project was to assess technical feasibility and economic viability of industrial-scale processes utilizing forest industry residues
- Focus today is on three concepts for value-added utilization of tannins from bark:
  - Spruce bark extract for replacement of biocides
  - Spruce bark extract as a leather tanning agent
  - Birch inner bark extract as a leather tanning agent

Economy of scale required for tannins to replace biocides

- Designed for the needs of a single pulp mill
- Capital investment 2.2 M€ and operating costs 2.4 M€/a
- Operating costs currently exceed revenue potential
- Larger capacity needed to reach profitability

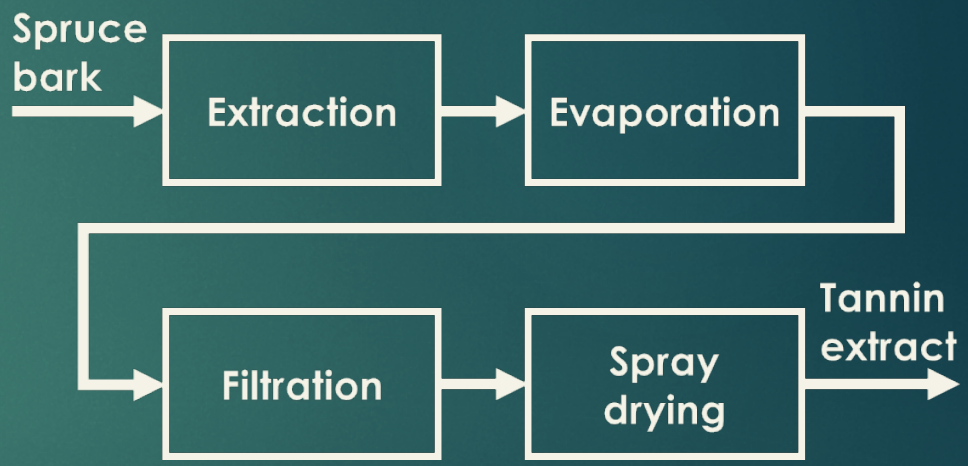


Savelainen, J. (2024) Process design of tannin extraction from spruce bark for antibacterial applications. Master's thesis. Aalto University.

Interreg Baltic Sea Region
Co-funded by the European Union
CIRCULAR ECONOMY
CEforestry

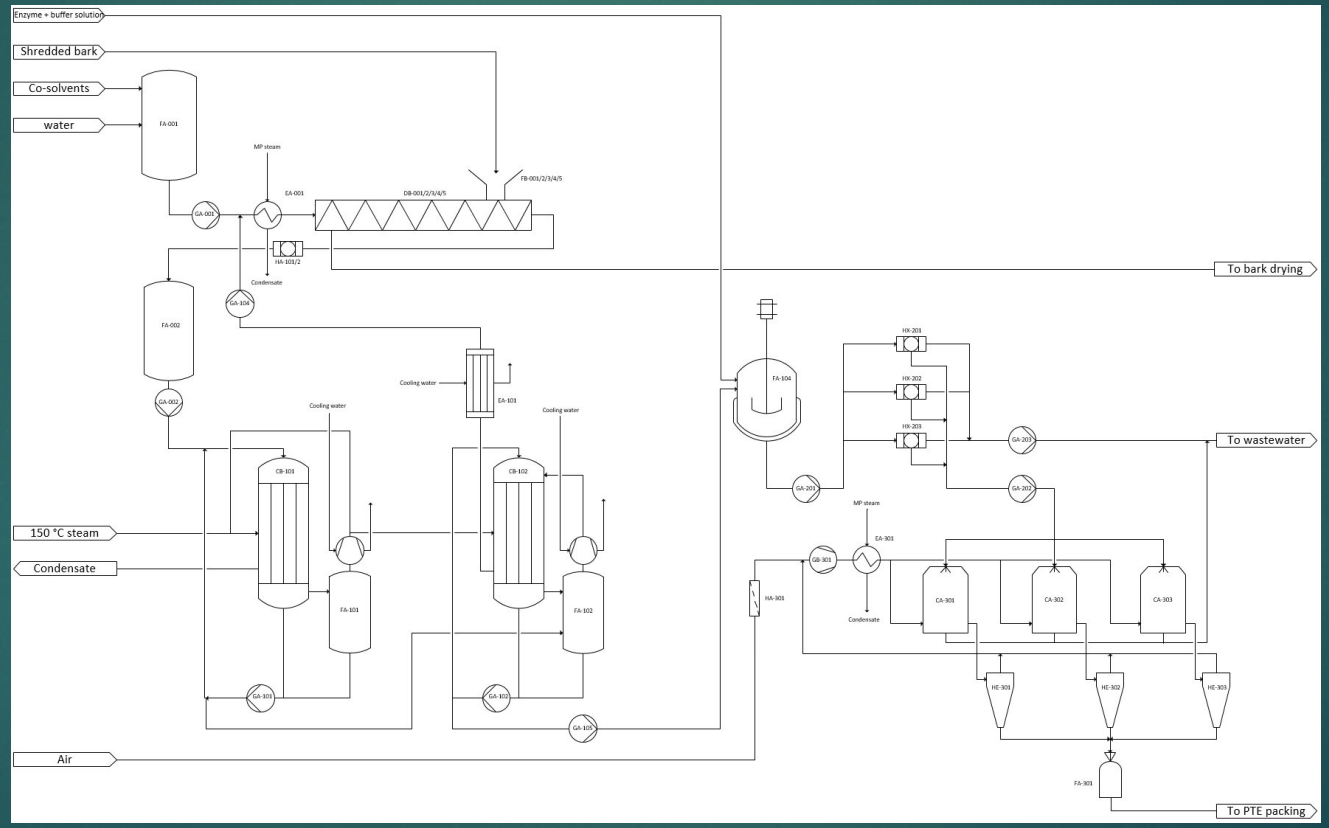
Tanning agent from spruce bark can be economically feasible

- Capital investment 9.6 M€ and operating costs 5.8 M€/a
- IRR 16% and payback time 5.5 a
- Selling price 2.3 €/kg
- Can be economically competitive with vegetable-based tanning agents



Niiranen, I. (2025) Process design and techno-economic analysis of tannin extraction from spruce bark for leather industry applications. Master's thesis. Aalto University.

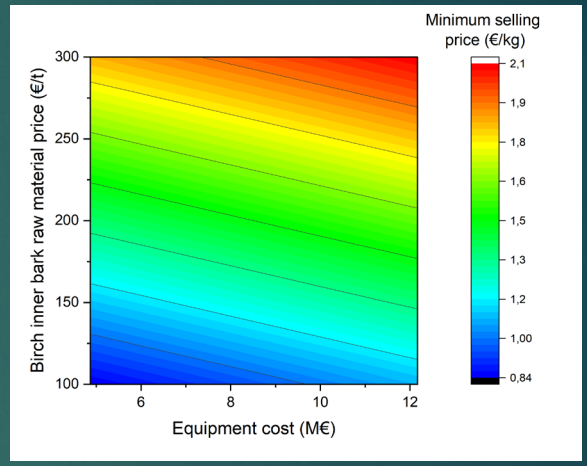
Extraction of tannins from spruce bark for leather tanning

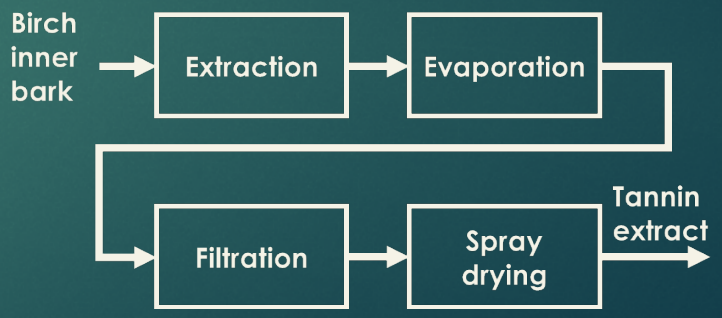


Niiranen, I. (2025) Process design and techno-economic analysis of tannin extraction from spruce bark for leather industry applications. Master's thesis. Aalto University.

Birch inner bark has potential to be profitable as leather tanning agent

- Capital investment 34 M€ and operating costs 27 M€/a
- Preliminary estimation: minimum selling price 1-2 €/kg
- Cost is sensitive to feedstock cost and yield
- Shows promise to be competitive with vegetable-based leather tanning agents





Forssell, S., Dickson, R. & Oinas, P.(2025) Techno-economic feasibility of selected valuable compounds. CEforestry project final report.

Conclusions

- Spruce bark extract needs economy of scale to profitably replace biocides
- Spruce bark and birch inner bark extracts show potential to compete with vegetable-based tanning agents
- Main risk is achieving sufficient yields; further testing necessary before scale-up
- Extraction of tannins from bark has potential for techno-economic feasibility

Interreg Baltic Sea Region
Co-funded by the European Union
CIRCULAR ECONOMY
CEforestry


Interreg
Baltic Sea Region
Co-funded by
the European Union
CIRCULAR ECONOMY
CEforestry
Thank you
Time for a question