



Pineapple leaves for high quality fiber and other biobased applications

Huib Hengsdijk¹, Martien van den Oever², Wolter Elbersen², Francisco Alpizar Rodriguez³

¹ Wageningen Plant Research (WPR)

² Wageningen Food & Biobased Research (WFBR)

³ Environmental Economics and Natural Resources (WU Department of Social Sciences)

To which design flagship did you submit your proposal?

A: Design Flagship Methodological Innovation

What are you exploring? With what objective?

Pineapple crop residues are an environmental burden and their discharge an important cost factor for the pineapple industry in many tropical countries. The pineapple leave fibers (PALF) have the potential to be used in the production of textiles and leather. However, maximum 10-20% of the dry matter of the pineapple leaves consists of PALF that are of interest for the textile and apparel industry. The remaining residual biomass will also have to find an application for the economic viability and for optimizing sustainability benefits of PALF.

The goals of this project are to:

- Explore how fiber extraction and other value addition of pineapple residues can be implemented;
- Better understand the agronomic, technical, economic, social-institutional and governance bottlenecks involved in pineapple residue transitions;
- Identify potential solutions to these bottlenecks.

We use the case of pineapple residues in Costa Rica, responsible for almost 50% of the global pineapple trade, to better understand required system changes and pathways towards transformations needed in a bioeconomy, and to explore the full potential of pineapple residues for improving the sustainability performance of the pineapple industry.

Why is this interesting scientifically?

Pineapple leaves serve as an example for other cases where residues have the potential to be used for textile feedstocks and face similar obstacles for implementation. Cascading of various value addition principles is needed in the bioeconomy will material transition take off and contribute to overall goal to phase out fossil fuels. Context-specific but similar technical, economic and social-institutional bottlenecks as in the case of the pineapple leaves are relevant in the value addition of sugarcane residues, agave residues, cocoa residues and açai residues.

How is this relevant to the materials transition?

Insights gained in this case study help to scale other innovations in the domain of material transitions as both technical, economic and social-institutional barriers and transformative solutions are explored to phase out fossil fuel and improve land use efficiency.

What are the key activities or steps?

- Describe the PALF characteristics, extraction process and application options.
- Inventory of other value addition options of pineapple residues in addition to PALF (cascading of options).
- Two student assignments to i) explore interests and bottlenecks of stakeholders in the pineapple industry to change current residue management, and ii) collect data for the development of a business case for the valorization of pineapple crop residues.
- Describe the transition pathways for value addition of pineapple residues and identify the various technical, economic and social-institutional and economic barriers.
- Engage with key stakeholders such as Ananam Ananas producer of Pinatex textile in the Philippines, Fyffes producer of pineapples, and the Dutch Embassy in Costa Rica to liaise with other actors in the pineapple industry.



Pineapple harvesting and the remaining pineapple residues in the field (250-300 t fresh matter per hectare).

What are key deliverables?

- Report describing the results of the methodological innovation.
- Easy-accessible document describing the methodological innovation project.
- Presentation(s) for the community meeting of the investment theme.
- Two students' theses.
- Presentation/poster/abstract for an international conference related to the bioeconomy.

On what issues would you like to get input from others?

- Suggestions for improving pineapple leaf fibre (PALF) spinnability?
- How do other projects deal with biomass rest streams after extraction of fibers?
- How obtain market prices for this type of new fibers?

