ALBERTA INNOVATES

CLEAN RESOURCES

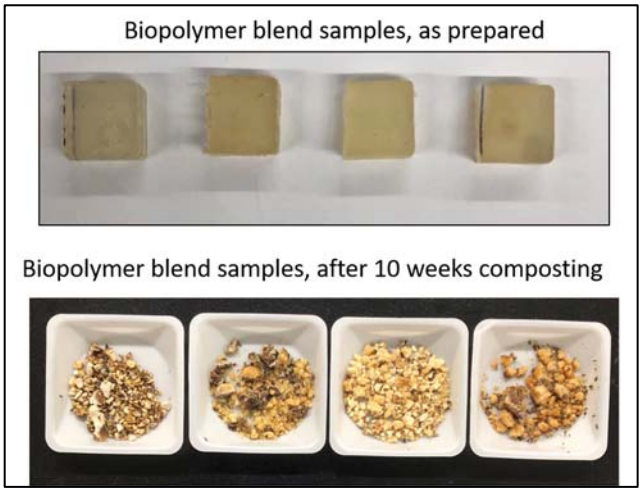
SMART AGRICULTURE AND FOOD

AGRI-FOOD INNOVATION – FOOD INNOVATION

FUNDING DETAILS

Bio-Based and Biodegradable Plastics for Agricultural Applications

There is a growing concern about the environmental impact of plastic waste. In the agricultural sector, large quantities of plastics are used in applications such as bale wrap, silage covers, and mulch film. These plastics are incinerated at the end of their useful lives which is not environmentally friendly. On the other hand, the development of biodegradable materials with the same functionality as conventional plastics is plagued by the challenges of cost and difficulty in developing materials whose properties remain stable during use but degrade at the desired time. Also, some existing biodegradable polymers may only degrade under very specific conditions, and, in some instances, may release additives that are harmful to the environment/living organisms. The project aims to develop biopolymer blends for agricultural applications that can maintain desirable properties under a broad range of environmental conditions and then degrade when desired.



RECIPIENT:
University of Alberta
PI: Dr. Anastasia Elias

PARTNERS:
Berry Global

TOTAL BUDGET:
$415,950

AI FUNDING:
$188,450

PROJECT DATES:
MAR 2022 – FEB 2025

PROJECT TRL:
Start: 2
End: 5

APPLICATION

The biodegradable biopolymer films to be developed by this project are targeted for use in the agricultural sector, particularly as mulch films and bale wraps. It is hoped that the films will provide a degradable alternative to conventional plastic films/non-degradable mulch films and offer a truly degradable alternative to polymers and polymer additives.

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PROJECT GOALS

- Develop biopolymer film blends for use in agricultural applications such as mulch films and bale wraps, with the incorporation of bio-based plasticizers and UV absorbers for enhanced mechanical properties, stability, and degradability.
- Determine the stability of the films under accelerated aging.
- Characterize the degradability of the films under different environmental conditions.
- Test the processibility of the films to ascertain compatibility with industry-relevant thermal processing methods.
- Develop enzyme formulations to accelerate the degradation of the materials.

BENEFITS TO ALBERTA

The project will contribute to:

- Acceleration of the growth of the biodegradable plastics and green plasticizers markets including the creation of new product lines for biodegradable agricultural films.
- Creation of new economic opportunities for Alberta producers in the forestry and agricultural sectors as a result of the utilization of Alberta-sourced materials (lignin and canola oil) in this project.
- Improved sustainability of agricultural activities for Albertan producers due to reduced waste and carbon footprint of the agricultural sector.

6-8 Publications

2 Students Trained

1 Patent

CURRENT STATUS

APR 2022

Plans are underway to develop poly lactic acid (PLA) and PLA-polyhydroxybutyrate (PHB) blends for use in agricultural films. Afterwards, the team will work towards modifying the mechanical properties, stability, and degradability of the films through varying the ratio of PLA to PHB.