



Agriculture and
Agri-Food Canada



Agriculture et
Agroalimentaire Canada

Resilience of Cropping Systems and Soil Health in Western Canada 2 PhD Graduate Student Positions Available

Highly qualified candidates are encouraged to apply for these positions.

Timeline for applications: until filled.

Desirable timelines for beginning the program: January 2024 or May 2024

Overall research summary: A large collaborative cropping system research project was established in 2018 to evaluate crop rotation philosophies for resiliency and soil health through a systems approach. This is a collaboration between Agriculture and Agri-Food Canada (AAFC), the University of Alberta, University of Saskatchewan, and seven experimental sites in Alberta, Saskatchewan, and Manitoba. This research is funded through Integrated Crop Agronomy Cluster phase II (2023-2028) as part of the Canadian Agricultural Partnership program. This 10-yr crop rotation study is a continuation of the ongoing crop rotations, including diversified, canola or pulse crop intensified, high risk, market driven, and soil health enhanced cropping systems, in addition to a control cropping system. Successful candidates will have the great opportunity to work with a diverse group of researchers across scientific disciplines at several prestigious institutions.

Research projects: Two PhD research projects are available to investigate contrasting cropping systems across major Canadian Prairie ecosites to determine impacts on agroecosystem resiliency and soil health. The overarching objective of these projects is to determine the best (more productive, sustainable, resilient, regenerative) cropping systems in each of the ecozones within the Canadian Prairie using a wide array of system indicators.

(1) The first project will focus on *Soil Health*. Project activities will include field sampling, laboratory procedures (e.g., tensiometry, aggregation, infiltration, compaction, organic matter fractionation, crop residues), data analyses of soil quality attributes and manuscript writing. Support and guidance in developing an impactful research project will be provided by Drs Henry Chau, Soil Scientist, at AAFC Lethbridge, and Prof. Guillermo Hernandez, at the University of Alberta (UAlberta). The successful candidate will spend most of the tenure working at the Lethbridge Research and Development Centre, AAFC, and will complete coursework requirements at UAlberta in Edmonton during two consecutive academic semesters. The student will be employed part-time as a research affiliate with the Government of Canada through the Research Affiliate Program (RAP).

Note: Preference will be given to Canadian citizens and permanent residents who meet the job requirements.

(2) The second project will focus on *Systems Resilience* and productivity, possibly including indicators associated with diseases, weeds, crop physiology, among others. In addition,

greenhouse trials may be required to assess crop resilience to biotic and abiotic stress. This project will be conducted in Saskatchewan, under the supervision of Dr. Maryse Bourgault, WGRF Chair in Integrated Agronomy at the University of Saskatchewan, and Dr. Kui Liu, at AAFC Swift Current. The successful candidate will complete coursework requirements at the University of Saskatchewan, in Saskatoon, as part of the degree program. Travel to experimental sites during the growing seasons, and relocation to Swift Current Research and Development Centre (AAFC) for the final year of the degree, tentatively, are expected.

A guaranteed minimum stipend of \$28,000 – \$30,000 for four years will be provided. Additionally, students are encouraged to apply for the many graduate scholarships available.

Requirements: Candidates must have a MSc degree with a minimum GPA of 3.3/4.0, or complete its requirements before admission, in agronomy, soil science, crop science, plant science, agroecology, or other related disciplines. Candidates must show willingness and availability to work outdoors in agricultural settings. A valid driver license and clean driving record/abstract are necessary, as travel to various field sites will be necessary during the growing season. Extended hours and/or overnight may be also necessary occasionally for timely completion of fieldwork or extension activities. In addition, lifting up to 30 lbs may be required.

Application process: Please submit a complete application package by email to the appropriate person according to your preferred project (see below). The application package must include:

1. A cover letter addressing *each and every one* of the following selection criteria with concrete and specific examples given of your skills and/or experiences (2-3 pages):
 - a. How your education and previous research is relevant to the current project
 - b. A description of your technical skills in plant and soil sciences, in the field, controlled environments and/or laboratory, and including statistical analyses
 - c. Your knowledge and experience of Canadian cropping systems, if any
 - d. Your communication skills for farmer and/or scientific audiences, including field day presentations, poster or oral presentations at conferences and submission or publications of scientific papers to peer-reviewed journals
 - e. Your ability to foster relationships with people of diverse backgrounds and work in teams
 - f. Ability to drive and possess a valid driver's license. For international applicants, please also comment on your ability to convert your driver's license to a Canadian license
 - g. For candidates whose first language is not English, and/or with a degree from a University that does not instruct in English, please comment on your English proficiency.
2. A CV
3. Unofficial transcript, or official transcript if available, showing progress or completion of MSc degree. An official transcript will be necessary for admission, if successful

Please note that these documents are needed to apply for the positions and are separate from the application to the University of Alberta or University of Saskatchewan graduate admission. Applicants that have previously applied do not need to re-apply.

- (1) For the PhD project with a focus on *Soil Health*, please send documents to Prof. Guillermo Hernandez: ghernand@ualberta.ca
- (2) For the PhD project with a focus on *Systems Resilience*, please send documents to Dr. Maryse Bourgault: maryse.bourgault@usask.ca