Jiaxu Wu

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Summary

How to enhance crop yield in the face of climate change and a growing population is an important topic in plant science. I am a Ph.D. candidate that conduct graduate research in plant disease resistance - focusing on developing the clubroot resistance varieties in canola through a multidisciplinary approach that encompasses genetics, biochemistry, and bioinformatics. Our primary objective is to assist Canadian canola breeding in managing clubroot disease while maintaining sustainability.

Education

- **PhD student** **2022-present**

  Plant Biology
  Faculté des Sciences de L'agriculture et de L'alimentation, Université Laval, QC, Canada
  Research thesis: Understanding the clubroot resistance mechanisms in Canola (*Brassica napus* L.)
  Supervisor: Dr. Edel Pérez-Lopez
  Funding: Bourses de formation au doctorat, Fonds de recherche du Québec (FRQNT), QC, Canada

- **Master of Science (MSc Thesis-based)** **2019-2022**

  Boreal Ecosystem and Agricultural Sciences (BEAS)
  School of Science of the Environment, Memorial University of Newfoundland, NL, Canada
  GPA: 4.0/4.0
  Research thesis: Evaluating role of phosphatidic acid in cold stress tolerance in silage-corn.
  Link: https://doi.org/10.48336/QDVD-ZE22
  Supervisor: Dr. Mumtaz Cheema and Dr. Raymond Thomas
  Funding: SGS Scholarship and Research Grant, Memorial University, NL, Canada

- **Bachelor of Science (BSc)** **2014-2018**

  Horticultural Science
  Henan University of Science and Technology, Luoyang, Henan, China
  GPA: 4.1/5.0
  Research thesis: Effects of Interaction between Arbuscular Mycorrhizal and Phoxim on Growth of Chinese Chive (*Allium tuberosum* Rottl. ex Spreng.)

Publications

- Mukhopadhyay S*., Javed, MA, **Wu, J.**, Pérez-López, E*. (2025). Structure-guided secretome analysis of gall-forming microbes offers insights into effector diversity and evolution. ***eLife,*** 14:RP105185, https://doi.org/10.7554/eLife.105185.1 (V1)
- **Wu, J.**, Mukhopadhyay S., Pérez-López, E*. (2025). Resistance gene enrichment sequencing refines the Brassica napus NLRome. ***Plant Physiology.,*** kiae631, https://doi.org/10.1093/plphys/kiae631
- **Wu, J**., Pérez-López, E*. (2023). A multilayer strategy is needed to uncover the clubroot pathogen mysteries. ***Physiological and Molecular Plant Pathology.***, 101971. https://doi.org/10.1016/j.pmpp.2023.101971

- Javed, M.A., Schwelm, A., Zamani-Noor, N., Salih, R., Silvestre Vañó, M., **Wu, J**. et al. (2023) The clubroot pathogen Plasmodiophora brassicae: A profile update. ***Molecular Plant Pathology.***, 24, 89– 106. https://doi.org/10.1111/mpp.13283
- Nadeem, M*., **Wu, J.,** Ghaffari H., Kedir, A J., Saleem, S., Mollier, A., Singh, J. and Cheema, M*. (2022), Understanding the adaptive mechanisms of plants to enhance phosphorus use efficiency on podzolic soils in boreal agroecosystem. ***Frontiers in Plant Science,*** https://doi.org/10.3389/fpls.2022.804058
- **Wu, J*.,** Nadeem, M., Galagedara, L., Thomas, R., and Cheema, M. (2022). Effects of Chilling Stress on Morphological, Physiological, and Biochemical Attributes of Silage Corn Genotypes during Seedling Establishment. ***Plants*****, 11(9), 1217.** https://doi.org/10.3390/plants11091217
- **Wu, J*.,** Nadeem, M., Galagedara, L., Thomas, R., & Cheema, M. (2022). Recent insights into cell responses to cold stress in plants: Signaling, defence, and potential functions of phosphatidic acid. ***Environmental and Experimental Botany*****,** 105068. https://doi.org/10.1016/j.envexpbot.2022.105068
- Nadeem, M*., Thomas, R*., Adigun, O., Manful, C., **Wu, J.**, Pham, T.H., Zhu, X., Galagedara, L. and Cheema, M*. (2020), Root membrane lipids as potential biomarkers to discriminate silage-corn genotypes cultivated on podzolic soils in boreal climate. ***Physiologia Plantarum*** https://doi.org/10.1111/ppl.13181

Posters & Presentations

- **Jiaxu Wu.** Low temperature stress tolerance in silage-corn: role of phosphatidic acid. *Agriculture and Agri-Food (AAFC) - Grenfell Graduate Student Session 2: Plant Growth and Health*, Memorial University of Newfoundland, NL, April 27th, 2021.
- **Jiaxu Wu.** Effects of low temperature stress on physiological and biochemical processes of silage-corn genotypes. *Tri-Society Virtual Conference (CPS, CSA and CSHS)*, July 8th, 2021. (**Winner of the 2nd position in the poster competition**) https://doi.org/10.1080/07060661.2021.2009254
- **Jiaxu Wu.** Understanding the molecular basis of NLR-mediated clubroot resistance in *Brassica napus*. *3MT*, *Faculty of Agriculture and Food Sciences*, Université Laval, QC, March 15th, 2023. (**Winner of the 1st position in the presentation competition**)
- **Jiaxu Wu.** Unveiling the clubroot-resistant canola (*Brassica napus* L.) NLRome. *2023 CSPB Annual General Meeting*, Quebec City, QC, June 18th, 2023.
- **Jiaxu Wu,** Unveiling the clubroot-resistant canola (*Brassica napus* L.) NLRome. *2023 IBIS Student Day*. Université Laval, QC, August 25th, 2023.
- **Jiaxu Wu.** Rensistance gene enrichment sequencing (RenSeq) – based refinement of *Brassica napus* NLRome. *Plant Canada,* Winnipeg, MB, July 10th, 2024 **(Honorable mention in the CSPB poster competition)**
- **Jiaxu Wu.** Rensistance gene enrichment sequencing (RenSeq) – based refinement of *Brassica napus* NLRome. *Annual CRIV Symposium,* Université Laval, QC, August 28th, 2024 (**Winner of the 1st position in the poster competition**)

Research Experiences & Training

- **Biological Characterization and Toxicity Assay of *Fusarium Oxysporum* of *Albizia julibrissin***

  04/2016-05/2017 | Volunteer

  This is a Student Research Training Program (SRTP). The objective of this project is to biologically characterize the *Fusarium Oxysporum* of *Albizia julibrissin* in Luoyang City, China. We surveyed and collected related plant materials and extracted wilt samples in Luoyang City. I isolated and purified pathogenic fungus in media and conducted morphological and molecular identification to verify *Fusarium Oxysporum*. I was also involved in writing grant application.

- **Bachelor Graduation Thesis**

  01/2018-07/2018 | Project leader

The title of my bachelor's thesis is "Effects of Interaction between Arbuscular Mycorrhizal and Phoxim on Growth of Chinese Chive (*Allium tuberosum*)". The results indicate that the application of phoxim has a certain stress and the peroxide content in the plant has increased on the Chinese chive. Inoculation with AMF effectively enhances the nutrient accumulation and stress resistance of Chinese chive.

- **miRNA Analysis Related to the Resistance against *Fusarium oxysporum* Induced by *Trichoderma* in Cucumber**

  12/2015-08/2016 | Volunteer

  In order to find MicroRNA (miRNA) related to the resistance against *Fusarium oxysporum* Induced by Trichoderma in cucumber plants. We constructed the small RNA library of cucumber root and used Illumina sequencing to analyze the small RNA library. A total of 92 known miRNAs were screened and 63 new miRNAs were predicted.

- **Analysis on the Effect of *Trichoderma* Against *Fusarium* Wilt in Cucumber**

  12/2017-06/2018 | Volunteer

  To analysis the effects of Trichoderma fungi on cucumber fusarium wilt resistance. We found that Trichoderma plays an important role in *Fusarium oxysporum* defense response by regulating redox homeostasis in the cucumber roots. In this study, I measured the oxidative stress-related contents (H_2O_2, O_2^-, MDA, AsA and GSH) and enzymes activities (SOD, CAT, MDHAR and GR).

- **Construction of Recombinant Gene Viral Vector pTRV2-*Fom-2***

  07/2018-10/2018 | Research Assistant

  In this study, specific primers were designed based on the published *Fom-2* gene in cucumber (GenBank accession number: AY619647.1) and the amplified fragment was 245 bp in length. VIGS technology was applied in this experiment. pMD18-T was used as the vector to construct the recombinant gene viral vector pTRV2-*Fom-2* to quickly identify the function of *Fom-2* gene in cucumber.

- **Root membrane lipids as potential biomarkers to discriminate silage-corn genotypes**

  02/2019-05/2019 | Research Assistant

  In this project, we found that root membrane lipids would act as a proxy or biosignature to discriminate silage corn genotypes based on their genetic traits for cultivation on podzolic soils in boreal climate. I received training in plant lipid extraction and high-performance liquid chromatography (HPLC) analysis.

- **Role of AtGAD1 under phosphorus deprivation**

  09/2021-12/2021 | Research Intern

  The objective of this project was to find the role of Ca^{2+}- dependent glutamate decarboxylase-1 (AtGAD1) phosphorylation under phosphorus resupplied *Arabidopsis thaliana* under phosphorus deprivation. In this project, I received training in the western blotting method. This work was supervised by Prof. William Plaxton at Queen's University, Kingston.

- **Master Research Thesis**

  01/2019-04/2022 | Project leader

  The objectives of this research project are: i) to determine the effects of cold and non-cold stress on seedling growth, morphological, physiological, and biochemical attributes of silage corn at early growth stage; ii) to investigate the role of phospholipidome mediation in cold stress tolerance in silage corn at the early growing stage. I designed the experiment and finished most experiment. The outcome led to two peer-reviewed publications in *Plants* and *Environmental and Experimental Botany*, respectively. The third publication is in preparation.

Skills

- **Computational skills**
  Microsoft Office
  Linux
  Python
  Data Analysis Software: R program language, GraphPad-Prism, SPSS, Sigma Plot.
- **Bioinformatic skills**
  Genome sequencing analysis: Sanger, Illumina, and Oxford Nanopore
  Transcriptome analysis (RNA-seq)
  Gene family identification
  Genome assembly (plant)
- **Wet lab skills:** molecular cloning, plant transformation, tissue culture, qRT-PCR, western blot, Co-IP etc.

Awards

- **May 2025** Bourse d'études Margaret Newton 2025 **($ 1, 300)**
- **August 2024** First Prize of Poster Award, *Annual CRIV Symposium* **($ 300)**
- **July 2024** Honorable Mention of Poster Award, *Plant Canada 2024*
- **April 2024** Doctoral Grant, Fonds de recherche du Québec **($ 75,000)** https://doi.org/10.69777/350513
- **March 2023** First Prize of English Section, *Three-minute Thesis (3MT),* Faculty of Agriculture and Food Sciences, Université Laval **($ 250)** https://www.fsaa.ulaval.ca/faculte/actualites-et-evenements/actualites/details/article/default-8623106a86
- **October 2022** Fellow of the School of Graduate Studies 2022-2023, Memorial University of Newfoundlandhttps://www.mun.ca/sgs/media/production/memorial/academic/school-of-graduate-studies/school-of- graduate-studies/media-library/Fellows%202022-2023%20Website%20v2.pdf
- **July 2021** Second Prize of Poster Award, *2021 Tri-Society Virtual Conference* **($ 100)**
- **November 2014** First Prize, *College Student English Speaking Contest*, Henan University of Science and Technology **($ 150)**
- **October 2014** *University Freshman Scholarships*, Henan University of Science and Technology **($ 1,000)**

Other Information

- **Extracurricular Activities**

  1. Tax clinic volunteer (March 2019 – May 2019): I participated in the "Community volunteer income tax program" at Memorial University of Newfoundland. This program is led by Prof. Lynn Kendall. In this program, I got training on how to complete income tax returns and then returns for university students and the people of the local community (especially senior people and low-income earners).

  2. Library volunteer (May 2017 – November 2017): I worked as a volunteer in the library of Henan University of Science and Technology during weekends. My duty is to clean returned books and place them in the correct locations.

  3. Botanical Garden volunteer (April 2015 - June 2016): Every Spring season, Luoyang City attracts lots of tourists because of the Peony Culture Festival of Luoyang. I joined the Wangcheng Park's volunteer team in 2015 Spring. My job was recording the growth of the peony flowers and introducing the basic knowledge of peony (growth habits, varieties and flower types) to the tourists.

4. Vice-chair of recreation department, Student Union (October 2014 – October 2016): I joined as a member of the student union's recreation department at Henan University of Science and Technology and became the vice-chair in March 2015.

- **Internship and Work Experiences**

March 2017-July 2017	Intern, Floriculture, Sui Tang City Botanical Garden, China
September 2017-December 2017	Intern, Luoyang Sixin Vegetable Cultivation, China
July 2018-November 2018	Research Assistant, the Laboratory of Vegetable Stress Tolerance, Henan University of Science and Technology, China
January 2019-January 2021	Research Assistant, Boreal Ecosystem Research Initiative Lab (BERI), Memorial University of Newfoundland, Canada

- **Memberships**

Member (May 2023 – present), Canadian Society of Plant Biologists

Member (October 2023 – present), American Phytopathological Society

Member (January 2023 – January 2024), Canadian Phytopathological Society

Member (May 2019 – May 2022), Canadian Society of Agronomy

- **Links**

ORCID: https://orcid.org/0000-0002-9165-2076

Google Scholar: https://scholar.google.com/citations?user=rTJDRJMAAAAJ&hl=en

ResearchGate: https://www.researchgate.net/profile/Jiaxu-Wu

GitHub: https://github.com/jiaxuwu

Personal Website: https://jiaxuwu.github.io/

Declaration, the above information is given from best of my knowledge and all are correct.