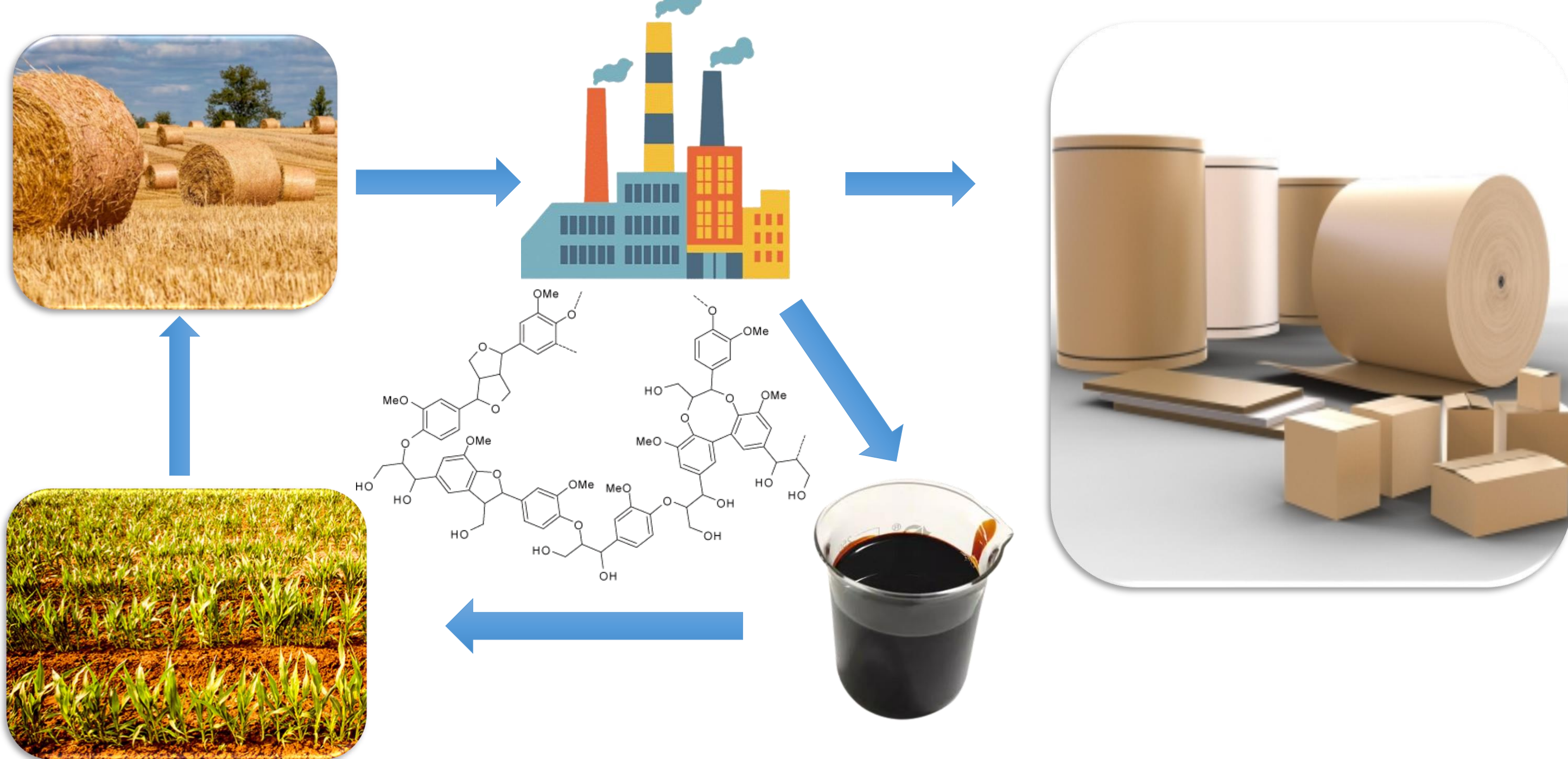


### Introduction

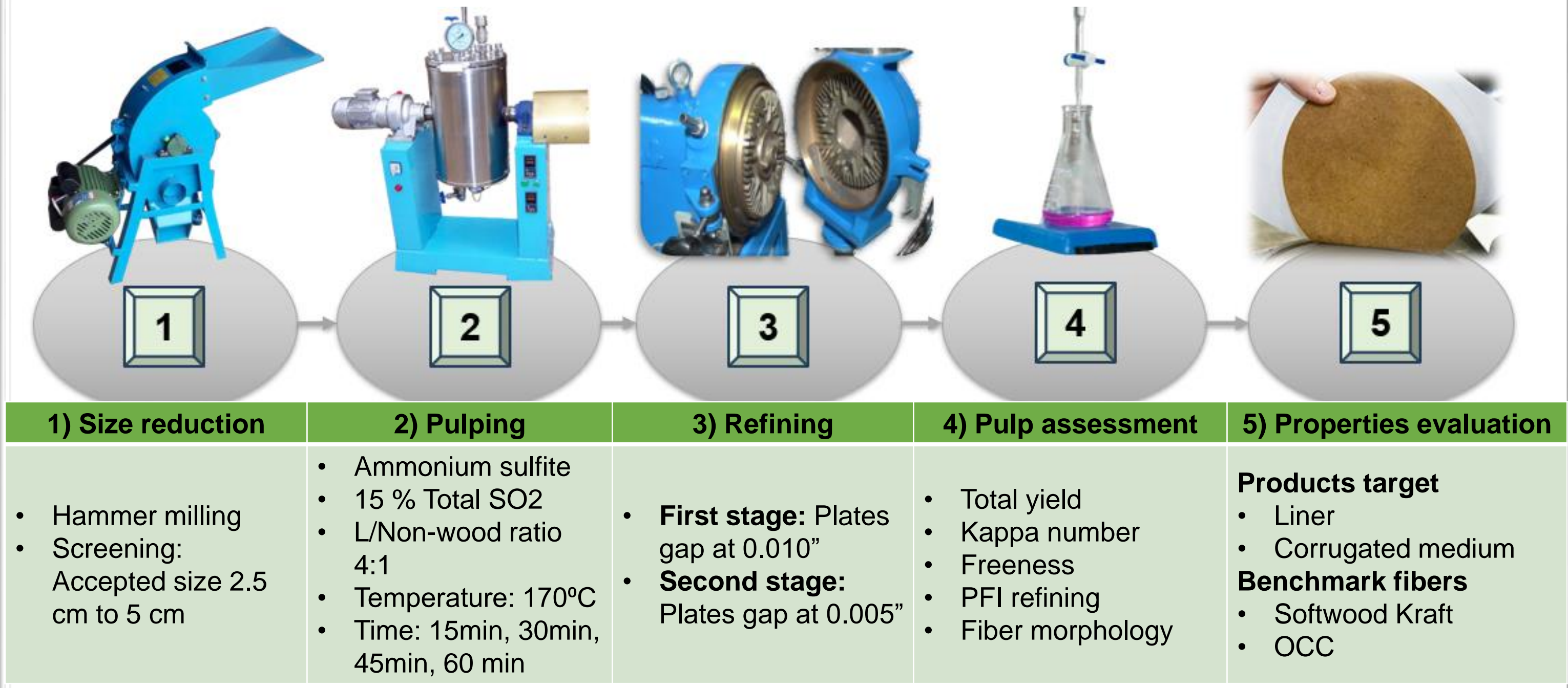
This study explores innovative methodologies for utilizing fibers from diverse sources, including agricultural residues and grasses, to respond to the evolving demands in paper-based packaging<sup>[1]</sup>. Due to non-wood materials facing enormous challenges for conventional kraft and soda processes, this approach evaluates a promising sodium-free alkaline pulping method using ammonium sulfite as an alternative process to transform Wheat straw, Miscanthus, and Switchgrass efficiently into suitable fibers for packaging and offering potential solutions to spent liquor treatment<sup>[2-5]</sup>.



### Objectives

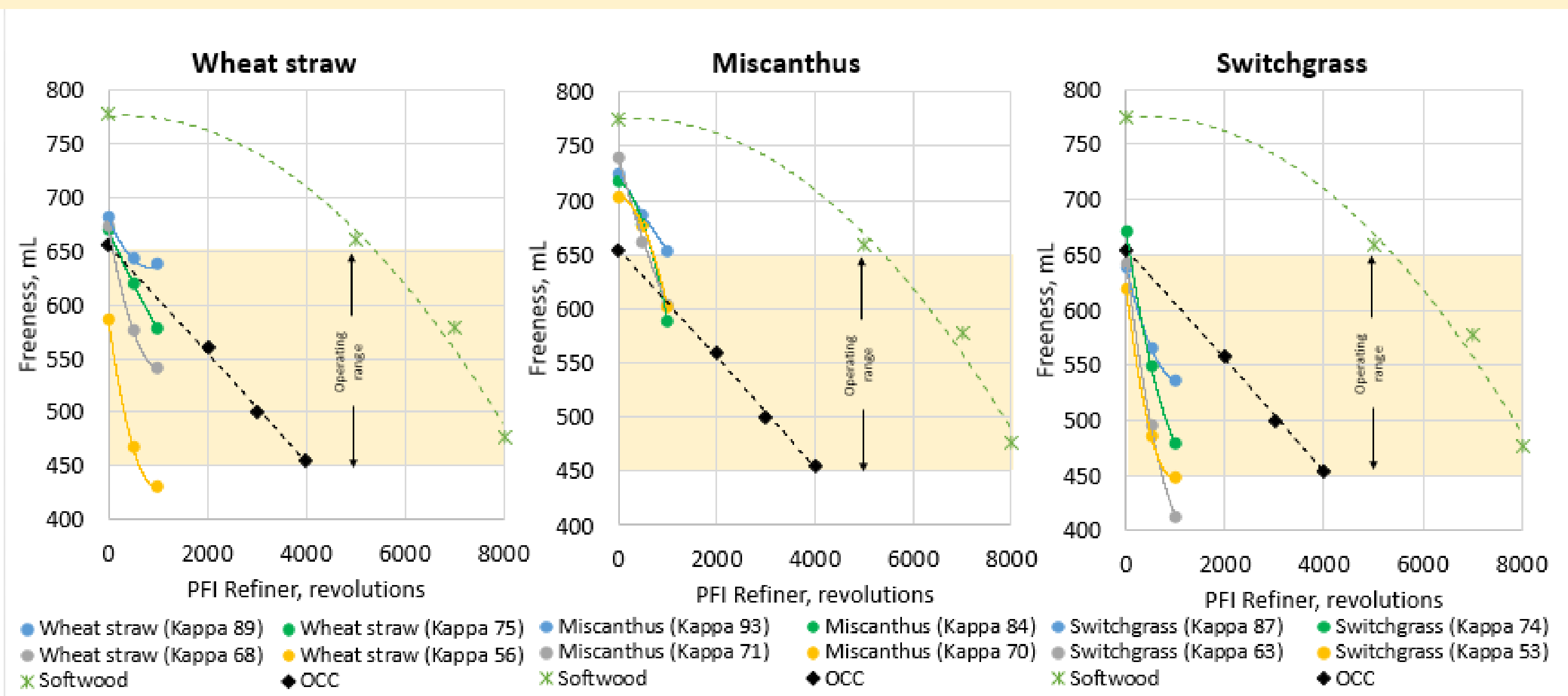
- ✓ Evaluate the ammonium sulfite semi-chemical process for pulping of Wheat straw, Miscanthus, and Switchgrass as a non-sodium alternative process.
- ✓ Compare the mechanical properties of non-wood pulps from the ammonium sulfite process with conventional fibers in corrugated medium and liner manufacturing.
- ✓ Assess the effect of refining and morphology of non-wood fibers on paper properties.

### Experimental

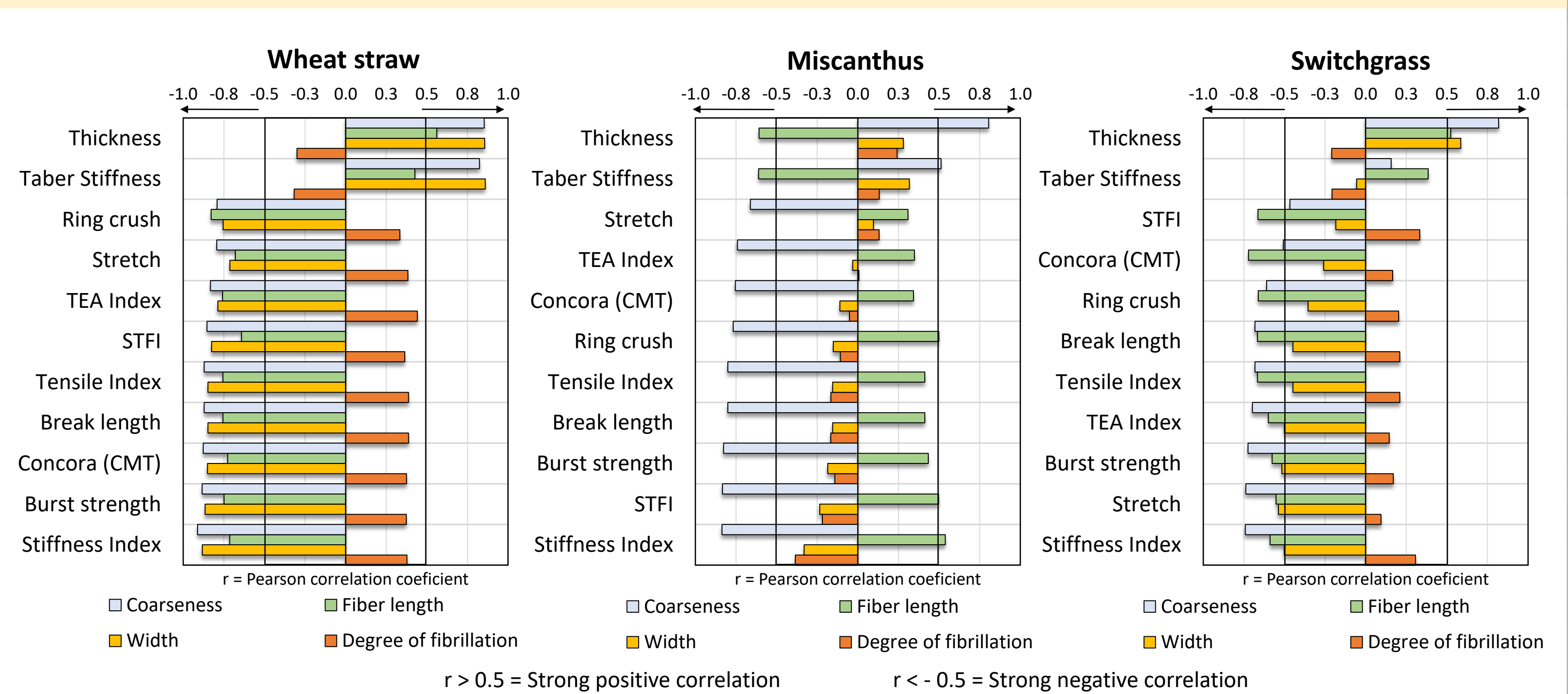


### Results

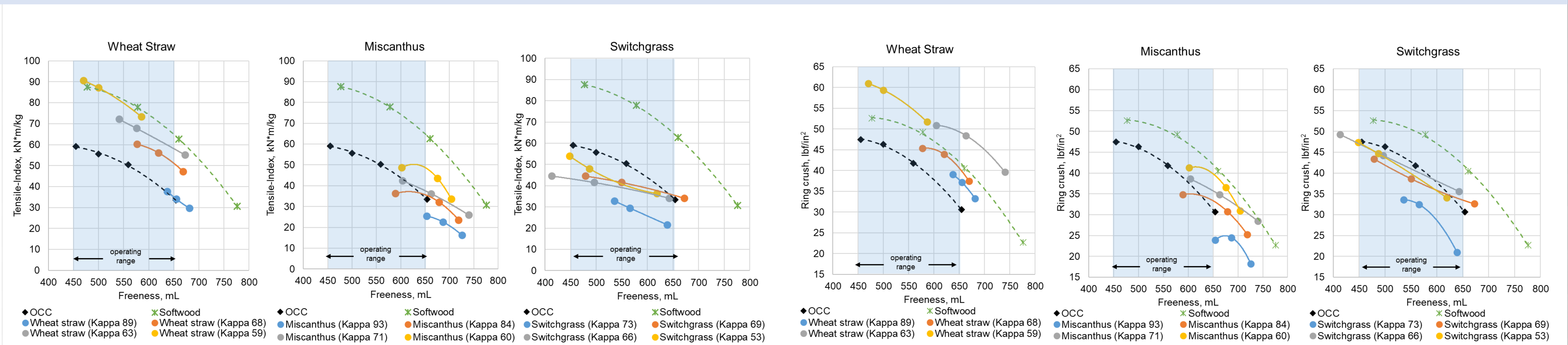
#### Non-wood pulps refining evaluation



#### Fiber morphology vs. mechanical properties



#### Non-wood pulps comparison with benchmark fibers



### Conclusions

- Ammonium sulfite pulping emerges as a potential alternative to obtain high-yield pulps from non-wood materials.
- Wheat straw and Miscanthus pulps demonstrated mechanical properties similar and superior than OCC.
- The non-wood pulps showcased advantageous mechanical properties and energy-saving potential, making them promising for packaging applications.

Biomass	Tensile Index		Bust strength		STFI		Ring crush		Concora		TEA Index		Stretch	
	CM	Liner	CM	Liner	CM	Liner	CM	Liner	CM	Liner	CM	Liner	CM	Liner
Wheat straw	Superior	Potential	Superior	Potential	Superior	Potential	Superior	Potential	Superior	Potential	Superior	Potential	Superior	Potential
Miscanthus	Superior	Potential	Superior	Potential	Superior	Potential	Superior	Potential	Superior	Potential	Superior	Potential	Superior	Potential
Switchgrass	Superior	Potential	Superior	Potential	Superior	Potential	Superior	Potential	Superior	Potential	Superior	Potential	Superior	Potential

CM = Corrugated medium

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