

# Seed Money Project Wood Vinegar

Presentation for Topsectors

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# Introduction

Valorisation of wood vinegar, a co-product of pyrolysis of wood and other lignocellulosic material.

A good application for this stream has not been found yet, while it is important for the economy and circularity of the process. One of the properties that hampers application of wood vinegar is the high water content (more than 80%).

Try to remove water using forward osmosis (using membranes).

Consortium: BTG, Wafilin (with contact Berghof membranes) WFBR

Test FO in lab, brainstorm on applications, economic assessment, contact other parties.

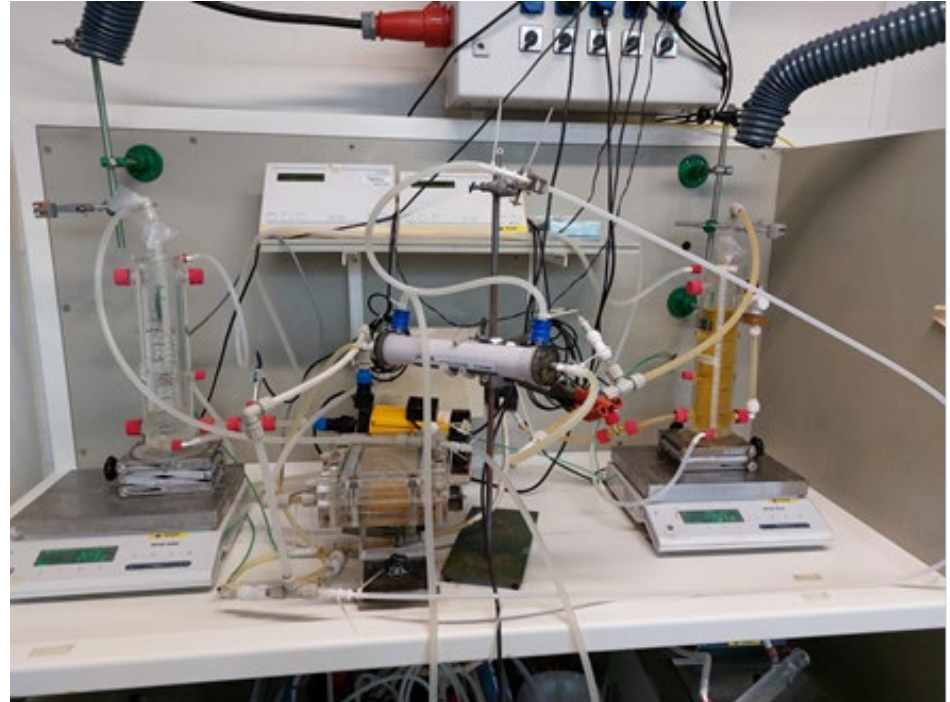
# FO experiment: wood vinegar

27 g acetic acid, 9 g formic acid, 31 g methanol,  
2 g ethanol and 6 g glycol aldehyde per liter WV

Wood vinegar (right yellow) is contacted with a draw  
solution (left, 5 M NaCl): water migrates from  
vinegar to NaCl solution.

First experiments with flat CTA membranes: not  
selective; many organic compounds migrated as  
well.

Spiral wound columns of Aquaporin membranes:  
successful: factor 2 concentration.



# Applications

Of the mixture:

- As herbicide
- To help denitrification in wastewater treatment plants (€150-400/ton org matter)
- To produce bioplastic (PHA) (€150-400/ton org matter)
- To add to manure storage to prevent methane and ammonia emission
- As biostimulant in agriculture

Isolated individual compounds:

- Acetic acid as a cleaning agent (€400-600/ton acetic acid)
- Acetic acid as deicer (CaMg-acetate; Nobian) (€100/ton acetic acid)
- Acetic acid as herbicide
- Acetic acid to produce caproic acid (Chaincraft)
- Glycolaldehyde to produce glycolic acid (cosmetics, medicines, health care)
- Glycolaldehyde to produce polyester (polyglycolic acid)



# Economic assessment

Per m<sup>3</sup> original wood vinegar:

Costs discharge in sewer: € 241

Transport over land: € 20

(FO can remove half of the water volume: save € 10 transport costs)

Potential value in case of an application: € 20 - € 80

Cost for forward osmosis including regeneration of salt solution used:

€ 8 - € 14



# Conclusions

Many potential applications

Wood vinegar can be concentrated by a factor two by forward osmosis using Aquaporin membranes.

The costs connected to forward osmosis are only justified in case it is necessary for an application, not solely to prevent transport costs.

Therefore, the next project should first identify and proof promising applications. Only then select the separation processes required.

# Next project

Larger project on application of wood vinegar

Participants: BTG, AquaMinerals with selected waterboards, WFBR

TKI LWV: Agri-Food

# How the SMP project helped BTG

- Provided fast access to a technology that is new for BTG Bioliquids
- Access to experimental set-up that would be very costly to develop ourselves
- Knowledgeable sparring partner
- Potential for follow-up study to use the wood-vinegar “as-is”