

Growing Pulses in Quebec: a Sustainable Transition Towards a Plant-Based Diet Using an Input-Output Approach

Topic: Input-Output Analysis: Sustainable Production and Consumption policies (7)

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Globally, Canada is renowned as a primary source and exporter of lentils, peas, and beans, meeting the increasing worldwide demand for sustainable plant-based nutrition. In addition, the nutritional benefits of pulses, including their high protein, fiber, and low-fat content, make them a viable option compared to animal-derived proteins. The updated Food Guide recommends Canadians increase their consumption of plant-based protein sources. Further, the country is witnessing a growing awareness of the environmental impacts of conventional animal-derived proteins. Pulses have a significantly lower GHG emission rate compared to all other protein sources, including meat. In addition, pulses require less water compared to other crops, while their ability to add nitrogen to the soil also makes them a desirable crop, particularly with the country's commitment towards environmental goals. Despite the national momentum, Quebec is not a major contributor to the country's overall pulse output, with the prairie provinces and Ontario witnessing the bulk of the production. Quebec thus has an opportunity to expand its production of pulse varieties such as chickpeas, lentils, black beans, and kidney beans to meet rising domestic demand. From a ramp-up in production, the province can also serve a dual purpose, catering to the demand of the local market while also helping the province to reduce its dependence on imported pulses, particularly from the US.

This study seeks to quantify the potential direct and indirect economic and environmental impacts of incrementally expanding pulse production in Quebec to meet the Food Guide dietary targets and Quebec's capacity to contribute to national export growth ambitions. To investigate the forward linkages of pulse production into food processing and animal feed industries. To assess the extent to which such expansion support a viable and sustainable transition toward plant-based food systems at the provincial and national level. To evaluate the environmental trade-offs and co-benefits associated with this transition.

The study adopts an Inter-Regional Input-Output modelling framework, which captures the full web of economic interdependencies across industries, commodities, and provinces. The approach moves beyond farm-level analysis, enabling the research to trace how changes in Quebec's pulse sector impact the broader economy affecting output, employment, and value-added activity not only within the province but across other Canadian regions through interprovincial trade linkages. The model is grounded in Leontief's foundational input-output structure, and extended to allow for the estimation of direct and indirect GHG emissions, land use changes, and water footprint implications associated with increased pulse production.

The IRIO model is constructed using Statistics Canada's Provincial Supply/Use Tables, which contain a range of industries, final demand categories, and commodities. An interprovincial trade flow matrix is integrated to develop the inter-regional dimension of the model, enabling the analysis to capture cross-provincial economic spillovers and dependencies. Environmental data is drawn from established emissions coefficients aligned with Canadian agricultural and food system benchmarks. This combination of national accounting data and environmental extensions enables a comprehensive, multi-dimensional assessment of the proposed agricultural transition.

The integration of the environmental feature of the IRIO framework allows the project to contribute to existing literature in certain key ways.

Firstly, estimating the impact of economic and ecological factors simultaneously, thereby allowing a more comprehensive assessment of the sustainable development trade-offs, compared to models that consider only the economic aspect.

Secondly, a closer analysis of provincial and international trading relations will be made.

Thirdly, the study will link the numerical projections to a set of clear policy guidelines, such as the dietary recommendations outlined in the Canadian Food Guide, the Pulse Canada export goals, or the commitment to achieving net-zero emissions in Canada.

This research also fills a literature gap by offering a precise and focused study of the dynamic, interprovincial market.

Ultimately, this project offers a complete, evidence-based rationale for Quebec to reposition itself as a significant contributor to Canada's sustainable food economy. The anticipated contributions of this study could influence a wide spectrum of stakeholders in Quebec and the wider agricultural sector, such as farmers, those involved in downstream industries such as food processing and animal feed, as well as consumers looking to diversify their diet.

Overall, this study makes the case that expanding pulse production in Quebec is not merely a matter of agriculture but a multifaceted opportunity with substantial impacts on the economy, environment, and public health.