



Natural Resources Institute Finland's work on product and business development

Annual seminar of the PlastLIFE project
20.11.2024
Risto Korpinen



LIFE21-IPE-FI-PlastLIFE

PlastLIFE-hanke saa EU:n LIFE-ohjelmasta rahoitusta, jolla hankkeen materiaalit on tuotettu. Materiaalien sisältö edustaa ainoastaan hankkeen omia näkemyksiä, joista CINEA/Euroopan komissio ei ole vastuussa.



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PlastLIFE - T6.3

Developing novel, alternative bio-based packaging materials and solutions with performance assessment



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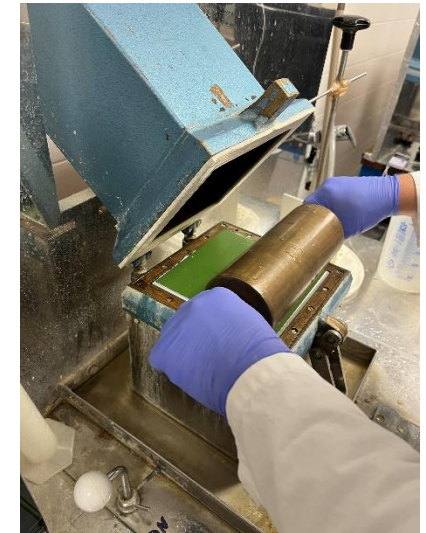
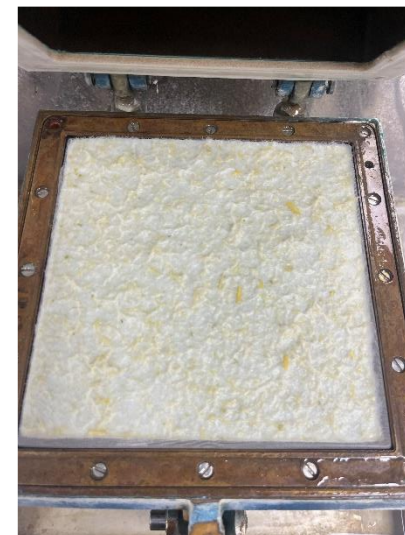
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Preparation of board prototypes

- Bleached pine kraft pulp was refined using a Valley beater for 90 min
- Handsheets were prepared in a sheet former (180 g/m²)
 - 100% kraft pulp
 - Defibered tomato and hop stems were used to replace 20% of the virgin fibres (kraft pulp)



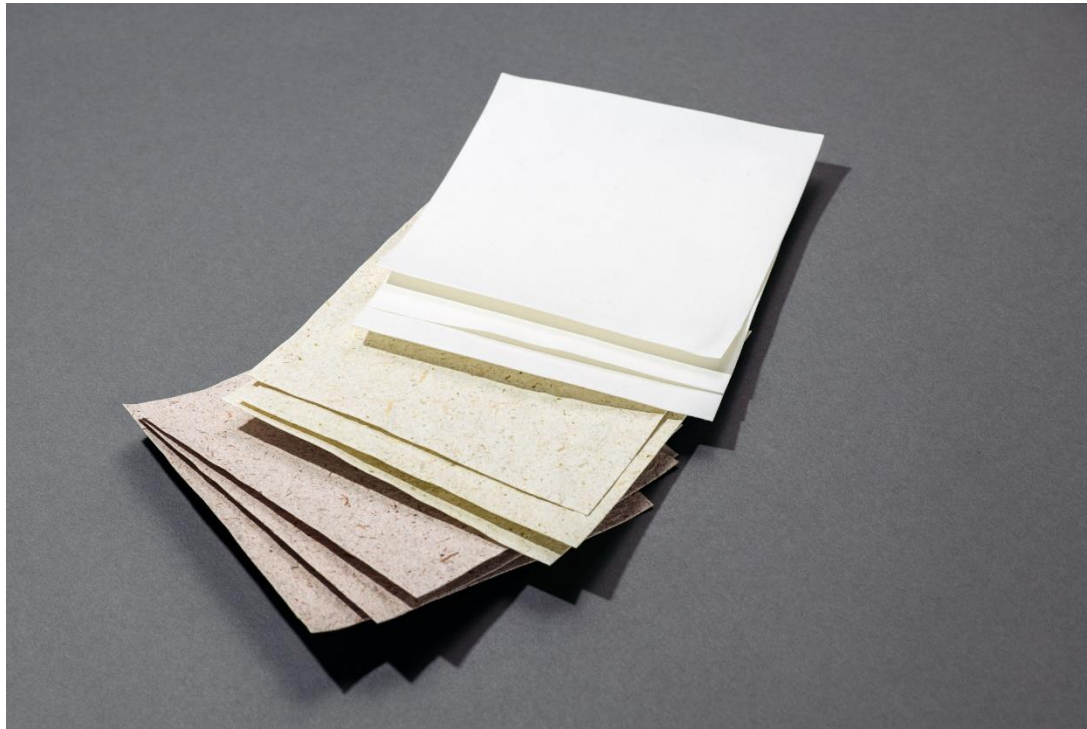
Pictures Risto Korpinen

- Handsheets were wet pressed twice
 - Fish side-stream was added to half of the handsheets after the first pressing
- Handsheets were dried after the second pressing
- The dried handsheets were cut



Pictures Risto Korpinen

Product development



Picture Jarkko Mikkonen

- Strength properties of handsheets will be tested
 - Half of the handsheets will be calendered before the testing
- The effect of fish side stream addition and calendering will be studied
- Aim is to develop fibre-based applications to replace plastic packaging



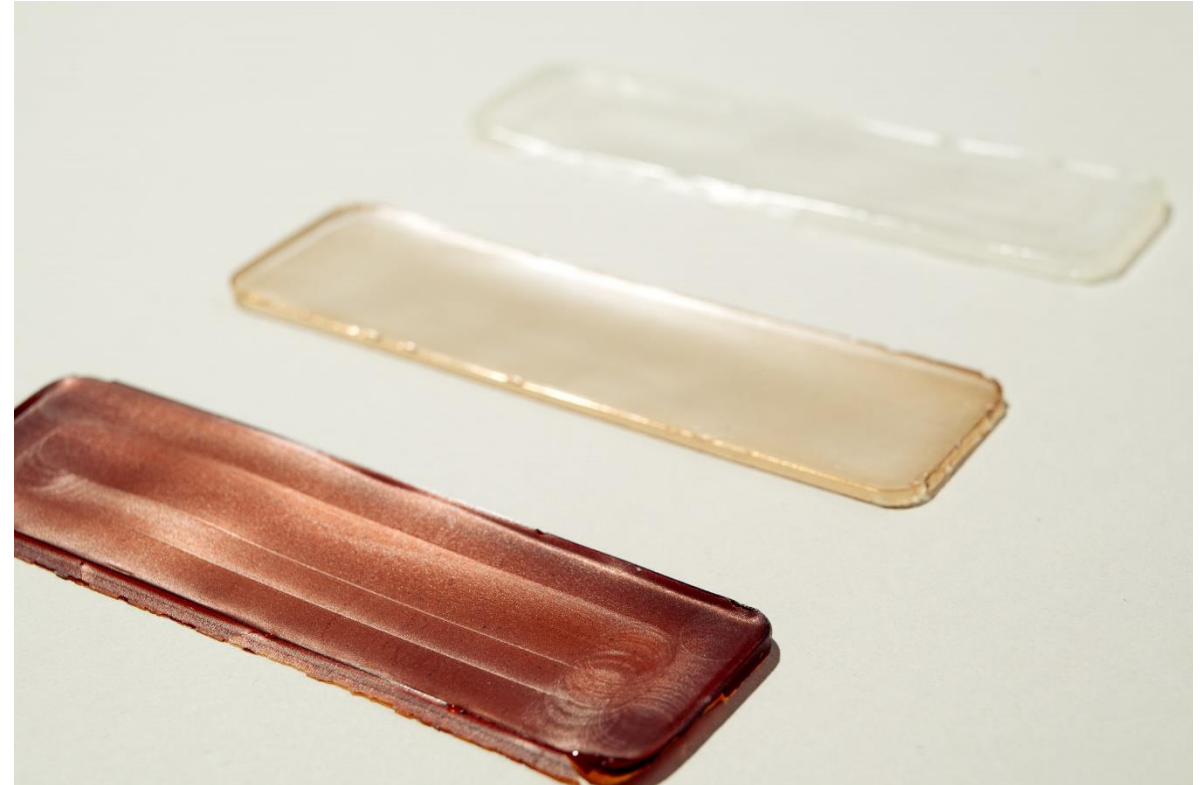
Fish side-stream based translucent material to replace plastic films



We have developed translucent film-like materials from fish and plant side-streams.

The films have been found to possess antimicrobial barrier properties and are an interesting option for food packaging

- Enhanced food safety
- Prolonged shelf-life



Picture: Jarkko Mikkonen



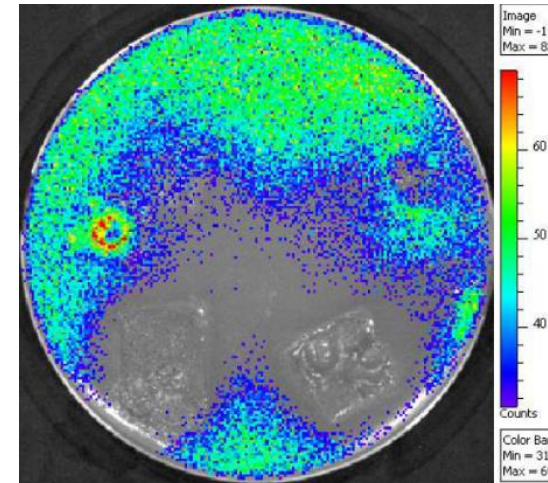
Fish side-stream based translucent material to replace plastic films

Current status

- **Film development and optimizing is ongoing**
- Different additions have been experimented to enhance the mechanical properties
- Film materials have also been combined with the fiber-based sheets
- We are investigating the possibility of using a berry side-stream extracts to bring desired activities with ensured food grade applicability



A. Fish side-stream film



C. Fish side-stream films with plant extract addition show inhibition against gram-positive bacteria.



B. Fish side-stream films with plant extract additions



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Pictures: Jarkko Mikkonen;
J. Hiidenhovi and J. Tienaho

Mycelia-based composites to replace e.g., styrofoam



Mycelia are grown on biowaste. Mycelia biomass is collected and processed further to materials tentatively suitable for packaging.

Extrusion and other processes have been used.



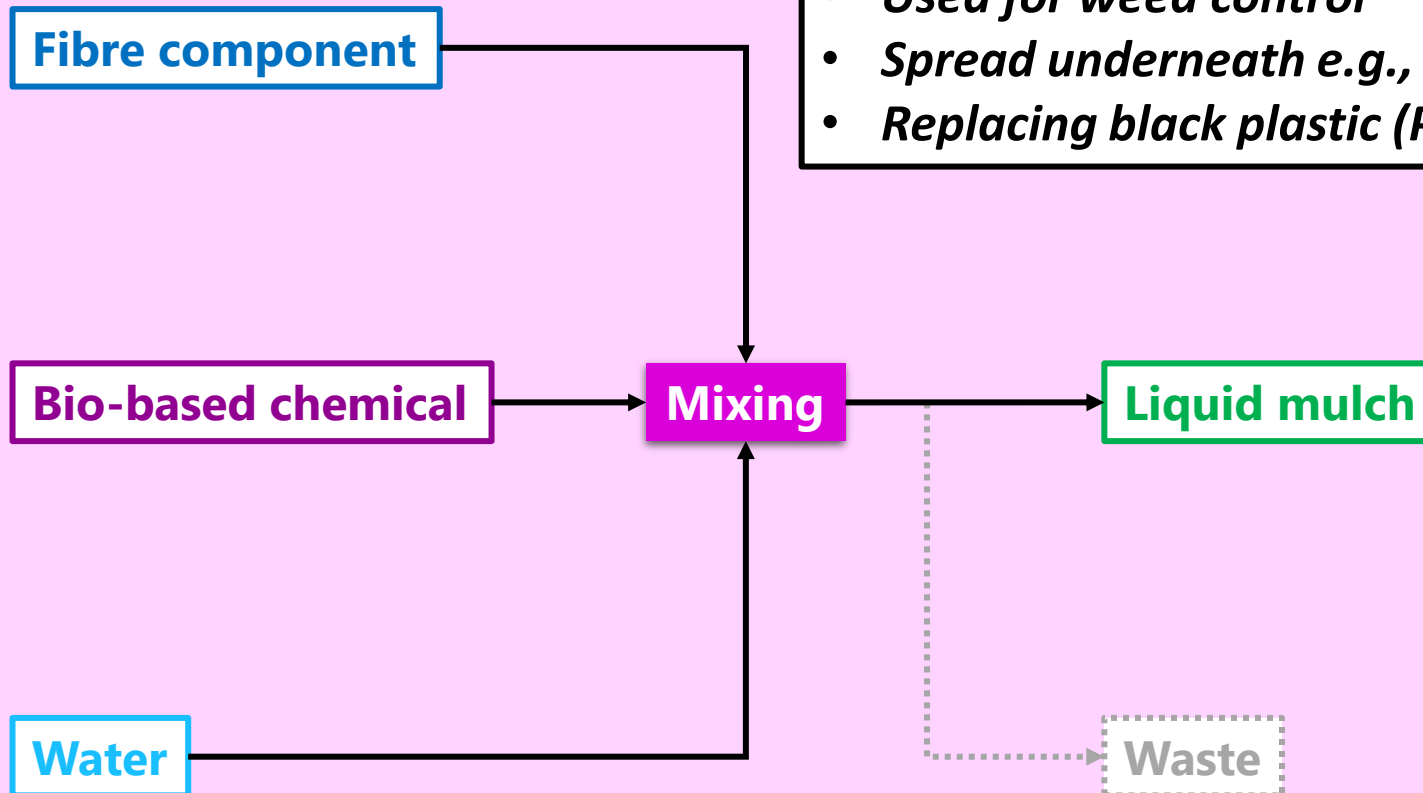
Ecotoxicity tests have been planned with JYU

- All the available Luke materials have been planned to be tested for their acute and chronic toxicity using *Daphnia magna* at JYU/Sami Taipale's group



Liquid Mulch: Utilization and Production

PRODUCTION PROCESS

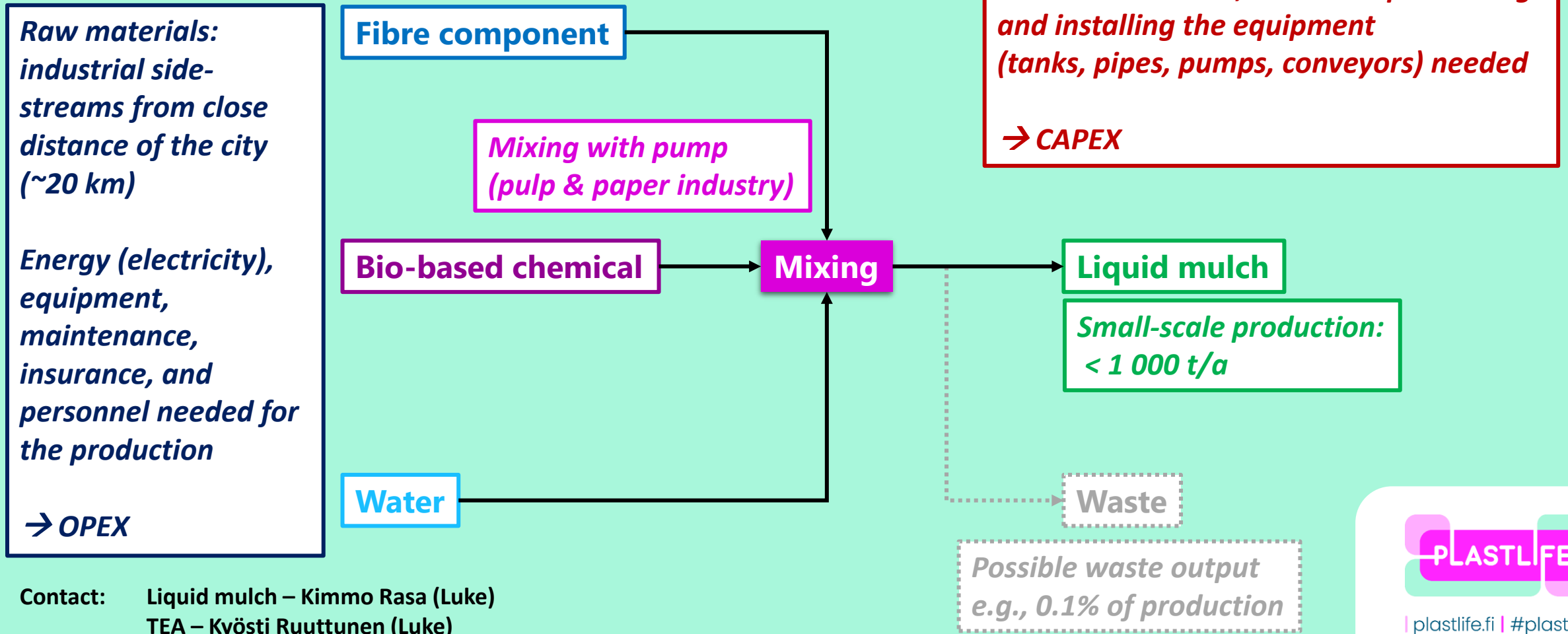


Liquid mulch

- *Used for weed control*
- *Spread underneath e.g., planted trees & bushes*
- *Replacing black plastic (PE) film*



Example: Techno-Economic Assessment (TEA) of Liquid Mulch for Municipal Parks



Contact: Liquid mulch – Kimmo Rasa (Luke)
TEA – Kyösti Ruuttunen (Luke)



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Persons involved

- Fibre-based packaging: Risto Korpinen, Pekka Saranpää, Kalle Kaipanen, Kyösti Ruuttunen, Jaakko Hiidenhovi, Eila Järvenpää, Tuija Peltomäki
- Fish side stream films: Jaakko Hiidenhovi, Jenni Tienaho
- Mycelia-based composites: Marta Cortina Escribano, Henri Vanhanen, Tuija Peltomäki, Taru Kariniemi
- TEA: Kyösti Ruuttunen, Marjatta Vahvaselkä, Kimmo Rasa



Thank you for your attention!

