

# Mariaelisa Polsinelli

Montreal, QC, Canada

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## Education

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### PhD: Bioresource Engineering

August 2022-Present

McGill University: Macdonald Campus, Sainte-Anne-de-Bellevue, QC

Thesis: *"Combining Crop Models and Machine Learning for Climate-Smart Irrigation in Prince Edward Island Potato Fields"*

Advisors: Zhiming Qi, Morteza Mesbah

### Bachelor of Science: Agriculture, with distinction

February 2022

University of Guelph, Guelph, ON

Concentration: Crop, horticulture, and Turfgrass Science

Major Research Project: *"An Analysis of Closed Loop Systems in Vertical Farming: Recirculated Water Sanitation in the GoodLeaf Hydroponic System and Optimizing Composting of Vertical Farm Waste"*

Advisors: Thomas Graham, Mike Dixon

### Bachelor of Science: Double Major Computer Science and Linguistics

June 2017

University of Toronto: St. George Campus, Toronto, ON

Additional Minor in German Language

Major Research Project: *"Touchbar: A Study of the Effects of Input Device Type on Error Correction Time"*

## Publications

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### Under Review

Mesbah, M., Murchison, K., **Polsinelli, M.**, Jégo, G., & Morissette, R. (2025). *Strategic Nitrogen Recommendations for Potatoes: Soil- and Climate-Specific Insights from the Model-Based Identifying NEMO Framework*.

### Non-Peer Reviewed

**Polsinelli, M.**, Mesbah, M., Qi, Z., Ramsay, M. (July 2024). "Imbalanced Datasets and Crop Yield Prediction: Application of Preprocessing Techniques for Regression Tasks in Agriculture". American Society of Agricultural and Biological Engineers Annual International Meeting, Anaheim, CA, USA. (1-19). doi: 10.13031/aim.202400813

## Awards

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### McGill Graduate Excellence Award (\$5000)

August 2025

McGill University, Montreal, QC

Merit-based departmental award recognizing outstanding graduate students.

- Mariaelisa Polsinelli**                      [mariaelisa.polsinelli@mail.mcgill.ca](mailto:mariaelisa.polsinelli@mail.mcgill.ca)  
**McGill Graduate Excellence Award (\$5000)**                      August 2024  
McGill University, Montreal, QC  
Merit-based departmental award recognizing outstanding graduate students.
- Graduate Student Mobility Award (\$750 CAD)**                      July 2024  
McGill University, Montreal, QC  
Awarded to fund one week of out of province travel to Prince Edward Island for research exchange and data collection activities.
- Graduate Research Enhancement and Travel (GREAT) Awards (\$500 CAD)**                      June 2024  
McGill University, Montreal, QC  
Awarded to 20 students to support conference attendance.
- Graduate Research Enhancement and Travel (GREAT) Awards (\$500 CAD)**                      September 2023  
McGill University, Montreal, QC  
Awarded to a limited number of students to support conference attendance.
- Graduate Student Mobility Award (\$750 CAD)**                      July 2023  
McGill University, Montreal, QC  
Awarded to fund 10 days of out of province travel to Prince Edward Island for research exchange and presentation.
- CSAFM-SCMAF Student Travel Award (\$500 CAD)**                      May 2023  
Canadian Society of Agriculture and Forest Meteorology  
Competitive award granted to one student, based on abstract submission, to support conference participation.
- RB Palmer horticultural Scholarship (\$1000 CAD)**                      October 2020  
University of Guelph, Guelph, ON  
Competitive award granted to one student with the highest cumulative average with interest in horticulture, plant breeding, or plant genetics.
- William Godfrey Memorial (\$1500 CAD)**                      October 2020  
University of Guelph, Guelph, ON  
Competitive award granted to one student with demonstrated interest in horticultural Science through work experience, volunteerism, and/or extracurricular involvement.
- F.E. Wolff International Scholarship (\$1500)**                      March 2020  
University of Guelph, Guelph, ON  
Awarded to a limited number of students enrolled in the Field course in International Agriculture to supplement travel for field trip to Costa Rica

## Research Experience

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### Research Affiliate Program

September 2020 – Present

Agriculture and Agri-food Canada (AAFC)

Charlottetown Research and Development Centre, Charlottetown, PEI

- Application of process-based crop model STICS, traditional machine learning algorithms and reinforcement learning in order to analyse and solve irrigation decision making challenges for potato crops in Prince Edward Island, Canada.

### Research Assistant

May 2022-September 2022

Ontario Ministry of Agriculture, Food, and Agribusiness (OMAFRA), Guelph, ON

- Implemented improvements to the Microsoft PowerBI weather dashboard, an interactive data visualization tool of weather and pest forecasts and trends created during previous employment with OMAFA.
- Automated climate data acquisition and organization from online platforms such as Environment Canada Historical data and NASA POWER using R, python and batch files. Ensuring easy upkeep for future non-technical users.

### Major Research Project

May 2021 – December 2021

Controlled Environment Systems Research Facility (CESRF), University of Guelph, Guelph, ON

- Completed an analysis of the recirculating fertigation system at local vertical farm.
- Determined important sites through literature review and investigation within facility from which to collect water samples.
- Completed a microbial analysis of water samples and substrate samples to find sources of pathogen pressure and investigate the effectiveness of the facility's sanitation systems.
- Designed and conducted a Box-Behnken Response Surface Model experiment to determine if spent hydroponic growth substrate, found to be a pathogen source, and available plant material waste could be composted to allow reuse in the system.
- Derived minimum peat moss to plant material ratio, moisture content, and aeration rate values required to achieve adequate composting conditions.

### Undergraduate Student Experiential Learning Position

May 2020 – September 2020

Ontario Ministry of Agriculture, Food, and Rural Affairs (OMAFRA), Guelph, ON

University of Guelph, Guelph, ON

- Scouted *Brassica* and *Allium* crops in Southern Ontario for pests and disease.
- Participated in field trials including herbicide and cultivar trials for carrots, potato and garlic crops collecting weekly weed counts, weed identification and emergence counts, and ratings for signs and severity of disease among other data.
- Timely preparation and posting of a weekly crop and weather report on the ministry's extension blog ensuring prompt communication with OMAFRA specialists for crop updates and compiling weather and pest forecast data.
- Established an interactive Microsoft Power BI data visualization tool for weather and pest forecasts and trends, enabling easier access and comparison between climate and pest trends.

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Major Research Project in Human-Computer Interaction

September 2016 – December 2016

University of Toronto, Toronto, ON

CSC428H1: Human-Computer Interaction

- Our 4-person team constructed a novel computer peripheral, the “Touchbar”, a touch sensitive strip applied to the keyboard space bar which could be used to move the cursor in word processing applications such as Microsoft Word.
- Conducted experimental user research analysing differences in spelling error correction time between the Touchbar and common correction methods such as the mouse and keyboard.
- Completed a scientific manuscript that was used as an example for the project in following semesters.

## Teaching

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**Teaching Assistant**

September 2023 – December 2023

McGill University

BREE 533 – Water Quality Management

- Principal teaching assistant for a class of 27 undergraduate and graduate students.
- Responsible for invigilating and grading two midterms as well as group assignments, reports and presentations.
- Organize lab components of class project, direct students on procedures and provide helpful resources.
- Collect measurements on student water samples (pH, electrical conductivity, dissolved oxygen).
- Timely set up of assignment submissions and inputting grades on university’s learning management system.
- Sending out reminders and supportive information, as well as giving appropriate feedback for midterms and assignments which students reported were very helpful for their success in the course.

**Teaching Assistant**

September 2023 – December 2023

McGill University

BREE 533 – Water Quality Management

- Principal teaching assistant for a class of 26 undergraduate and graduate students.

**Teaching Assistant**

January 2024 – April 2024

McGill University

COMP 360 – Algorithm Design and Analysis

- Efficient grading and feedback for assignments and exams for class of 200 students.
- Created solutions for midterm provided to students on topics including graph theory and linear programming.

**Teaching Assistant**

September 2023 – December 2023

McGill University

BREE 533 – Water Quality Management

- Principal teaching assistant for a class of 24 undergraduate and graduate students.

## Presentations

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### Oral Presentations

- **Polsinelli, M.\***, Mesbah, M., Jiang, Y., Qi, Z. (July 15, 2025). *“Climate-Smart Irrigation Strategies to Sustainably Maximize Potato Yield in Rain-Fed Agriculture: A Case Study in Prince Edward Island, Canada”*. American Society of Agricultural and Biological Engineers Annual International Meeting, Toronto, Canada.
- **Polsinelli, M.\***, Mesbah, M., Qi, Z., Nyiraneza, J. (April 1, 2025). *“Process-Based Modelling for N<sub>2</sub>O Emission Estimation at the Field-Scale in Atlantic Canada”*. AgMIP10, CIMMYT (Centro Internacional de Mejoramiento de Maíz y Trigo), El Batán, Mexico.
- **Polsinelli, M.\***, Mesbah, M., Qi, Z., Ramsay, M. (July 2024). *“Imbalanced Datasets and Crop Yield Prediction: Application of Preprocessing Techniques for Regression Tasks in Agriculture”*. American Society of Agricultural and Biological Engineers Annual International Meeting, Anaheim, USA
- **Polsinelli, M.\***, Mesbah, M., Qi, Z., Ramsay, M. (January 2024). *“Combining a Process Based Model with Machine Learning for Potato Yield Prediction in Prince Edward Island, Canada”*. Charlottetown Research and Development Seminar Series, Online.
- **Polsinelli, M.\***, Mesbah, M., Qi, Z., Ramsay, M. (August 2023). *“Combining a Process Based Model with Machine Learning for Potato Yield Prediction in Prince Edward Island, Canada”*. Prince Edward Island Potato Board, Kinkora, Prince Edward Island.
- **Polsinelli, M.\***, Mesbah, M., Qi, Z., Ramsay, M. (June 2023). *“Combining a Process Based Model with Machine Learning for Potato Yield Prediction in Prince Edward Island, Canada”*. AgMIP9, Columbia University, New York, USA.
- **Polsinelli, M.\***, Mesbah, M., Qi, Z., Ramsay, M. (May 2023). *“A Case Study in Prince Edward Island, Canada: Comparing Process Based Models and Machine Learning for Potato Yield Prediction”*. CGU/CSAFM-SCMAF Annual Meeting, Banff, Alberta.

### Poster Presentations

- **Polsinelli, M.\***, Mesbah, M., Qi, Z., Jiang, Y., Jégo, G. (February 2, 2026). *“Supplemental Irrigation in Rainfed Potato: Long-term Costs, Benefits, and Insights from Prince Edward Island, Canada”*. iCROP2026, Florence, Italy.
- **Polsinelli, M.**, Mesbah, M.\* , Jiang, Y., Qi, Z. (July 30, 2025). *“A Cost-Benefit Analysis of Climate Smart Irrigation for Prince Edward Island Potato”*. AAFC Charlottetown Research and Development Centre Stakeholder Day, Prince Edward Island, Canada.
- **Polsinelli, M.**, Mesbah, M.\* , Qi, Z., Ramsay, M. (August 2, 2023). *“Can Machine Learning and Crop Models Help Farmers? A Case Study of Oyster Cove Potato Farms”*. AAFC Charlottetown Research and Development Centre Stakeholder Day, Prince Edward Island, Canada.

### Service

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Reviewer

2025

Agricultural Water Management

## Volunteer Experience

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### CSAFM-SCMAF Student Representative

May 2023 – May 2024

Canadian Society of Agriculture and Forest Meteorology

### Data Collection Volunteer: Efficient Dairy Genome Project

November 2019 – March 2020

Elora Dairy Research Station - University of Guelph, Guelph, ON

- Operated a Greenfeed system which measures gas fluxes from large, individual, ruminant animals as they eat.  
Recorded observations of animal behaviour during feeding.

## Technical Skills

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- Programming languages and applications: R, python, ArcGIS, SQL, Java, C, MATLAB, SAS, Microsoft Excel, and Microsoft PowerBI.
- Crop model calibration and application: STICS, RZWQM2
- Microbial culture and plate preparation.
- Soil and water sampling in agricultural fields, controlled environment systems and natural water bodies.
- Calibration and Maintenance of pH, DO Meters.
- Experience using a variety of instruments for measuring crop growth, development and solar radiation including use of 2-channel reflectance spectrometer, SPAD meters, line quantum sensors, respirometers, and LI-3100 leaf area meter.

## Languages

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- English: Native
- Italian: B2
- French: A2
- Spanish: A1/A2
- German: A1
- Japanese: A1 (JPLT N5)