

# Clean Resources

## Smart Agriculture and Food Innovation

Smart Agriculture

### FUNDING DETAILS

## Smart Technology for Optimized Greenhouse Crop Production

Alberta has the fourth largest greenhouse industry in Canada and has experienced rapid growth in recent years. This has led to a highly competitive environment where greenhouse growers are forced to look to innovative technologies such as LED, advanced growing media, computer-controlled climate, integrated production (such as aquaponics), sensing technology, and more efficient water and nutrient management systems. Furthermore, the industry is under increasing pressure to reduce its environmental impact, including wastewater discharge and light contamination. This project aims to build and test a new recirculating irrigation system based on sensing technology and artificial intelligence to improve water and nutrient efficiency for the greenhouse industry. This smart energy optimization model will conserve energy and improve the competitiveness of greenhouse operations in Alberta and Canada.



**RECIPIENT:**  
**Lethbridge College**



**PARTNERS:**  
**Gold Leaf  
Technologies Inc.  
&  
Tamura Imports**



**TOTAL BUDGET:**  
**\$95,577.33**



**AI FUNDING:**  
**\$95,577.33**



**PROJECT DATES:**  
**March 2020 –  
March 2023**



**PROJECT TRL:**  
**Start: 4  
End: 6**

## APPLICATION

Greenhouse crop production is highly sensitive to stress due to lack of water and nutrients, which can easily cause yield decline. The proposed smart greenhouse management system is based on artificial intelligence and can proactively respond to plant stress long before the plants show visible symptoms. The system will allow for the evaluation of different nutrient sources prior to crop collection through the analysis of real-time plant growth rates. The smart greenhouse crop monitoring system will be a powerful tool that will optimize nutrient regimes for different crops and varieties.



# ALBERTA INNOVATES

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## PROJECT GOALS

- Develop a smart greenhouse crop management system based on the data received from sensors collecting real-time data on crop changes and multiple, wide ranging environmental parameters including climate and substrate, which directly affect plant growth.
- Develop and validate unique mathematical models describing interactions between environmental factors and crop yield.
- Use the developed irrigation systems for demonstration as a prototype for commercial greenhouse growers.

## BENEFITS TO ALBERTA

- The developed artificial intelligence will enable greenhouse growers to predict crop behavior and make decisions on crop management to maximize output with minimal water, nutrient and energy use.
- This smart system will significantly decrease production costs related to water and nutrient supply management, increase yield and ultimately, improve the competitiveness of greenhouse production in Alberta.
- The technology will recycle nutrients, increase water and nutrient use efficiency and promote sustainable practices in agriculture, while decreasing the environmental impact of the food industry.



**6 Publications**



**10 Students  
Trained**



**1 New  
Product/Service**

## CURRENT STATUS

### August 2020

The equipment required to create the greenhouse crop management system has been ordered and is expected to arrive by July 2020. The system is expected to be installed and commissioned by the fall of 2020.