

# GREAT Institute



## Greenhouse Research Education And Training (GREAT) Institute

### GREAT Institute Introduction

Thursday, October 15, 2020



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Science



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## Greenhouse Research Education And Training (GREAT) Institute

### Webinar Agenda

- 1030-1040 Introduction and Concept.
- 1040-1050 Audience Feedback and Inputs Survey.
- 1050-1140 Comments From Experts: Hear From The Following Agencies:
  - o OMAFRA [Fadi].
  - o University of Windsor [Rupp].
  - o Agriculture and Agri-food Canada [Xiuming].
  - o Agriculture and Agri-food Canada [Rose].
  - o Lambton College [Rob].
  - o Ontario Greenhouse Vegetable Growers [Niki].
  - o University of Guelph [Dave].
  - o Vineland Research and Innovation Centre [Travis].
  - o NatureFresh Farms [Stephanie].
  - o Western University [Vava].
- 1140-1200 Wrap Up and Next Steps.



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### MOTIVATION



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# YOU ARE ALREADY GREAT

So What Are We Trying To Do Here?

- The Ontario Greenhouse Sector is ripe with many examples of Research, Innovation, Commercialization, Education, and Teaching.
- The wealth of knowledge among Growers, Government Labs, NGO Agencies, Consultants, and Universities is staggering.
- Careful examination of the sector has revealed a wealth of untapped opportunities for markedly increased coordination, collaboration, and knowledge translation.



# YOU ARE ALREADY GREAT

So What Are We Trying To Do Here?

## COORDINATION



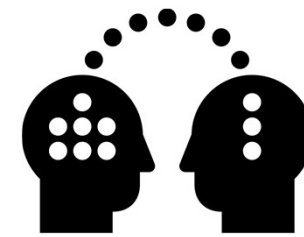
Avoid redundancy,  
increase efficiency of  
resource utilization.

## COLLABORATION

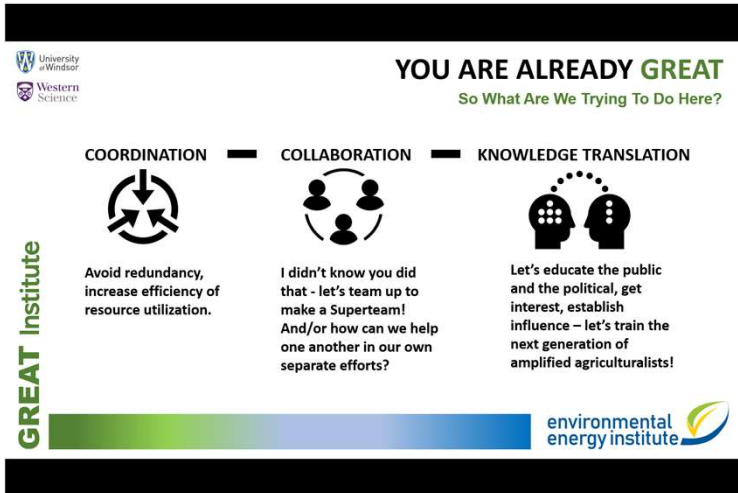


I didn't know you did  
that - let's combine to  
make a Superteam!  
And/or how can we help  
one another in our own  
separate efforts?

## KNOWLEDGE TRANSLATION



Let's commercialize  
innovation, educate the  
public and the political,  
get interest, establish  
influence – let's train the  
next generation of  
amplified agriculturalists!



# YOU ARE ALREADY GREAT

So What Are We Trying To Do Here?

## BUILD A BRAND FOR EXPORT



Many existing GREAT Stakeholders have already established globally recognized product brands. The same should be true for our GREAT Research, Education, and Commercialization.



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### COMPOSITION



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# IT'S ALL ABOUT A **GREAT** NETWORK

Core Components



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### The GREAT Network

Construction Begins

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*"Who Does What And Where"*



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# GREAT Places

- Some additional GREAT places doing neat work in the CEA sector:





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### STAKEHOLDER SURVEY



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- The Agriculture Development Branch (ADB) within OMAFRA provides crop and business management technology transfer and advice to enable innovation and changes to strengthen economic and environmental sustainability of a diverse agriculture sector.
- Role: The Greenhouse Vegetable Specialist supports vegetable and cannabis growers using Controlled Environment Agriculture in Ontario (greenhouses and vertical/indoor farms), by performing knowledge and technology transfer (KTT) activities and supporting research and funding efforts.
- Provide growers with updated information about production issues and funding opportunities. Connect researchers and suppliers with growers needed for projects. Advocate for research and funding support for CEA within OMAFRA.
- Seeking collaborations in three main areas:
  - 1) Expanding the use of CEA (greenhouse and vertical farms) in urban, northern, and remote regions of Ontario
  - 2) Increasing the use of automated and autonomous production technologies in CEA
  - 3) Adoption of renewable energy and renewable products in CEA



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**Rupp Carriveau, David Ting, Lindsay Miller, Jill Urbanic**

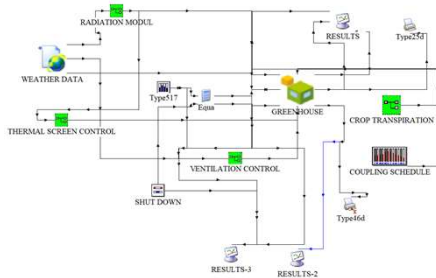
**Turbulence and Energy Lab, Environmental Energy Institute Researchers**



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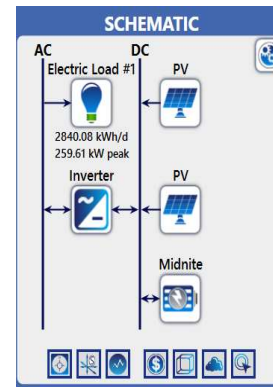
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**CEA CLIMATE-ENERGY  
MODELING**



**3D PRINTED CEA**



**CLEAN DISTRIBUTED  
ENERGY RESOURCE  
DESIGN**

- **WASTE-WATER MANAGEMENT**
- **PEST MANAGEMENT**
- **CURRICULUM DEVELOPMENT**
- **EXTENSION SCIENCE LAB**
- **AQUACULTURE**







Agriculture and  
Agri-Food Canada

Agriculture et  
Agroalimentaire Canada



**Xiuming Hao,**  
Crop Physiology  
and Energy  
Efficiency



**Quade  
Digweed,**  
Engineering

- Controlled Environment Agriculture (CEA) is a combination of biological science and engineering.
- Harrow Research and Development Centre is the Canadian Centre of Excellence for generating new scientific knowledge and developing innovative production systems and technologies to support the growth of Canadian CEA industry – focusing on edible/food crops.
- Xiuming Hao (Research Scientist) - Develop climate (**light**, temperature, humidity and CO<sub>2</sub> etc.) control strategies, water, nutrient and crop management strategies, and soilless/hydroponic systems to optimize growing environment for improving yield, quality (nutritional value), resource use efficiency and environmental sustainability in CEA (greenhouse and vertical farming).
- Quade Digweed (Engineering) – Microclimate data collection and new sensor development, energy conservation/climate control technology development and evaluation (such as phase change materials), and the development of climate control systems for vertical farming.
- Service to the Sector – Research, evaluation and advices on any issues related to above areas.
- Partners and Resources seeking: Anyone with new environmental (climate and root zone) control technology, data-driven AI system and sensors (focusing on year-around production).



Agriculture and  
Agri-Food Canada  
Agriculture et  
Agroalimentaire Canada

**Dr. Geneviève Marchand**

**Dr. Roselyne Labbe**

**Greenhouse crop protection**

- AAFC's Harrow Research and Development Centre is the largest greenhouse research facility in North America with an interest in expanding on current research in controlled environments aimed at optimizing agricultural productivity and minimizing pest pressure.
- Research Scientists in Entomology and Pathology, investigate the impact of artificial lights and the controlled environment on plant pest pressure or suppression.
- We actively seek to develop arthropod and pathogen pest management solutions.
- Current partners include OMAFRA, University of Windsor, University of Guelph, Canadian Horticultural Council, Ontario Greenhouse Vegetable Growers. We seek to establish new partnerships with academia, government and companies aiming to develop solutions for integrated pest management in the greenhouse or controlled environment.

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# Dr. Rob Nicol

## Manager & Principal Investigator, Bio-Industrial Process Research Centre

- Lambton College is consistently ranked as one of the top Research Colleges in Canada with Bio, Manufacturing, IT, Water and Energy Research Centres.
  - We are currently engaged with 5 companies on Greenhouse Crop Waste Reuse projects, 5 companies on Greenhouse Biopesticide Development projects and 3 companies on Greenhouse Vegetable and Cannabis Production projects.
  - We are partnered with University of Guelph, University of Waterloo, Carleton University, Fanshawe College and Agriculture and Agri-Food Canada on these projects.
- Rob Nicol, PhD Plant Sciences (Western). I have been conducting agricultural research for over 20 years and greenhouse production research for 10 years (sustainable crop inputs & waste reuse).
- We offer research development and expertise, access to QC/QA analytical equipment or equipment training, funding development, manufacturing audits, business development/networking, cannabis analysis (Health Canada licensed)
- We are seeking public, private and community partners to further the shared goals of the CEA sector.



# Niki Bennett

Science Coordinator

- Ontario Greenhouse Vegetable Growers (OGVG) is a non-profit organization representing all growers packers and marketers (>\$1B farmgate 2020) of greenhouse tomatoes, peppers and cucumbers across Ontario. OGVG facilitates research on behalf of members and also promotes the sector through media and trade shows.
- My role involves advancing the sector through managing the research, crop protection, emerging pests and organics files. I often act as a liaison between growers, businesses, emerging technologies, researchers and government.
- OGVG provides support for research activities (cash and in-kind), knowledge transfer activities, general greenhouse knowledge, facilitate connections with growers and other sector stakeholders.
- OGVG is always interested in connecting with new partners who share our interest in advancing the greenhouse vegetable sector in Ontario.

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# William David Lubitz

Associate Professor, School of Engineering

- The University of Guelph is world renown for agricultural research. A few examples of Controlled Environment Agricultural (CEA) research at Guelph include:
  - Controlled Environment Systems Research Facility (Dr. Michael Dixon)
  - Improving greenhouse productivity in low light or supplemental light (Dr. Barry Micallef)
  - Insect/pest control in greenhouse crops (Dr. Cynthia Scott-Dupree)
  - Greenhouse robotics and automation (Dr. Medhat Moussa)
- My focus is on energy use and efficiency in greenhouses, including
  - Measuring and characterizing energy flows in operating greenhouses
  - Developing predictive mathematical models to forecast energy efficiency of greenhouse designs
- We measure and analyze energy use in greenhouse facilities, and research potential efficacy of using new or different energy technologies to reduce costs or improve the growing environment.
- We are looking for additional greenhouse environmental data and partners operating greenhouses to further expand our research.





**vineland**  
RESEARCH & INNOVATION CENTRE

# Travis Banks

Director, Plant Variety Development

- Vineland Research and Innovation Centre is a non-profit horticultural research institute. Our mission is to improve the economic viability, sustainability, and competitiveness of horticulture in Canada.
- We conduct research in the following areas
  - Automation
  - Biocontrol Systems
  - Consumer Insights
  - Plant Variety Development
- I lead all research activities related to the breeding and introduction of new plant varieties. This includes the development of greenhouse TOVs adapted to Southern Ontario greenhouse conditions
- Vineland can offer services and collaboration in Biochemistry, Genomics, Robotics, Machine Learning, IPM, Plant Pathology, and Consumer Research
- We are looking to partner on projects that help advance the horticulture sector

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# Stephanie Swatkow

Director of Marketing

**Nature Fresh Farms** began as a “Build and Sell” project in 1999. As a greenhouse designer, manufacturer, and builder, our Founder & President Pete Quiring recognized that the greenhouse industry was in transition, and that technology and innovation would drive continued growth.

Quiring set out to prove that an upfront investment in state-of-the-art greenhouses would have a transformational impact on quality. From that moment forward, he has been perfecting automation for cost control, technology for crop control, and varietal advancements for consumer appreciation.

Nature Fresh Farms has over 2,500 acres of greenhouses and has grown to become one of the largest independent greenhouse produce growers in Canada, as well as one of the largest growers for lit crop Tomatoes in North America. Nature Fresh Farms is a tremendously efficient and highly automated greenhouse. Originally modelled after the very best European technologies, it continues to use emerging greenhouse science to achieve new levels of excellence.

As **Director of Marketing**, I am responsible for Nature Fresh Farms’ marketing and communications strategies as well as their branding and overall image. Driving the overall awareness of the benefits of greenhouse growing is important, we need to be able to leverage that base knowledge to increase our business.

I am open to **collaboration** to drive awareness of the industry.

I am looking for any **information** that I can use to further curate and support our story.

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# Vojislava Grbic

Associate Professor

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- Western creates, disseminates and applies knowledge for the benefit of society through excellence in teaching, research and scholarship. Western is committed to environmental sustainability.
- Role: Development of genomic-based precision agriculture strategies for the greenhouse pest management – focused on the two spotted spider mite.
- Provide Growers with IPM decision support tool that will help Growers manage the pesticide resistance management in the two spotted spider mite; development of new RNAi-based biopesticides.
- Seeking collaborations:
  1. In development of beta-version of mite pesticide resistance management tool (collection of mite samples and associated meta-data)
  2. In testing new RNAi-based biopesticides
  3. Adoption of new pest control tools
  4. In identifying pest management problems
  5. Joint applications for research funds

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