



**VERTBERRY**

Proof of Concept of  
an Integrated  
Aeroponic System for  
Indoor Berry  
Cultivation

**Homegrown**  
INNOVATION CHALLENGE

Presented by : Martine Dorais, PhD

- To meet the **growing demands** of the world's population, food production will need to increase by 70-100%<sup>1</sup>
- Forecasts indicate that by 2025, half of the world's population will face **water scarcity** <sup>2</sup>
- Human activity and climate change are depleting **arable land** crucial for agricultural production at an alarming rate, with one-third of this land already considered degraded <sup>3</sup>
- There is a growing **pest pressure** and **labor shortage** in several regions of the world, including Canada
- Pandemics, wars and other geopolitical crises have caused and will continue to cause **disruptions in the supply chain**

It is crucial for the agricultural food industry to embrace practices that not only boost production levels but also guarantee the restoration and, ideally, the enhancement of the environment. Additionally, the utilization of renewable resources should be strongly promoted

**Controlled Environment Agriculture (CEA) and Vertical Farming for fruit and vegetable production are potential solutions to address these challenges and contribute to Canadian food security and food sovereignty**

<sup>1</sup> <https://www.usda.gov/topics/food-and-nutrition/food-security>

<sup>2</sup> World Water Day: Are we ready for the thirsty future? – DownToEarth

<sup>3</sup> <http://www.fao.org/3/ca7126en/ca7126en.pdf>

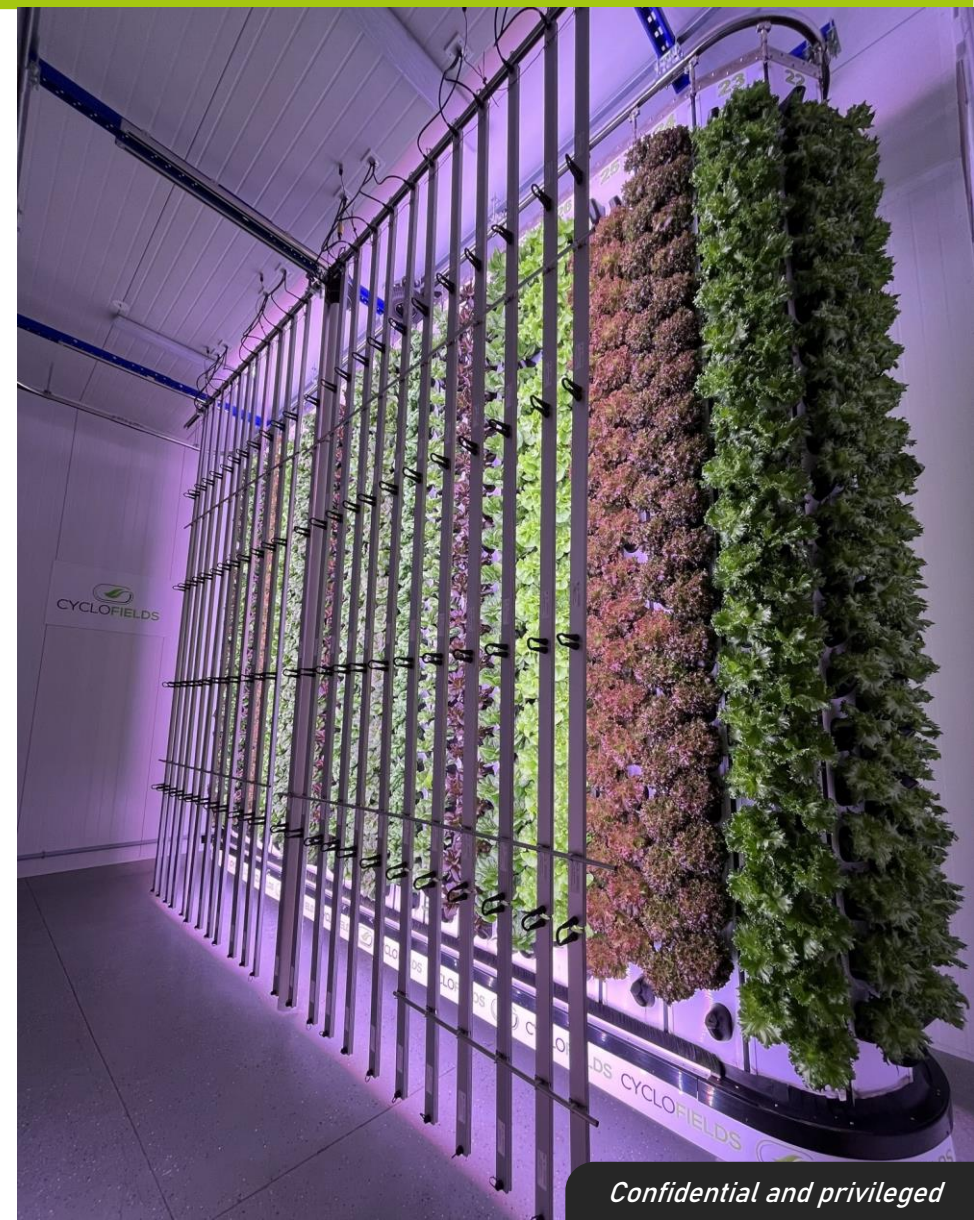


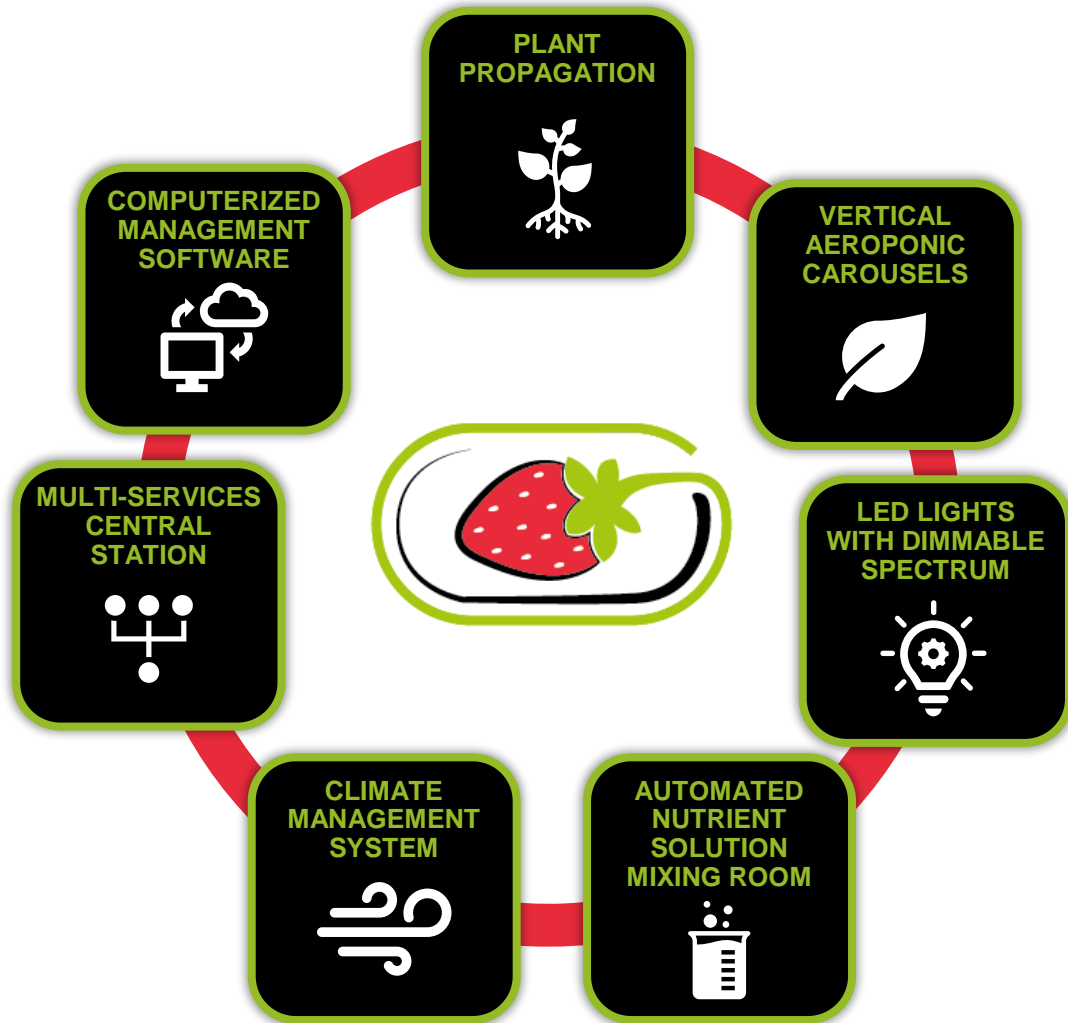
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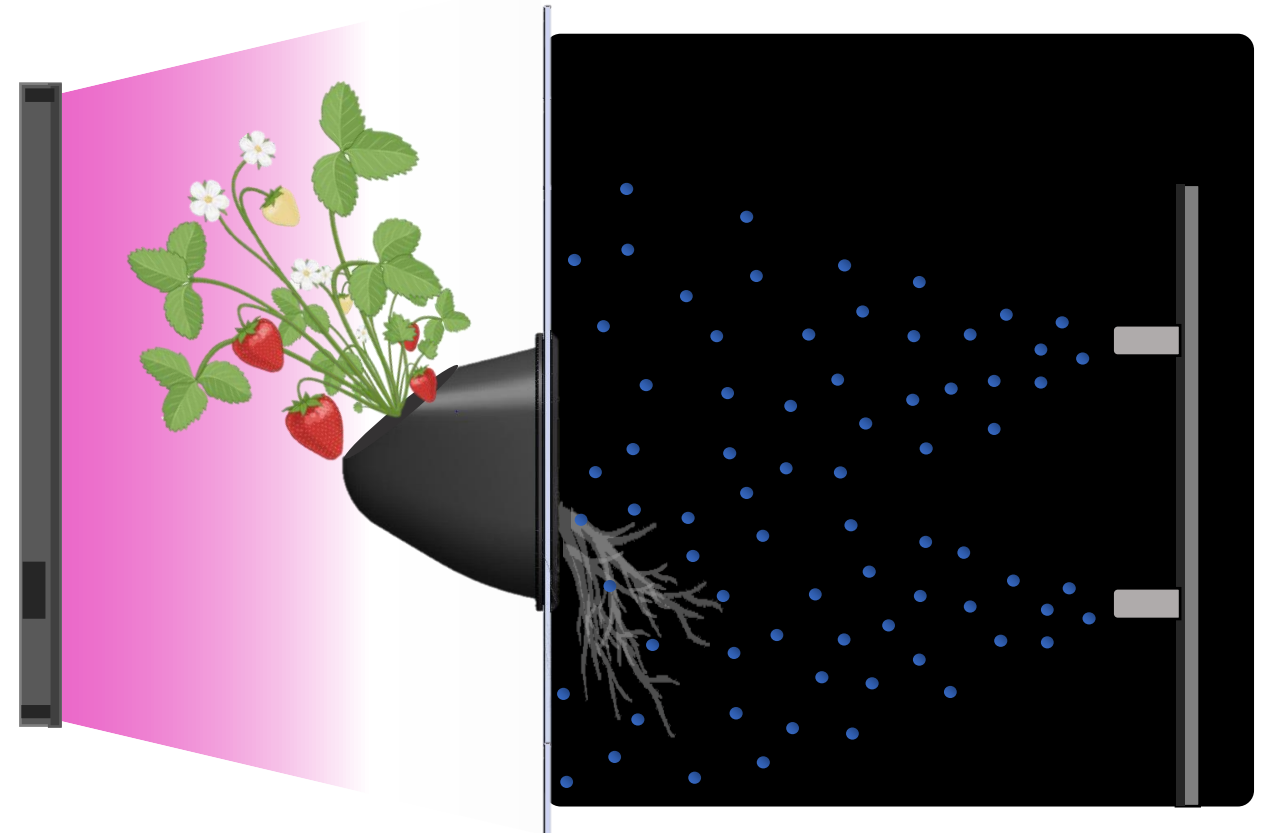
**CYCLOFIELDS**  
INDOOR FARMING TECHNOLOGY

The **VertBerry** project aims to integrate CycloFields' aeroponic vertical farming technologies into a fully automated, highly efficient, and low-footprint innovative system for berry production





## AEROPONICS IN CONTROLLED ENVIRONMENT



# DESCRIPTION OF OUR TECHNOLOGY

Self-contained, flexible, low-emission & high-performance aeroponic growing system for year-round indoor production of fruits or vegetables

- 🐦 **Large-volume rotating carousels** that maximize light penetration and ensure an even microclimate around plants
  - Modular design with adaptable density per plant species
  - Reversible walls, allowing for a uniform germination micro-chamber
- 🐦 **Energy-efficient LED system** of variable intensity by wavelength range
  - Customized to the plants' developmental stages
- 🐦 **Fertilizer mixing room** for automated fertigation management
  - Including tanks, pumps, probes, valves, etc.
- 🐦 **Climate control system**
  - *Vapor-pressure deficit* system ensures the recovery and reuse of energy and water contained in latent heat
- 🐦 **Integrated custom management software**
  - High-performance, cutting-edge, comprehensive, and flexible software that adapts to the production & management of different plant species – market adaptability
  - Optimize profitability by considering market selling prices, input costs, and labor requirements





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The production of **high-quality transplants** adapted to the aeroponic and mobile *VertBerry* system



The optimization of **flower induction** for indoor production, *while considering the energy demand required to maintain a sustainable climate and microclimate*



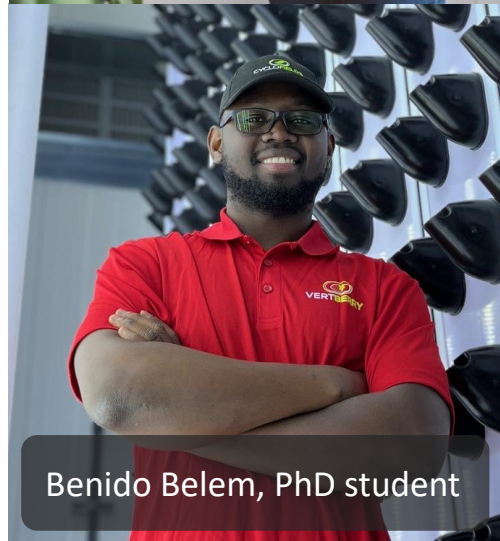
The **sustainable optimization** of growth, productivity, and fruit quality to *reduce the environmental footprint, increase producer profitability, and fulfill consumer expectations*



Dr. Thi Thuy An Nguyen



Antoine Deschambault  
Vincent Fortin-Coderre



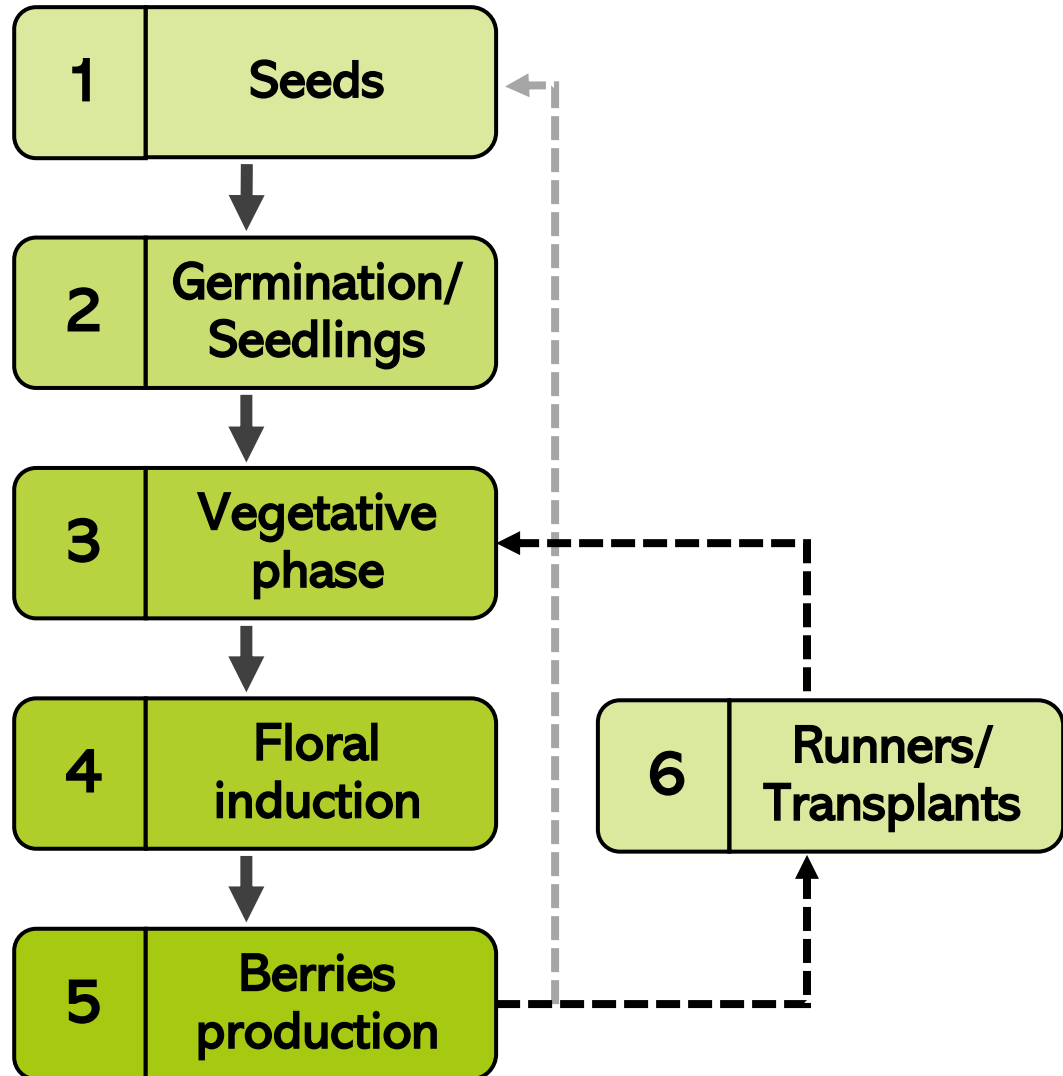
Benido Belem, PhD student



Prof. Steve Pepin, Co-PI

# PLANT DEVELOPMENTAL STAGES

## OPTIMIZATION OF GROWING CONDITIONS



- Improving germination rate
- Producing high quality transplants tailored for aeroponics
- Promoting flower induction and plant productivity in a sustainable manner
- Reducing crop cycle time
- Achieving standardized crop management resulting in high quality products that are free of pesticides

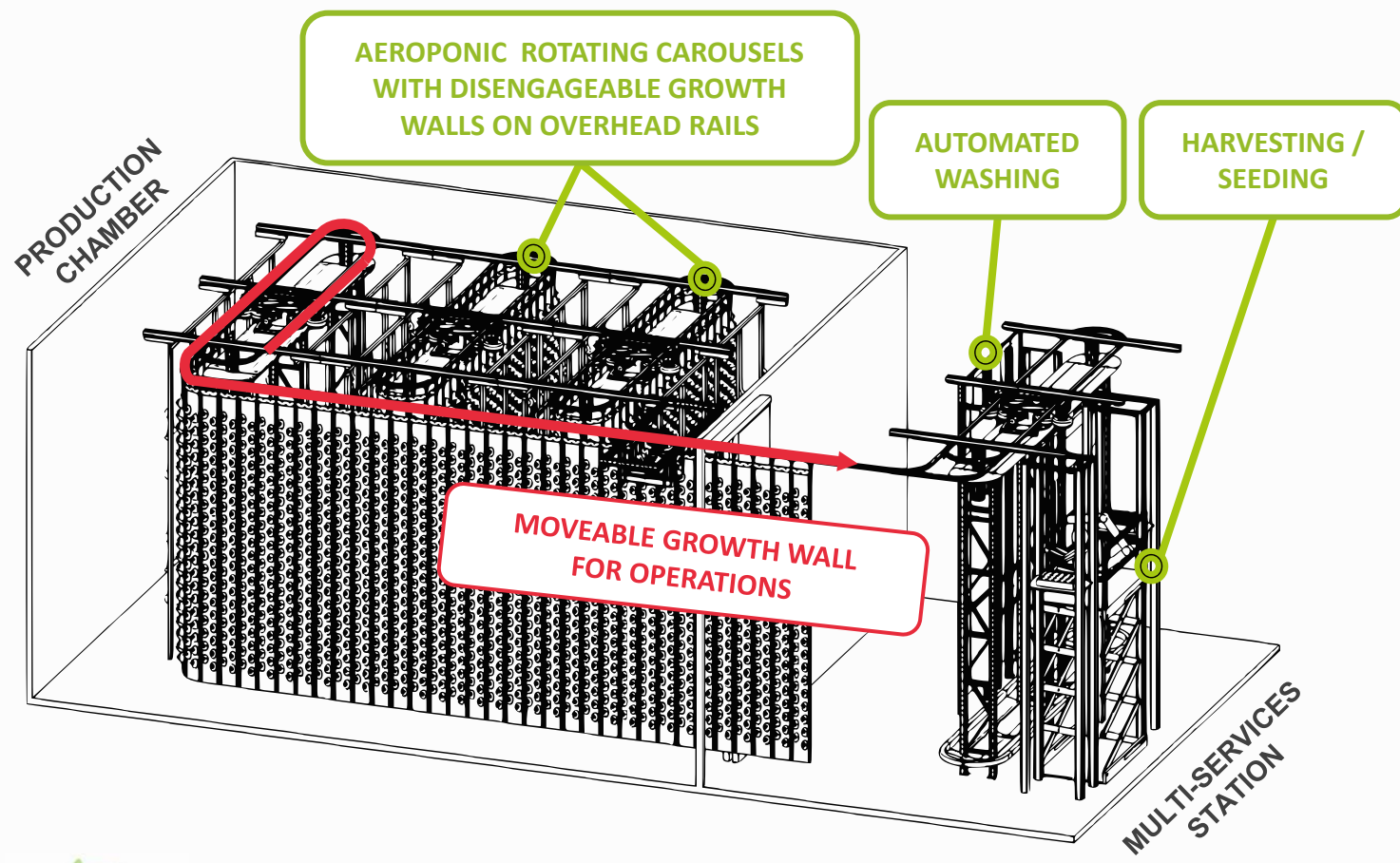
VertBerry will provide a complete, integrated & sustainable system in order to feed Canada's rising population with year-round pesticide-free berries

The proposed VertBerry technologies will:

- Increase berry productivity and quality through aeroponics and innovative crop management practices
- Reduce greenhouse gas emissions associated with berry production, and enhance energy, water and nutrient use efficiencies, while reducing resource used
- Reduce dependency on plant material suppliers and the risk of pest infestation through a highly efficient and adapted propagation method
- Maximize labor efficiency with an automated centralized working station
- Ensure profitability and versatility for producers







This sustainable approach includes:

- Automation and optimization of the cultivation areas
- Use of renewable energy & minimal use of resources
- Energy-efficient LED lighting & integrated climate control system
- Heat and water recovery from operations
- Independent from weather conditions and external propagators
- Carbon neutrality (Scaling Phase)

VertBerry aims to scale its performant, autonomous & profitable CEA system through:

- Its Scaling Phase technology showcase
- Partnerships with supermarkets, produce distributors and producers



During the scaling phase of VertBerry, a complete integrated system will be implemented to validate and improve the various components of the system and extend year-round crop production to include blueberries and raspberries. Emphasis will be placed on achieving carbon neutrality through various innovative approaches.



# VERTBERRY

**Homegrown**<sup>™</sup>  
INNOVATION CHALLENGE

[homegrownchallenge.ca](http://homegrownchallenge.ca/grantees/vertberry)  
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Thank you!