AGRINOVA

RECHERCHE ET INNOVATION EN AGRICULTURE

Agrinova *is a Canadian applied research and innovation center working with industry partners to develop, test, and scale sustainable agri-food technologies, supported by pilot-scale infrastructure and expertise in potato research and storage.*

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Our experimental potato storage facility in Quebec (Canada).

RESIDUES ARE NOT WASTE!

Transforming Potato By-Products into Next-Generation Packaging

Worldwide, potato storage and processing generate significant losses from culling, shrinkage, sprouting, and quality defects. These side streams create large volumes of underused biomass, representing both economic losses and environmental burdens. Most remain untapped, despite their strong potential as renewable feedstock for bio-based materials and circular innovation.

[PROJECT OBJECTIVE]

Identify available potato residues and convert them into molded-fiber packaging prototypes.

[KEY RESEARCH AREAS]

Process Adaptation
- Extracting starch as a natural binder
- Incorporating residues into fiber recipes
- Forming molded fiber packaging

Environmental Valorization
- Reusing process whitewater
- Assessing soil amendment potential
- Evaluating water retention properties

Value Chain Development
- Mapping residue streams
- Linking industry stakeholders
- Initiating circular pathways

POTATO RESIDUE VALORIZATION WORKFLOW

Overview of the step-by-step process used to convert potato residues into molded-fiber materials.

1 From Postharvest to Residues
Residues are collected from storage and processing operations, including culls, downgraded potatoes, and peels.

2 Starch Extraction
Starch is extracted from potato residues and evaluated as a natural binding agent. Extraction yields reached 5% (H_2O) and 3% (NaOH).

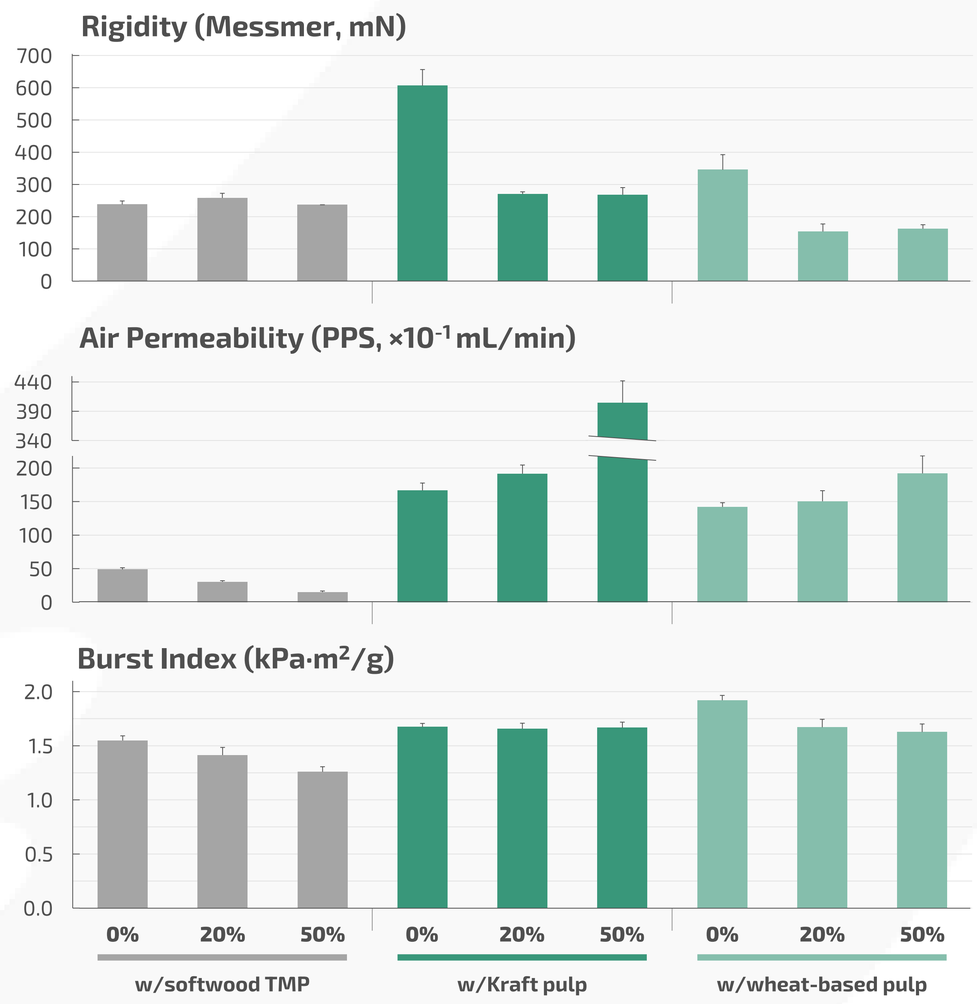
3 Residues or Starch into Fiber Mix
Fiber formulations use either 2% potato starch as a binder or potato residues added at 20% and 50% in softwood TMP, Kraft pulp, and wheat-based pulp.

4 Sheet & Molded Product Forming
Formulated fiber mixes are formed into laboratory sheets and molded products.

5 Performance Testing
Mechanical and functional performance of sheets is evaluated using burst index, rigidity (Messmer), and air permeability (PPS).

MECHANICAL AND FUNCTIONAL PERFORMANCE

Evaluation of key mechanical and functional properties of laboratory sheets.



Measured properties of laboratory sheets prepared with 0%, 20%, and 50% potato residues in different fiber matrices. Data are shown as mean ± SE.

[RESULTS]

Fit for Purpose

Potato residues can be incorporated at up to 50% depending on the fiber matrix..

While mechanical properties vary across formulations, overall strength is maintained and air permeability increases, making these materials well suited for lightweight and breathable molded fiber packaging.

Molded trays containing 25% tubers and molded plates containing 10% peels, produced using a TMP-based formulation.

[NEXT STEPS]

Closing the Loop

Ongoing work focuses on valorizing process whitewater, including its evaluation as a soil amendment and its potential use as a water-retention agent, supporting the circular use of process by-products.