

# National Research and Innovation Strategy

Canadian Potato Council

January 14, 2022

**Key Priority Areas for Research for the next  
Agricultural Policy Framework 2023-2028**



Canadian Potato Council  
Conseil canadien de la pomme de terre

## Section 1: Introduction

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### Background

In the summer of 2012, the Canadian Potato Council of the Canadian Horticultural Council commissioned a national consultation to support the development of a national research and innovation strategy. The overall objective was: “To develop a national strategy for potatoes that will articulate the stakeholder priorities for research and innovation in the Canadian industry over the next ten-year period and provide guidance on addressing these priorities through new and existing collaborations”. The development of this national research and innovation strategy required the full cooperation and participation of industry members – growers, grower organizations, processors, academics and public servants through consultations at the provincial and national levels. The strategy required the development of an assessment of the current status of potato research and innovation, along with a vision and clear and comprehensive industry priorities. Those research priorities formed the basis of projects selected for an application under the Agricultural Policy Framework (APF) for the *Canadian Research Cluster for Horticulture*<sup>2</sup> for the period 2013-2018. In preparation for the next APF, the *National Research and Innovation Strategy* was revised in 2016 and identified research priorities submitted for funding under the *Canadian Research Cluster for Horticulture*<sup>3</sup> for the period 2018 to 2023. Again, in the fall of 2021, a national consultation followed provincial consultations to identify research priorities for the next funding period for 2023 to 2028. The results of those consultations are communicated in this updated *National Research and Innovation Strategy*.

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**During the fall of 2021, Canadian Potato Council provincial member organizations consulted with potato growers and industry stakeholders in their respective provinces to review the key priority areas for the next Agricultural Policy Framework 2023-2028. As an outcome of these consultations, key priority areas for research were identified in this revised *National Research and Innovation Strategy* and will guide the application for funding under the Canadian Research Cluster for Horticulture<sup>4</sup>.**

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### Agriculture and Agri-Food Canada’s AgriScience Cluster 4 (April 1, 2023 – March 31, 2028)

It is anticipated that the AgriScience Cluster program will be renewed in the NPF. As stated by AAFC, the Cluster program is intended to mobilize industry, government, and academia through partnerships, and address themes and horizontal issues that are national in scope. The revision of the National Research and Innovation Strategy has carefully considered the Agriculture and Agri-Food Canada climate targets and the identified priority areas for the upcoming funding cycle.

AAFC has set the following Climate Plan targets:

- National greenhouse gas emissions reduction target of 40-45% below 2005 levels by 2030;
- Goal to reach net zero emissions by 2050; and
- Target to reduce fertilizer emissions of 30% below 2020 levels by 2030.

AAFC has shared the following priority areas for the NPF, and it is expected that these priorities will be the focus of the next cluster. In order to be considered for inclusion in the Cluster application, potato research priorities must align with the following AAFC priority areas:

#### **Climate Change and the Environment (30-40%)**

AgriScience renewal could prioritize areas that address climate change and environmental sustainability to position the sector in contributing to the Government of Canada’s 2030 and 2050 targets. This would

focus on GHG emissions reductions and carbon sequestration, as well as other environmental areas including soil health, water quality, air quality, biodiversity, and plastics.

### **Economic Growth (40-50%)**

AgriScience renewal could help to drive an ambitious approach to investments targeting economic growth, including:

- Focus on emerging technologies to address challenges, create more value-added products, and increase productivity,
- Research to improve productivity. Develop new or improved product attributes and production systems,
- Proposal selection will consider treatment of emerging sectors vs established commodities; participation of value chain partners; and potential impact relative to cost.

### **Sector Resilience (20%)**

AgriScience renewal could prioritize areas that include undertaking research aimed at improving sector resilience in response to market and social pressures, including mental health.

## **Consultation and Strategy Development Methodology**

For the revision of the *National Research and Innovation Strategy*, a three-step process was adopted with the following components: 1. Provincial Stakeholder Consultations 2. National Priority Setting Workshop and 3. Revision of the *Strategy*.

The objective of the stakeholder consultations at the provincial and national level was to gain input on:

- The priorities relevant for their member growers, industry stakeholders, and Canadian Potato Council Research Working Group (RWG) in the short-, medium- and long-term;
- Identify if these priorities align with the funding priorities of AAFC (climate change and the environment, economic growth, sector resilience)
- The existing research capacities in their respective provinces
- The interest to participate in partnership (funding and/ or collaborative research) opportunities as part of a national effort to address sector priorities of mutual interest.

### **Step 1. Provincial Stakeholder Input**

The provincial organizations facilitated a consultation meeting that brought together growers, industry partners such as processors, shippers and exporters, and researchers to discuss several key strategic questions. Consultation participants were encouraged to consider the following questions:

Questions regarding research and innovation strategy:

- What are the key priorities for research and innovation as we look toward 2030? Some areas to consider include:
  - Crop management and productivity, in-field and in storage
  - Integrated Pest Management and priority pests
  - Cropping systems
  - Soil health
  - Water quality and efficiency
  - Greenhouse gas emissions
  - Genetics and variety development
- In what areas must the potato industry achieve breakthroughs in the next three years? Five years? Ten Years?

Questions regarding our existing and emerging research capacity and capabilities:

- What is the existing research capacity in your province? Is it well leveraged and utilized?
- Who are the existing research partners? Who are the potential research partners?

Consultation report templates from each session were submitted from each provincial meeting.

## Step 2. National Research Priority Setting Workshop

The Canadian Potato Council provincial member organizations met in November 2021 for a national discussion to bring together the provincial input and perspectives and to help identify common themes. A representative from each province or association presented their provincial input on the environmental scan of the industry and priorities. This input was critical in revising the *National Research and Innovation Strategy* in preparation for the Next Policy Framework.

## Step 3. National Potato Research and Innovation Strategy

Based on the feedback from the provincial consultations and the National Priority Setting Workshop, the *National Research and Innovation Strategy* was revised for consideration by the Canadian Potato Council. This revised *Strategy* will form the basis for the development of the AgriScience Cluster application for funding for the period 2023 to 2028.

## Section 2: Strategic Environmental Analysis

The development of a strategy rests in part on the analysis of an organization's environment. The pan-Canadian industry consultations provided much of the relevant information required to complete a strategic environmental analysis for the *National Research and Innovation Strategy*. During the course of these consultations participants discussed both the important trends affecting the industry and the underlying change drivers<sup>1</sup> that give rise to the trend.

### Key Trends and Change Drivers

The key trends and drivers identified ten years ago in the 2012 Strategy were revisited for a comparison to the responses received in the consultation for the 2023-2028 strategy review. Of the six items reported in 2012, four remain relevant factors today as mentioned by the provincial organizations (increasing regulatory burden; changing growing conditions and changing pest and disease profiles; increasing potato production challenges; consumer factors). Two of the original trends/drivers (challenges with Knowledge Transfer; need for a national approach to research and extension; persistent challenge of Knowledge Transfer) appear to have been addressed during Cluster 2 & 3 funding cycles to an extent that they were not identified as current issues.

Important Trend	Underlying Change Driver
<b>Need to Adopt Sustainable Production Systems and Action on Climate Change</b>	Customers are increasingly demanding the production of potatoes using sustainable practices that consider the impact on the environment. Production practices focused on soil health, have the potential to mitigate the impacts of climate change, like more severe and variable weather. Water use efficiency and quality; and changing pest management under climate change are also important factors. Greenhouse gas emissions from

<sup>1</sup> A change driver is an important force that is giving rise to change in the industry's strategic environment

agriculture is a significant concern to be addressed by research and adoption of sustainable production practices.

### **Increasing Regulatory Burden on the Industry**

The related costs to implement sustainability programs and associated metrics will place additional burden on growers. Phytosanitary regulations, trade restrictions, and pest and disease issues are all barriers to trade, while at the same time the industry is facing diminishing access to pesticides which may further limit opportunities.

### **Increasing Potato Production Challenges**

Although the consultations revealed many production-related challenges, the principal ones include:

- Increases to the cost of production due to rising costs of fertilizer, fuel, labour, land costs and other inputs.
- Increasing pressures on water availability and irrigation. Shortage of skilled labour, both in qualified agricultural professionals (agronomists, researchers, specialists) as well as on-farm labour (both skilled and unskilled).
- The identification and adoption of sustainable potato production methods in response to climate change and protection of the environment is recognized as a critical driver for the future.

### **Customer and Consumer Preferences**

Changing consumer tastes and trends continue to influence the industry, although significant advances have been made regarding the nutritional and economic value of the role of potatoes in a healthy diet. Increasingly, consumers and customers are demanding that potatoes be produced under sustainable systems that are demonstratable and measurable. The type of products, pack sizes, varieties and consumption patterns continue to change. Continuing issues are the lack of consumer education explaining the industry challenges of meeting sustainability targets while providing excellent products, the disconnect between the consumer and primary agriculture, mistrust of science (concern regarding modern breeding methods, pest management products, access to groundwater). Increased demand for potatoes is currently pushing against limitations to water supply and available acres suitable for production. Customer and consumer preferences must be considered in all decisions made by the industry.

## **Industry Strengths**

The provincial stakeholder consultations revealed several important strengths that are common to all potato producing provinces and as such must be considered as national strengths. There are four noteworthy strengths:

- The strength of the grower community was consistently identified as a characteristic of the Canadian potato industry. The strengths were based on expertise and knowledge, perseverance under adversity, and receptiveness to new ideas and adapting to problems through research. Canada has an extensive national potato production network that is well supported and led by provincial associations. The presence of such a network, motivated by a willingness to collaborate for the betterment of the industry is an important force that can position the network to take a greater role in coordinating a national research and innovation strategy. Provincial associations benefit from the active support and direct involvement of growers, processors, and researchers and as a result, the network can readily connect research priorities

to the farm gate. Stakeholders are ready to engage in new and different forms of collaboration and resource sharing to achieve a more prosperous and sustainable industry.

- Canada's diversity in potato production across the country, characterized by access to quality land and favourable climate, provide the opportunity to produce high quality and reliable potato crops. At the same time, growers are facing challenges associated with changing climate and adapting to this by adopting and continuing to develop sustainable mitigation practices.
- Canadian potatoes are globally competitive and provide excellent quality, price, and diversity to the market. The proximity to large consumer markets and our well-established infrastructure capacity for both domestic and exports supports a strong industry.
- The existing research infrastructure and assets, both physical and human, provides opportunity for national coordinated, collaborative potato research on critical problems facing the industry.

## Industry Weaknesses

Principal weaknesses were identified throughout the consultations and have been partly expressed in the previous section.

Recognizing that Canada has ideal climate across the country for potato production, the reality over the last decade has been ever increasing variability and extremes in weather including heatwaves, drought, and excessive moisture at undesirable times during the cropping season. Such extremes require mitigation by the adoption of sustainable management practices in potato production and identifying the contribution of potato production to greenhouse gas emissions.

Challenges facing the industry such as access to labour, increasing costs of production, climate change impacts, access to water, and suitable land for expansion are all viewed as industry weaknesses at this moment in time. The current impact of potato production on the environment was mentioned as an industry weakness by several provinces.

Similarly, increasing regulatory burden in all aspects of potato production including environment, labour, food safety and pesticides is a weakness.

## Potato Research and Innovation Strengths

Canada has an established national network for collaborative potato research whose foundation was laid in the Cluster 2 & 3 funding cycles. This network is characterized by experienced and innovative Agriculture and Agri-Food Canada, university, private and processor researchers that conduct broad-based projects. The successful completion of multi-institution projects has demonstrated the willingness for cooperation in research, and also in the willingness of provincial grower organizations to support and fund initiatives that have both regional and national benefit. At the same time, research at the provincial or regional level has developed through agreements with provincial governments, universities and processors or other industry partners.

The increasing willingness of growers to cooperate in on-farm research projects is an important strength of potato research in Canada that encourages early adoption of new technologies, an important part of the innovation continuum.

## Potato Research and Innovation Weaknesses

Knowledge Transfer of research results continues to be identified as an overall weakness in potato research, even though significant progress has been made during Cluster 3. The elimination of many provincial extension positions contributes to the declining ability to communicate results to growers.

The lack of sufficient scientific and technical expertise to conduct and extend potato research so that the physical resources available can be maximized is a continuing problem. Loss of people through attrition and retirement has been an on-going limitation to potato research. It must be acknowledged that Agriculture and Agri-Food Canada has partially addressed this through the hiring of scientists for vacant or new positions across the country over the past few years.

Canada lacks capacity in potato storage management research both in capital investment and in qualified personnel to conduct the research. Given the importance of storage to overall potato production, this is a significant research and knowledge gap in Canada.

The area of pest and disease diagnostics is a significant weakness in the potato sector. There is very strong capability concentrated at the Canadian Food Inspection Agency laboratory in Charlottetown, PEI in terms of capacity and expertise. However, all federal plant health diagnostics and testing for potatoes are concentrated at this single location for all of Canada. The Charlottetown lab carries out testing extensively for two soil-borne quarantine pests, Potato Cyst Nematode and Potato Wart in addition to other regulated pests such as Bacterial Ring Rot. Diversification of the expertise and laboratory capacity for diagnostic testing for potatoes to a second location, preferably in western Canada, would be desirable to share the risk of laboratory closure due to major catastrophe, contamination or human resources (pandemic impact). The Canadian potato sector is viewed as highly vulnerable to loss of testing capability and call for diversification and enhancement of this capacity.

Finally, the actual investment of public funding into agricultural research has been stagnant since 2013 funding for Cluster 2. In planning for Cluster 4 (2023-2028), there is no indication of the level of funding that will be available for the agriculture sector for research. At most, projects can be funded for five years which is not supportive of long-term research (i.e. research that supports sustainability and greenhouse gas emissions reduction). The requirement for industry contribution limits the nature of projects funded to those that have relatively fast benefits to growers and demonstratable return on investment.

## Section 3: Strategy - Guiding Elements

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### A Vision for the Industry...

An industry that is economically profitable, environmentally sustainable, and socially responsible.

### A Vision for Research and Innovation...

Consistent with the industry vision, potato research and innovation in Canada is characterised by a nationally coordinated, long-term program that leverages national and international research assets and recognizes the diverse nature of the entire potato production value chain. Research and innovation activities are focused on a broad range of research priorities that reflect the industry's needs. They are facilitated by effective extension programs and resources and supported by long-term funding coming from private and public sources.

### Mission or Purpose of the Research and Innovation Strategy

The purpose of a National Research and Innovation strategy is to:

- Ensure that Research is **COORDINATED** and possible duplication is eliminated;
- Research is **EFFICIENT** making best use of our research dollars;

- Research is conducted in an **EFFECTIVE** manner bringing results to the Canadian potato industry;
- Research priorities and results are **COMMUNICATED** to all industry stakeholders.

## **Strategy – Guiding Principles**

- The strategy is built on the goodwill and collaboration of all industry stakeholders. Ongoing communications and engagement is necessary for the success of the strategy and ensuring proper return on the research investment.
- Designed to benefit all members of the industry, the strategy is industry led and coordinated.
- The strategy makes effective use of physical assets and researcher expertise available throughout the country.

## **Section 4: Strategic Priorities Areas, Strategic Outcomes and Objectives 2023-2028**

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The National Potato Research and Innovation Strategy identifies four priority areas within which research and innovation projects may be established. Given the breadth of these priority areas, it is conceivable that some areas attract a greater number of research projects than others. The national consultations provided some insights as to the relative importance of each area and are listed in that order. Extension and technology transfer was identified as an ongoing area of priority, and the Research Working Group concurred that additional improvements were required in this area. Details of the specific provincial priorities can be found in the respective provincial consultation reports.

The four areas are:

- Soil health and regenerative agriculture
- Irrigation management and water use efficiency
- Greenhouse gas emissions, environmental performance, and on-farm adaptations
- Variety evaluation

The following table presents the Key Priority Areas, along with statements of desired outcomes relative to each priority area. These strategic outcomes define the desired end state the strategy proposes to achieve for each priority. In addition to the strategic outcomes, each priority area proposes a set of strategic objectives that will guide those making decisions on where research investment should be directed (selecting research projects for funding).

Key Priority Area	Strategic Outcome	Strategic Objectives
	<i>Statement of the desired outcome (or end state)</i>	<i>Statement of objective(s) required to achieve the desired state</i>
<b>Soil Health and Regenerative Agriculture</b> <b>High priority</b>	A systems approach that optimizes productivity while maintaining or enhancing soil health.	Improve soil health, marketable yield, and quality by integration of alternative crops, cover crops, tillage, and/ or other innovative or regenerative practices into potato production systems.
<b>Irrigation Management and Water Use Efficiency</b> <b>High priority</b>	Regional best management practices for the sustainable use of water that supports the production of high-quality potatoes, while mitigating production risks due to climate change.	Develop water management BMPs to increase water use efficiency such as the use of new technology to monitor and manage irrigation programs, including variable rate.. Research on irrigation management needs to focus on availability, measurement, and management.
<b>Greenhouse Gas Emissions, Environmental Performance, and On-farm Adaptations</b> <b>High priority</b>	Enhanced agronomic practices that reduce greenhouse gas emissions and strengthens the environmental performance of potato production in Canada.	To conduct research in agronomic practices leading to the optimal use of inputs with specific emphasis on 4R Nitrogen management and N <sub>2</sub> O reductions; soil and nutrient conservation; carbon sequestration.
<b>Variety Development</b> <b>High priority</b>	A comprehensive variety development program is in place responding to environmental pressures, resource scarcity and customer preferences.	To coordinate an ongoing variety development research program including a national evaluation program which can lead to varieties that have increased resistance characteristics to disease and pests, and /or; require reduced inputs (nutrients, water, etc.), and/or; provide improvement in taste, appearance, ease of storage and processing characteristics.
<b>Communication and Research Extension</b> <b>High priority</b>	<p>Research priorities and results are communicated to Canadian Growers</p> <p>The application of research results is facilitated through a variety of programs and support.</p>	<p>To ensure all research proposals have extension mechanisms in place to facilitate transfer of knowledge and technologies to industry members;</p> <p>To develop and implement communication tools and mechanisms to inform industry members on the research priorities, progress made on the priorities and results of the research efforts;</p> <p>To embed a research extension capacity within all national potato research and innovation projects.</p>