



THESIS OPPORTUNITY: Evaluating and modeling the benefits to soil health of extending the duration of grasslands in perennial forage based-crop rotations in Quebec.

Summary:

In Quebec, the sharp decline in hay acreage between 2016 and 2020, combined with the increase in forage corn, reflects a North American trend that emphasizes the positive effects of perennial crops on soil health. However, continuing this trend risks weakening Quebec's forage sector agronomically, environmentally, and economically, and limiting its contribution to the objectives of the 2020–2030 Sustainable Agriculture Plan and the Canadian Partnership for Sustainable Agriculture. Yet, the scientific literature clearly demonstrates that integrating grasslands into crop rotations significantly increases ecosystem services, including carbon and nitrogen storage, reduced nitrogen losses, improved soil health, the maintenance of biodiversity, and the fight against climate change. Recent findings also show that extending the duration of grasslands, particularly permanent grasslands, maximizes carbon sequestration compared to temporary grasslands. Despite these recognized benefits, the optimal duration of grasslands in crop rotations and their economic impacts remain poorly documented, especially in the Quebec context. Quantifying the productivity gains and economic value associated with grassland ecosystem services is therefore a key lever for reversing current trends and strengthening the sustainability of the forage sector in the province.

The overall objective of this project is to assess the agronomic, economic, and ecosystem benefits associated with extending the duration of grasslands in perennial forage crop rotations in Quebec. Considering the spatial heterogeneity and diversity of forage production operations and soils, we seek to demonstrate the crucial role of rotational pastures in providing ecosystem services.

More specifically, the PhD candidate will work on the following sub-objectives:

- Evaluate the effect of the duration of grasslands in the rotation on the level of carbon stored;
- Evaluate soil health based on the duration of grasslands in the rotation;
- Characterize the stable fraction of soil carbon in forage crop rotations;
- Integrate a simulation of carbon storage and emissions based on soil properties and climate change.

Start date: January 2027

Funding: The selected candidate will receive a grant of \$25,000 per year for three years. Financial support for attending conferences and meetings is provided.

Team: The doctoral program will be supervised by Stéphanie Lavergne, Ph.D., Vincent Poirier, Ph.D., and Marie-Noëlle Thivierge, Ph.D.

Qualifications:

The successful candidate must be in the process of completing a master's degree in agriculture, soil science, environmental science, or any other related field. They must demonstrate intellectual rigor, attention to detail, independence, and organizational skills, as well as an interest in research. The candidate should be dynamic, considerate, and able to adapt easily to new environments. The successful candidate will be required to apply to the [tailor-made doctorate program in agriculture \(1482\)](#) at UQAT and will be supported by the professor in this process.



Your responsibilities:

- Conduct a literature review;
- Conduct fieldwork;
- Perform laboratory analyses;
- Analyze the results using statistical methods;
- Present the results at scientific conferences and regional events;
- Write a doctoral dissertation;
- Write scientific articles.

Location:

The doctoral program will take place at the Institute for Agricultural and Agri-Food Research (IRAA) at UQAT, specifically at the Témiscamingue Centre. The IRAA team consists of approximately fifteen full-time staff members. The Témiscamingue Centre houses the Agricultural Analysis Laboratory, which is equipped with state-of-the-art analytical facilities, including a wide range of equipment for analytical chemistry, chromatography, soil science, and plant science. Student housing, built in 2025, is located within walking distance of the Centre, facilitating mobility.

Contact person and details:

Interested candidates should send a cover letter, along with their resume and a copy of their transcript, and include the PhD title in the subject line, to:

Stéphanie Lavergne, PhD., agr.

Assistant Professor

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Located in the heart of a territory where vast open spaces, lakes, and forests foster creativity and the emergence of talent, UQAT is naturally different. A region of 22,000 lakes in the heart of the boreal forest, Abitibi-Témiscamingue thrives on a creative population, new ideas, and bold projects.

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