



# CANOLA INNOVATION STRATEGY

**A VALUE CHAIN  
VISION FOR CANOLA'S  
INNOVATION JOURNEY**

MARCH 2022



Investment in research and innovation has driven canola to become one of the world's most important oilseeds and Canada's most valuable crop. Canola is poised to do even more for our economy and our environment, as long as we harness the opportunities available and are open to and guided by innovation.

➤ The Canola Innovation Strategy, developed through 28 in-depth consultations with major stakeholders, provides an aligned value chain vision, from farm to customer, for the innovations needed to keep getting better. It outlines objectives for canola performance, precision, protection and products, and calls for a predictable and science-based regulatory system.

Through the long-term vision of this strategy, growers, government, universities and private researchers can collaborate to increase the chances for success. Communication with growers, government agencies, private companies and other stakeholders is essential to a successful roll out of this strategy and long-term application of its objectives.



# Canola Innovation Strategy

The canola industry is committed to this generation and future generations by providing Canadians and the world with healthy oils, food ingredients and meal for livestock while protecting our land, water and air. We will seek out innovative solutions to improve performance, protect the crop, the industry and the environment.

In 2020, the Canadian canola industry provided the world with 8.8 million tonnes of high value canola oil with low saturated fat for food and renewable fuels and 10.7 million tonnes of meal used for livestock, primarily in the dairy industry where it is valued as a premium feed.

The canola industry is very important to Canada and contributes \$29.9 billion to the Canadian economy annually, including 207,000 jobs from growing, processing and exporting canola. With the announcements in 2021

and early 2022 of five new processing plants in Saskatchewan and the doubling of another, canola has opportunity to increase its place among the major growth sectors in the Canadian economy and play a key part in the post-COVID recovery.

Our industry is poised to do even more, as long as we harness the opportunities available to us and are open to and guided by innovation. With research, both short-term focused and long-term foundational, technology, and predictable and aligned regulations, the canola value chain can increase productivity per acre, continue to lower its environmental footprint per tonne of seed, oil and meal produced, satisfy customer expectations, and develop new uses and markets for this made-in-Canada crop.

## Total Impact on the Canadian Economy

**207**  
THOUSAND  
JOBS 

**\$12.0**  
BILLION  
IN WAGES 

**\$29.9**  
BILLION  
TOTAL ECONOMIC ACTIVITY

Annual averages for the period 2016/17-2018/19, including direct, indirect and induced impacts.

*“With research, technology, and predictable and aligned regulations, the canola value chain can increase productivity per acre, satisfy its customers and continue to lower its environmental footprint per tonne of seed, oil and meal produced.”*

# Canola Innovation Strategy

## OUR INNOVATION STRATEGY

➤ The Canola Innovation Strategy provides a value chain vision, from farm to customer, on the importance of innovation and a focus on what innovation is needed to reach our 2025 strategic goals and beyond. One key purpose of the strategy is to help set near-term priorities and provide guidance for the federal government for the renewal of AgriScience Cluster research in the Next Agricultural Policy Framework. The innovation cycle includes many players, and the success of any innovative endeavor is predicated on cooperation in both effort and funding. Canola growers have long provided substantial research funding and their voice for future innovation is critical. At the same time, a focus on a long-term vision means that growers, government (including Agriculture and Agri-Food Canada; Environment and Climate Change Canada; Health Canada; Innovation, Science and Economic Development Canada; and the provinces), universities and private researchers can collaborate in a way to increase the chances for success. The Innovation Strategy provides direction and framework for collaboration.

This strategy is about sustainable growth. By improving performance, increasing precision, protecting the crop and markets, and focusing on canola's strength as an oilseed crop we can create more economic activity and more jobs while providing for a growing, sustainable world.

*"This strategy outlines areas for the value chain to focus on, nurture and encourage, advocate for and communicate about so that canola will continue its innovation journey."*

This strategy is primarily focused on incremental innovation with some opportunity for disruptive technology in the crop production soil root zone and genetic research. The canola industry is poised for growth and open to assessing all technologies that would increase production in a sustainable way.

To create value, innovation requires collaboration, an environment open to new ideas and investment that supports implementation. Innovation in canola means a business and intellectual property environment that is supportive of partnerships and investment, and a commitment to form partnerships and participate in consortiums with a focus on value creation. Private industry, including growers, seed developers, crop protection companies, processors and exporters, has made substantial investments in canola. However, most of the publicly funded research in canola is conducted through partnerships with grower organizations. This strategy outlines areas for the value chain to focus on, nurture and encourage, advocate for and communicate about so that canola will continue its innovation journey. The goal is to ensure that Canada's canola industry continues to grow and meet the world demand for healthy and environmentally sustainable products.

The role that Canadian canola can play, now and in the future, in food security, economic development and climate change is an important story that must be told in Canada and abroad to ensure that consumers will continue to support sustainable canola production.



# Background

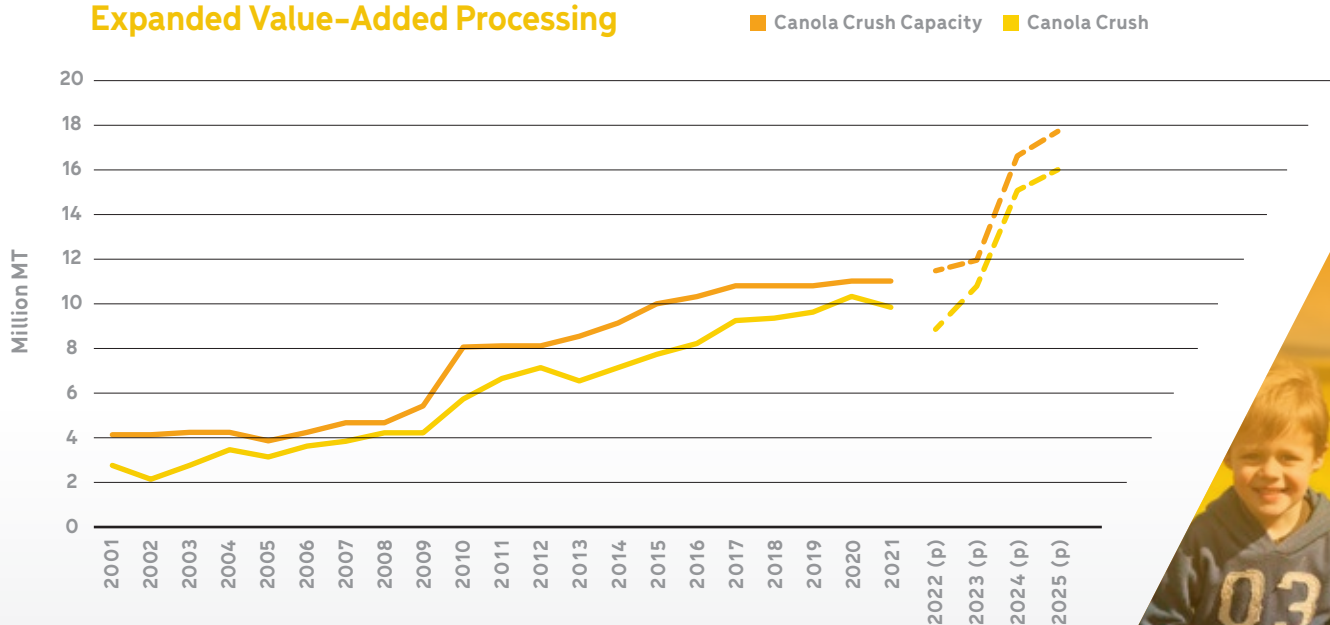
Canadian canola was born of innovation in the late 1960s at the University of Manitoba in Winnipeg and Agriculture and Agri-Food Canada in Saskatoon. It was a first for the world and canola in Canada would record other innovation “firsts” in the years to come: the first herbicide-tolerant crop which allowed better weed management and carbon reduction through the use of minimum and zero tillage; the first genetically-modified crop with more herbicide tolerant traits and improved hybrid varieties; and the first oilseed with a qualified health claim for heart health. Canola farmers and stakeholders have made many investments and improvements over the years with substantial increases in acres and yields, adoption of minimum tillage agriculture to reduce erosion and fuel use, the development of plants with novel traits, including genetic modification, to reduce herbicide use, increased crushing capacity, the development of more and new export markets and increased investment in variety

development. Canola has led the agriculture industry in attracting significant value-added production, adding jobs and economic growth on farm and well beyond.

Governments have played a key role in canola innovation from its very beginnings through to today with continued support through Agriculture and Agri-Food Canada research stations, personnel, provincial extension programs and funding through programs like the Canadian Agricultural Partnership (CAP).

With the world experiencing critical challenges with climate change, food security, environmental and human health, this strategy supports canola’s continuing evolution as a key partner in addressing these and other issues. Innovation will be key to finding opportunities for growth and being part of the solution for our future.

## Expanded Value-Added Processing



*“Canola has led the agriculture industry in attracting significant value-added production, adding jobs and economic growth on farm and well beyond.”*



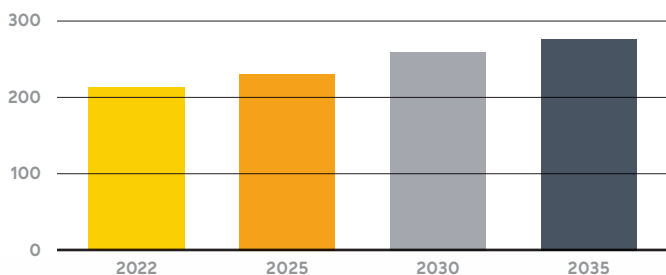
# Underlying Factors

Demand for vegetable oils will continue to increase as the global population grows and more people are lifted out of poverty and able to focus on a healthy, sustainable diet. Demand will also be driven by renewable fuels policy in the U.S., Canada and around the world. The Canadian canola industry's goal of 26 million tonnes of production by 2025 is on track, and some stakeholders think demand for 30 million tonnes is possible. The 26-million-tonne goal will depend primarily on yield increases (52 bushels/acre) achieved through sustainable intensification so as not to increase land use in support of crop rotation, disease management, farm economic risk management and biodiversity. In order to realize and manage optimum production, canola acres on the Prairies need to be around the 22-million-acre mark needed for optimum crop rotation.

There is substantial growth opportunity for canola oil in the renewable fuel sector. As countries move away from fossil fuels and create renewable fuel mandates, canola demand will increase and the industry must be ready for this increase in production.

## Global Vegetable Oil Demand

(Million Tonnes)



Source: LMC International, Oilseeds & Oils Report 2021.

Increased production will result in considerable canola meal availability. Canola meal utilization has potential to increase in all animal production, particularly fish and poultry. Demand is also on the rise for plant-based protein for human consumption as diets move away from animal protein to plant protein. Napin-rich canola protein isolate (Puratein®) has approval for human consumption in Canada and both Cruciferin-rich Canola and Napin-rich Canola are Generally Recognized as Safe (GRAS) in the U.S. In addition, Food Standards Australia New Zealand (FSANZ) has also approved its uses in foods. The food industry will continue to explore the protein market for other potential uses.

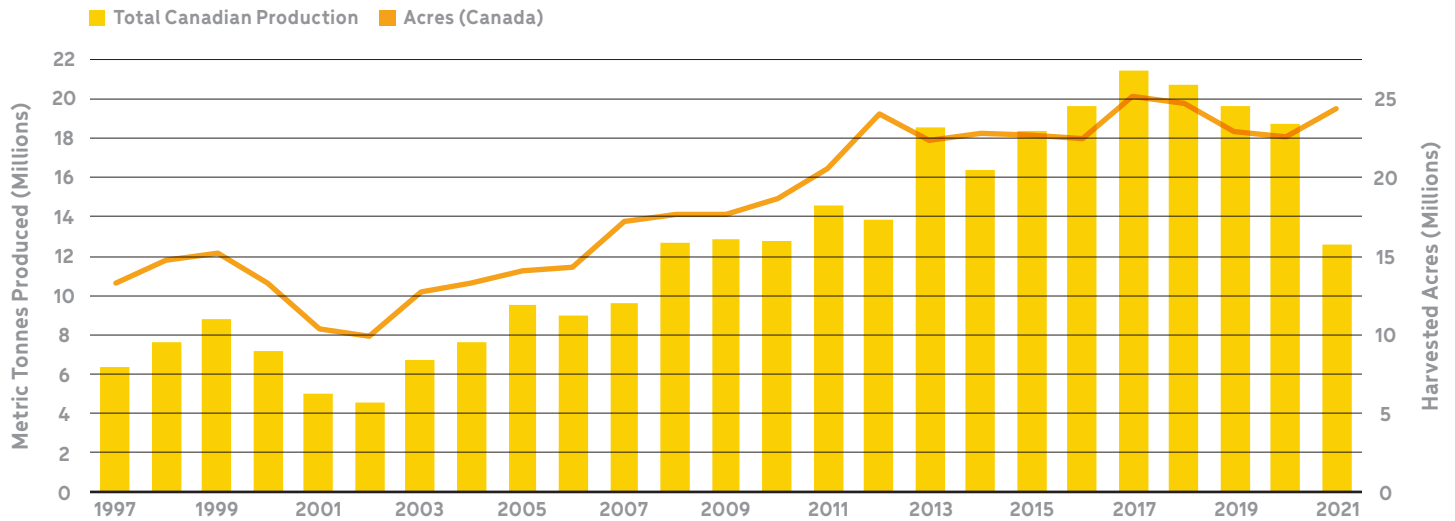
Without a doubt, the focus on the environment and addressing climate change issues and impacts will continue to drive all industries towards a lower carbon-based system. Policies, programs and regulation related to climate change, including reduced greenhouse gas (GHG) emissions, increased carbon sequestration, biodiversity, soil, water and air quality, are and can be expected to become a bigger part of life for everyone, including those of us in the canola value chain. The recent UN report on climate change, released August 2021, increases the urgency of these objectives. Governments around the world will continue to feel pressure to take action. Agriculture is part of the solution. We need to call for clear objectives from our federal government and demonstrate how the entire canola industry is and can be part of the solution.

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# Underlying Factors

## Canadian Canola Harvested Acres & Production



*“The 26-million-tonne goal will depend primarily on yield increases (52 bushels/acre) achieved through sustainable intensification so as not to increase land use in support of crop rotation, disease management, farm economic risk management and biodiversity.”*

At the same time, climate change is impacting production, which means canola agronomic practices and genetics will need to adapt to weather variability, including warmer, drier conditions primarily, but also excess water in some years and areas. Growing seasons may increase in length. Innovative, technology-driven solutions to many of these challenges will need both domestic and international government policies and regulatory frameworks that support the introduction and use of new genetic tools.

Canada’s canola value chain needs to demonstrate that agriculture is part of the solution to our collective need for food, feed and fuel and environmental responsibility, and that sustainable intensification of production is a pathway to address climate change.

Public researchers and regulators are critically important partners on this journey. Our industry cannot thrive without investment into public research. We need the benefits which accrue from funding and long-term scope for foundational research that drive discovery and innovation. Canadian regulators are also key and must be involved in the development of transparent and timely regulations for new innovative processes and products.

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# Sustainability



The Canola Council of Canada (CCC) defines sustainability as all parts of the value chain meeting current customer, grower and industry needs without compromising the ability of future generations to meet their needs. This means producing, exporting and processing canola in a way that not only meets global demand for canola oil and protein, but maintains and improves Canada's environmental, economic and social wellbeing for future generations.

A fundamental core of the innovation strategy is improving performance, through yield intensification, while reducing GHG emissions, increasing carbon sequestration, improving soil and water quality, and enhancing biodiversity. A clear goal is to harness innovation to produce and process canola with the lowest carbon footprint of any oilseed grown.

The CCC is supportive of the UN's Sustainable Development Goals (SDGs) and will continue to strive to increase efficiency, reduce energy use, reduce and sequester carbon, improve soil and water health, and increase biodiversity.

The Canola Innovation Strategy focuses on four key pillars – performance, precision, protection and product – and emphasizes that sustainability is part of everything we do.

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# Details of the Canola Innovation Strategy: Four Pillars



## PERFORMANCE

### THE NEED:

Increase productivity (yield per acre) and meet current and future customer needs for oil and protein while remaining a top crop for Canadian producers, sequestering more carbon in the soil, reducing greenhouse gas emissions and increasing biodiversity. More productivity on the same land will help Canada protect its landscape, diversity and preserve non-farmed spaces.

Canola crop performance is driven by inputs such as hybrid seed, fertilizers and crop protection products, by the environment (weather) and by grower management.

### FOCUS:

- **Yield intensification.** Private and public research on yield intensification to find innovative agronomic solutions to increase the efficiency of crop production through analysis of each input and land management practices. Inputs include seed, fertilizer, crop protection and practices such as land preparation, seeding, protecting the crop, harvesting and storing.
- **Nutrient use efficiency.** Partnerships between private and public researchers on fertilizer efficiency and nitrous oxide emissions: identify solutions to improve nitrogen use efficiency and reduce fertilizer emissions per tonne of canola produced. We need to know the current nitrogen use efficiency for canola in Canada, how much is lost during production and why, and how to reduce losses and improve N efficiency.
- **Genetic improvements.** Private seed development companies will continue to provide the hybrid seed for canola growers. Growers are demanding better hybrids every year which includes higher yield, better resistance to clubroot, blackleg and sclerotinia, shorter maturity and other agronomic traits. This development takes place within the constraints of the industry for oil content and meeting the canola definition.

- **Soil health.** Publicly funded foundational research on soil health, particularly the rhizosphere and root-soil interactions to improve plant and soil health, reduce disease prevalence and impact, increase carbon sequestration, improve nutrient use efficiency and increase yield. For example, the answers to effective disease management, like clubroot, may live within the soil microbial populations.
- **Abiotic stress resilience.** Publicly funded foundational research and public-private partnership pre-commercial research focused on abiotic stress tolerance. With canola plants able to withstand drought, heat and excess moisture, this will increase yields and potentially reduce inputs.
- **Plant architecture and photosynthesis.** Publicly funded foundational research to increase the efficiency of the canola plant, both physiology and architecture. The best carbon sequestration tool is the green plant and photosynthesis. If we could increase photosynthesis by just 10 per cent, it would make a noticeable difference to yield and atmospheric carbon. Research on plant architecture may also hold solutions. For example, improving oil content and improving carbon efficiency by leaf retention at the end of the season.
- **Carbon sequestration.** Research on the current soil carbon situation in Canada's canola growing regions and methods to measure changes in soil carbon; opportunities for growers to increase carbon sequestration in general and with canola as compared to alternative methods.



# Details of the Canola Innovation Strategy: Four Pillars

## ADVOCATE:

- **For regulations that support innovation.** Canada must focus on a science and risk-based, harmonized regulatory system for plant breeding and genetics tools, including gene editing and RNA interference (RNAi) technology. This technology provides opportunities to improve yield, yield consistency and stability, nutritional value, abiotic stress tolerance, pest resistance, carbon sequestration and more. Canada must take a lead role in advocating for harmonized regulations globally, specifically in key canola export markets.
- **For harmonized global seed trait regulations,** especially for low-level presence, to limit trade impediments and increase seed industry investments.
- **For intellectual property policy** with good patent protection so seed developers are incentivized to both create and realize value.
- **For a transparent and predictable Canadian variety registration system.** Issues which need to be addressed include varietal purity and the confined field trial requirements to continue to ensure no environmental release of unapproved events while also not limiting commercialization of new traits.

## COMMUNICATE:

- **Grower needs.** Continue to communicate grower needs for varieties to the seed industry, including improved yield, disease resistance, shatter resistance and other agronomic traits.
- **4R nutrient management.** Communicate the fertilizer industry 4R (right source, time, place and rate) practices to increase return on investment for fertilizer by reducing losses to soil, water and air, and increasing nutrient use efficiency.
- **Research results.** Communicate research results to the value chain, including management practices to growers. The strategy will include innovations in communication, with the goal to share updated best practices with all farmers.

*“Foundational research on soil health, particularly the rhizosphere and root-soil interactions, can reduce plant disease impact, increase carbon sequestration, improve nutrient use efficiency and increase yield.”*

# Details of the Canola Innovation Strategy: Four Pillars



## PRECISION

### THE NEED:

Use current and new technologies to increase productivity and reduce the environmental footprint of canola.

### FOCUS:

- **Strong starts.** Research on crop establishment (which may include vigor and tolerance to weather stresses such as low moisture, high moisture, cold) and crop management.
- **Precision tools.** Encourage private and publicly funded research to include canola in trials when using precision techniques to improve yields and more precise application of inputs – seed, fertilizer, crop protection.
- **On-farm trials.** Encourage research on smart farms and “Living Labs” to address canola specific issues and to develop a model for on-farm testing by industry and growers to evaluate new management practices and products.
- **Economic analysis.** Require economic analysis on all publicly funded canola projects.

*“Include canola in trials to study precision techniques that target inputs in a way that improves efficiency and yield.”*



# Details of the Canola Innovation Strategy: Four Pillars



## PROTECTION

### THE NEED:

Protect the crop from pests and other threats to productivity, including climate change factors, while also protecting markets. Protecting markets means using approved crop protection products and seed traits, and demonstrating attention to sustainability – including economic, environmental and social.

Crop protection in canola currently comes from a few sources:

- Hybrid seed which has resistance to diseases like blackleg and clubroot, and tolerance to sclerotinia.
- Weed management using rotations, scouting, herbicides and harvest management.
- Insect management using seed treatments, pest surveys, scouting and in-field pesticide applications.
- Rotations and seed treatments to manage soil and root diseases, supplemented with in-field fungicide treatments as needed.
- Volunteer canola management to prevent disease bridging in non-canola crops, which protects the benefit of crop rotation.

### FOCUS:

- **Pre-commercial genetics.** Foundational genomic research to identify genetic improvements for tolerance to weather stress and adaptation to climate change (both excess water and drought) and resistance to pests, including diseases and insects.
- **Flea beetles.** An industry-wide, multi-faceted consortium to improve flea beetle management.

- **Biologicals.** Encourage the development of effective biologicals for pest management.
- **Crop protection alternatives.** Encourage private industry to continue research into new and novel crop protection products.
- **More cooperation.** Encourage or lead the development of consortia between private and public genomic programs. Private breeders drive the development of new canola varieties while public research often lays the groundwork for many genetic innovations, especially for disease and insect protection. Public breeding could also do more “discovery” through long-term investment in foundational research. Consortia on disease management, disease traits, collaboration between government, growers and industry on setting research targets is the goal.
- **Biodiversity.** Encourage ways to improve biodiversity in rural Western Canada. This includes understanding of beneficial insects and their economic value, and an appreciation for non-farmed spaces. This could include putting lower productivity areas back into perennial grass habitat.

### ADVOCATE:

- **For pest surveys.** Provincial and federal governments need to continue pest surveys to help growers manage pests and the development of models for prediction and management.
- **For performance indicators.** Industry- and government-supported development of objective performance information for growers to make the best decisions on their farms continues.



# Details of the Canola Innovation Strategy: Four Pillars

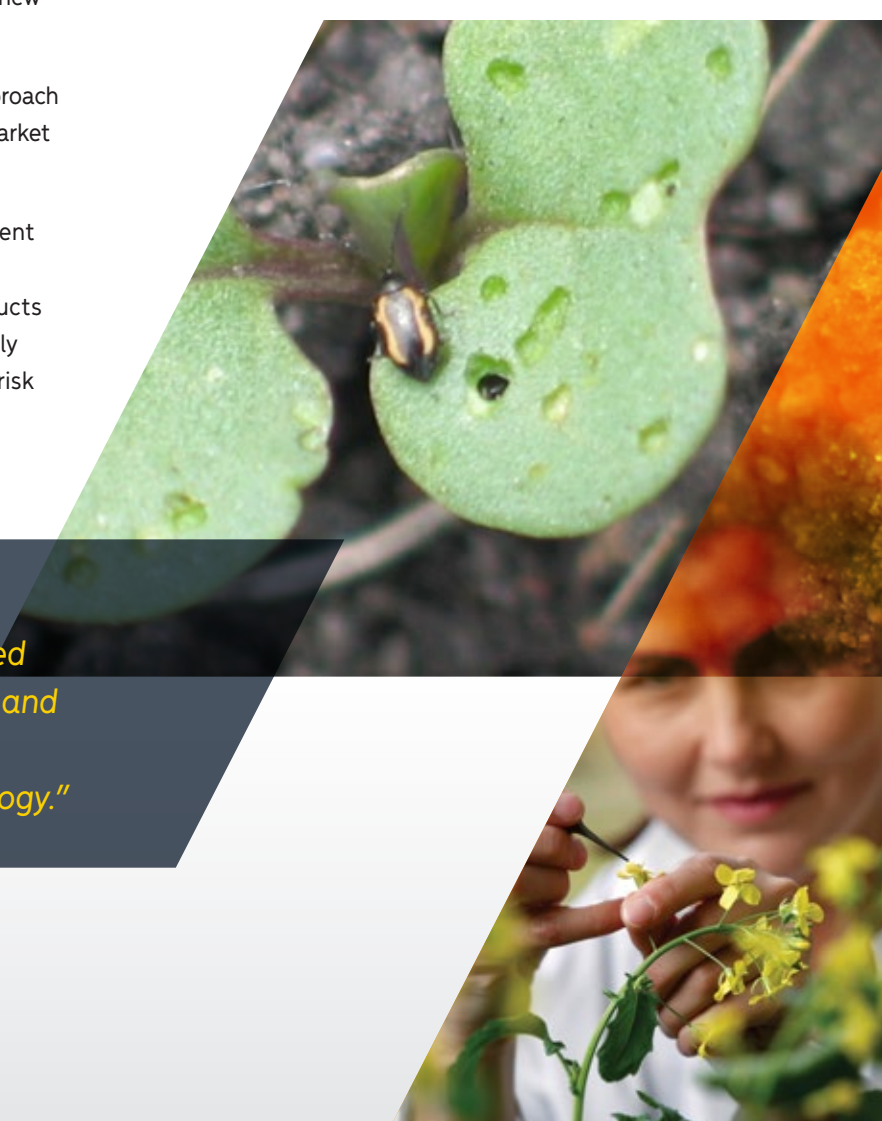
## REGULATORY:

- **International regulations.** The canola industry will monitor international regulatory systems and the need for market approval in export markets.
- **Harmonized regulations.** Many crop protection products are under regulatory review around the world. A globally harmonized, science and risk based regulatory system is necessary for re-approval of older products and for new product registrations.
- **Trait management plans.** Trait stewardship is important to protect various traits from resistance and every new product needs a trait management plan.
- **Market access for traits.** We need an industry approach to responsible trait commercialization to ensure market access for the canola crop.
- **Alternative products.** Canada needs a transparent and science-based regulatory system for new technology like RNAi and other alternative products to use. As an example, RNAi could allow for highly targeted crop protection products that pose no risk to off-target insects.

## COMMUNICATE:

- **Integrated pest management (IPM) tools.** Communicate to growers to continue to improve IPM through varietal choice, cultural practices and agronomic decisions that protect the genetic traits and reduce the risk of resistant pathogens, weeds and insects. This includes the use of surveys, economic thresholds, safe application of crop protection products and careful attention to pre-harvest intervals. It also includes an appreciation for beneficial insects and the value of diversity within the landscape.

*"Canada can take a lead role on a science- and risk-based, harmonized regulatory system for plant breeding and genetics tools, including gene editing and RNA interference (RNAi) technology."*



# Details of the Canola Innovation Strategy: Four Pillars



## PRODUCT

### THE NEED:

The most valuable part of the canola crop is the oil. We will ensure Canada's canola industry can supply current customers while also being flexible to adapt to changing market demands for oil, meal, protein and fuel.

The industry will continue to focus on oil content to ensure maximum value for the canola crop.

Research on designer oil profiles or altered proteins will be based on market demand and led by commercial enterprises. These opportunities may develop into broad market drivers in the future, but currently the innovation must be integrated into the existing value chain or through an identity-preserved system without affecting the integrity or profitability of the value chain.

Similarly, protein could be a value driver for canola as long as the innovation can be integrated into the current value chain or through an identity-preserved system without affecting the integrity or profitability of the value chain.

### FOCUS:

- **Maximize oil content.** Encourage research on seed composition and yield of those components (oil, meal and fibre) to maximize oil content.
- **Processing.** Encourage continued private research on processing technologies and methods that are safe for people, livestock and the environment while maintaining efficiency.
- **Protein consortium.** Develop a consortium of private industry value chain members and public research and regulatory agencies to coordinate value chain interests related to canola protein. This could lead to increased use of canola meal for livestock and new uses for aquaculture, companion animal and human consumption.

### REGULATORY:

- **Canola definition.** Review the canola definition and rules for output traits that may be outside the primary definition. Canada's canola industry must be open to emerging markets for health, functionality and biofuels while ensuring that we protect the current commodity oil and meal markets. How canola is defined could limit innovation. However, the industry still needs to ensure that the commodity canola will meet customer requirements.



*"Canada's canola industry must be open to emerging markets for health, functionality and biofuels while ensuring that we protect the current commodity oil and meal markets."*





INNOVATIVE.  
SUSTAINABLE.  
RESILIENT.

**CREATING SUPERIOR VALUE  
FOR A HEALTHIER WORLD.**



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