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Seeds Canada: Sustainability Action Plan

Executive Summary

Seed is the first step in the on-farm sustainability journey.

Regardless of your definition of sustainability, it is hard to argue against the contribution of seed and seed associated technology. The following document outlines how seed sets the stage for sustainable production as well as provides insight into the policy landscape in Canada and initiatives undertaken by our international partners to not only promote seed, but to encourage sustainable seed production practices.

Seeds Canada has developed a Sustainability Action Plan to coordinate the promotion of seed's contribution to sustainability, encourage a culture of continuous improvement and provide guidance on best practices in the industry.

The Seeds Canada Sustainability Action Plan offers the following key actions to help achieve the above objectives:

Key Action: Advocate for genetic innovation and seed's contribution to sustainability.

Key Action: Be a catalyst, facilitator, and supporter of sustainability conversations and initiatives in the seed sector.

Key Action: Partner for impact.

Key Action: Develop resources to support members in adopting best practices for sustainable production and delivery of seed and seed technology.

The Seeds Canada Sustainability Action Plan provides a roadmap to position seed as a critical piece of Canada's sustainable agriculture future.



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Sustainability in the Seed Sector

What is “sustainability” in an agricultural context?

From the FAO *“To be sustainable, agriculture must meet the needs of present and future generations, while ensuring profitability, environmental health, and social and economic equity. Sustainable food and agriculture (SFA) contributes to all four pillars of food security – availability, access, utilization and stability – and the dimensions of sustainability (environmental, social and economic) ([Sustainable Food and Agriculture | Food and Agriculture Organization of the United Nations \(fao.org\)](https://www.fao.org/)).*

While to many in the Canadian agriculture community, sustainability has meant a general improvement in efficiency and the continued ability to operate, society adds much more weight to the word. Sustainability has three dimensions: environmental, social, and economic. So, while sustainable yield increase is included in the concept, there is also an expectation that natural resources are protected and enhanced, livelihoods are improved inclusively, resiliencies of people, communities and ecosystems are enhanced, and our governance systems can adapt to new challenges.

Internationally, there have been endless calls to increase the sustainability of agricultural production. Here in Canada, the announcement of consultations to develop a Sustainable Agriculture Strategy is only the latest. However, these policies have been met with frustration by the farming community, as they imply to the public that current practices are not sustainable and previous efforts towards improvement were not impactful.

Regardless of political views, the attention on sustainability is here to stay.

How does the seed sector contribute to sustainability?

Seed is the first step in the on-farm sustainability journey.

Sustainable Productivity Growth

The seed industry provides the best-possible base for sustainable crop production through plant breeding. The goal of breeding is to confer incremental improvements to varieties: higher yields to produce more crops on less land, better nutrient use-efficiency to reduce the amount of input needed per unit of yield, and greater resistance to biotic and abiotic stress to better adapt to changing production conditions with less intervention. In addition, crops can now be tailored for environments or production areas, even within one operation, to ensure the optimum use of resources and benefits.

Biotechnology, including transgenic and cisgenic gene-editing techniques, has played a significant role in seed's ability to facilitate more sustainable production. In addition, traits like herbicide resistance, have allowed producers to dramatically increase soil health and reduce fuel use and emissions by enabling low, no-till or conservation tillage farming.

With the rapid pace of innovation in the gene-editing space, the potential for further improvements to the sustainability contribution of seed is endless. Developers are focusing on increasing yield per unit input, enabling non-pulse crops to fix their own nitrogen, dramatically reducing emissions, and helping crops resist disease and insect populations that have been shifting due to climate change.

The main limiting factor for genetic innovation seems to be regulation and social licence. Therefore, the industry needs to advocate for science-based regulation that accurately predicts the risk of these products and ensure that sustainability metrics are readily available. Canada is in a unique and privileged position that government regulation of gene editing generally recognizes no increased risk over conventional breeding. Meanwhile, new traits need to be made available to producers, and an economic benefit needs to be realized at the farm level.



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The impact of yield on sustainability deserves special mention. Increased yields contribute to food security, which is part of the social dimension of sustainability. In addition, increased yields, if achieved with comparable levels of inputs, minimize environmental impact. Given the limitations in agricultural land availability, increased yields can also contribute to reducing practices like deforestation.

In early 2022, Canada signed on to an international sustainable agriculture production and food systems coalition, “the Sustainable Productivity Growth for Food Security and Resource Conservation coalition (SPG),” as an outcome of the United Nations Food Systems Summit in September 2021. From a Government of Canada [news release](#), “the coalition will work in collaboration to develop strategies focused on accelerating the transition to more sustainable food systems through agricultural productivity growth. Its work will be informed by ideas that optimize sustainability across social, economic, and environmental dimensions, including all agriculture sectors.” Increasing production while stabilizing or reducing greenhouse gas emissions appears to be the goal; if so, genetics delivered via seed should be the MVP.

The Canadian seed sector is home to many highly trained seed analysts and accredited seed testing labs, whose contributions towards sustainable production cannot be left out. Seed labs enable the use of the best seed possible and provide knowledge of seed health so that it can be managed appropriately. By planting seed with known viability, farmers can optimize inputs and maximize production. In addition, by planting seed with low or known pathogen load, farmers can ensure the health of their soil and future crops, as well as optimize seed or in-crop fungicide treatments. Sustainability starts with planting the healthiest seed possible, and testing can identify that seed.



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Seed and Soil Health

When it comes to sustainability and soil health, seed has a constructive role to play. One of the first contributions seed can make is in increasing soil carbon sequestration. Soil carbon sequestration is the process of capturing carbon dioxide from the atmosphere and storing it in the soil. A recent Canadian Agrifood Policy Institute (CAPI) [report](#) found that there are three levers to increase soil carbon sequestration. The first is to increase the photosynthetic rate per unit of soil area by adopting practices including cover crops and diversified crop rotations.

One of the BMPs that have been recommended to improve soil health and further sequester carbon is “cover cropping.” Cover cropping is the practice of growing a non-cash crop in addition to the primary cash crop. Cover cropping can build soil organic matter, prevent soil loss, increase the diversity in the soil and maintain living roots throughout the year as much as possible. Unfortunately, uptake of cover cropping has been slow and varies by region. Some of the barriers to adopting this practice are the additional costs associated, lack of access to the equipment needed to grow cover crops, timing (often our harvests are late and don’t allow for cover crop planting prior to weather conditions limiting entry to fields), short growing season, and general lack of knowledge on the practice and benefits.

The seed industry can play a role by ensuring that cover crop seed is readily available in varieties well adapted to the growing areas. Unfortunately, many of the crop types being used for cover cropping have limited availability and a lack of ongoing breeding activity. Our industry needs to ensure that, at a minimum, existing genetics are maintained and complimentary inputs, like inoculants appropriate for those crop types, are registered for use in Canada and available.

Along the same lines, genetics, packaged as seed, can play a role in increasing the photosynthesis of existing cropping options. Research is ongoing to increase the



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photosynthetic capacity of crops, and new breeding innovations, like gene editing, will assist in this endeavour. We need to encourage our government to institute science-based regulation to allow these tools to be deployed.

The second lever to increase soil carbon sequestration is to maximize the amount of biomass returned to the soil by integrating manure or leaving crop residues on fields. For many crops, farmers will decide to leave residue in the field or to bale it. Even within those choices, there are variations, and many factors go into making these decisions. Genetics can influence biomass both above and below ground. More-developed root systems have a positive impact on yield but also leave additional biomass in the soil after harvest. The characteristics of above-ground straw, including height, can also be manipulated through breeding. Traits can be optimized for operational efficiency and returning biomass to the soil.

The third lever is to reduce soil carbon outputs through organic matter mineralization by adopting practices like reduced tillage, which was mentioned earlier. At first glance, it may not be easy to see the role seed can play in influencing tillage practices. However, the development and subsequent adoption of herbicide-resistant genetic technology enabled conservation tillage adoption by Canadian farmers. Herbicide-resistant crops meant that farmers didn't have to till their soil once or more per year to reduce weed pressure. Genetic innovation in this area is ongoing, with different approaches being considered, including looking for traits which allow the crop to be more competitive towards weeds. Of course, additional herbicide-resistant trait work continues via conventional breeding, genetic modification, and gene editing.

Soil health is not defined purely by carbon sequestration. Soil fertility is a component of soil health, as is encouraging biodiversity. In addition to genetic traits conferring fertilizer use efficiency, including the holy grail of "nitrogen fixation" in cereals and oilseeds, seed-applied technologies have contributed to this space. Seed-applied inoculants can be applied to

legume crops to enhance the symbiotic relationships between the plant and nitrogen-fixing bacteria which exist within nodules along the roots. Even utilizing seed-applied pesticide products, which are more targeted to the plant, reduces the negative impact of in-crop chemistry application.

Finally, while, to this point, we have examined agriculture systems, seed plays a role in soil health in non-agricultural reclamation settings. Plants bred specifically to survive in less-than-ideal conditions can help to rehabilitate or reclaim soil on land used for industrial purposes. By doing so, the plants not only help to revitalize ecosystem and potentially bring the land back to a productive status, but can provide ecosystem services, as well.

Saskatchewan Stockgrower's Foundation recently announced a "[reverse auction](#)" looking to convert once-cultivated land back to native grassland. This reverse auction seeks bids from landowners on their expected compensation for converting land using provided native grass seed and maintaining it as grassland for 30 years. In addition, the organization plans to study the carbon sequestration potential of the land over time. As these efforts to convert under-productive land to alternative uses, new seed markets will emerge. and our industry needs to be prepared to supply the best suited seed as well as discuss the benefits of such seed.

Reference used: Ashton et al., 2022. TRANSLATING SCIENCE TO POLICY: Approaches to increase soil carbon sequestration in Canada's cropland [2022-05-26-CAPI-Doctoral-Fellows-Research-Report_EN.pdf \(capi-icpa.ca\)](#)

How can the seed industry be more sustainable in Canada?

Seeds Canada, and the seed sector, can play a role in influencing all three dimensions of sustainability within Canada, and within those countries with which we form trade relationships. As discussed below, it must be acknowledged that member organizations may develop their own rigorous sustainability programs, especially if they operate internationally.



- Seed production is subject to many of the same environmental challenges as commercial crop production, and similar best practices for reducing environmental impact will apply.
- Ensure the use of ethical and sustainable labour practices regardless of production location.
- Follow best practices and encourage stewardship of traits (both use and introduction) to avoid misuse or erosion of trust with farmers, consumers, and policymakers.
- Consider sustainability in trait development and facilitate farmer access.

The American Seed Trade Association (ASTA) has developed a seven-step [sustainability guide](#) for seed production, focusing on: production release process, site selection preparation, planting, crop management, harvest, post harvest and storage, warehousing and distribution. Within each step, activities are categorized based on the FAO [Sustainable Development Goals](#) (SDGs), of which there are 17.

Partnering for success in sustainability?

Sustainability has been a hot topic in recent years as the impacts of changing growing environments and weather patterns combine with the implications of growing populations. As such, many sustainability programs have been initiated across the globe and within Canada, focusing on more domestic issues.

Within the seed sector, Seeds Canada's partners ASTA and International Seed Federation (ISF) have been developing sustainability initiatives. As part of a [Seed Sector declaration](#), ISF has an Environment and Social Responsibility (ESR) coordination group established in 2022 to provide "scientific, economic, technical, policy, regulatory and other expertise" on behalf of the seed sector. The focus of this group is promoting the benefits of seed as the foundation

of sustainable agriculture value chains and encouraging policy environments that support sustainable (all pillars) business models.

Many of Seeds Canada's organizational members are already well down the sustainability path, some having entire departments dedicated to examining and communicating contributions. Several Seeds Canada members have signed the ISF Seed Sector declaration referenced above. Seeds Canada has yet to sign on, although ASTA and Seed Association of the Americas (SAA) have.

Within Canada, a spectrum of industry special interest groups have been working towards sustainability platforms and programs:

Grain Growers of Canada (GGC) have launched "Road to 2050", a "path forward that focuses on innovation, research and beneficial management practices" to reach net zero emissions by 2050 ([Net-Zero Emissions by 2050 - Road to 2050 \(ggcroadto2050.ca\)](https://ggcroadto2050.ca)).

The Canadian Roundtable for Sustainable Crops (CRSC) has been workshopping a "Grains Code of Practice" for crop production over the past several years. The voluntary Code of Practice lays out the requirements for the sustainable production of cereals, oilseeds, and special crops in Canada. The code is intended to be voluntary, hopefully preventing the implementation of mandatory practices. In addition to the Code, the CRSC hosts the Canadian Grains Sustainability Metrics platform ([Home : Canadian Grains Sustainability \(sustainablecrops.ca\)](https://sustainablecrops.ca)) which provides measurements of Canadian grain production sustainability performance ([Canadian Roundtable for Sustainable Crops - Home](#)).

Farmers for Climate Solutions represent a less mainstream view on farm sustainability, pushing for the government to take more direct action on the agriculture industry. eNGOs make up the majority of their membership ([About us – Farmers for Climate Solutions](#)).

Current Policy Landscape in Canada



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In early December 2022, the federal government [announced](#) the formation of a consultation process to develop a “Sustainable Agriculture Strategy” for Canada. The newly named strategy represents a rebranding of the formerly announced “Green Agricultural Plan”. Focusing on five issues- soil health, climate adaptation and resilience, water, climate change mitigation, and biodiversity- the consultation will lead to a strategy to guide sustainable growth for the sector. Consultations will run until March 31, 2023

An advisory group has been established, including producer and industry groups across the country, to ensure that relevant solutions are included in the strategy and to maximize collaboration, transparency, and information sharing. Scott Ross, Executive Director of the Canadian Federation of Agriculture, will co-chair the advisory group.

The committee membership consists of the following:

- Canadian Organic Growers
- Egg Farmers of Canada
- Canadian Agri-Food Policy Institute
- Farmers for Climate Solutions
- Canadian Canola Growers Association
- Fertilizer Canada
- Canadian Cattle Association
- Fruit & Vegetable Growers of Canada
- Canadian Pork Council
- Grain Growers of Canada
- Canadian Wildlife Federation
- National Farmers Union
- Canola Council of Canada
- Nature United
- Chicken Farmers of Canada
- Pulse Canada
- Dairy Farmers of Canada
- Union de producteurs agricoles
- Ducks Unlimited
- Soy Canada

The initiative appears to be a reaction to feedback on the [2030 Emissions Reduction Plan](#), announced as part of the original Green Agricultural Plan. Producers felt that there was a lack of proper consultation and industry input before the release, and the outcomes and tactics to achieve the plan's goals were unclear.



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Many existing government research and production funding programs have shifted focus towards sustainability. The upcoming agricultural policy framework, which will run from 2023-2028, will be known as the “Sustainable Canadian Agricultural Partnership” (SCAP), and will require applicants to prove efforts towards emissions reduction and carbon sequestration to secure funding.

Sustainability requirements, including measurement of impact, have been built into nearly all government programs, new and existing.

Seeds Canada Sustainability Action Plan

Key Action: Advocate for genetic innovation and seed’s contribution to sustainability

Advocacy initiatives need to be focused on three key groups: government, farmers, and the public. Partnerships and approaches may differ by group.

Government: work with Crop Life Canada and others where appropriate (e.g. Canada Grains Council) to ensure that government regulators have accurate and scientific information on risk of innovation. Government policymakers need to know which traits can contribute to sustainability so that the industry is supported.

Farmers: ensure farmers know the products available and the benefits (economic and environmental) of new, improved genetics

General public: work with partners to ensure the public understands the benefits of new breeding technologies and that metrics are available.

Tactic 1: A media strategy can ensure that Seeds Canada’s seed sustainability stories reach a audience. Targeted articles in Germination and other industry press, as well as popular press can focus on topics like:



- Seeds Contribution to Soil Health (World Soil Day December 5th)
- Gene editing and sustainability
- Cover Cropping and Seed Selection
- Seed's role in reclamation
- How Seed Applied Technology allows farmers to be sustainable

Tactic 2: An important part of effective advocacy is the availability of sound data. This data can be obtained via performance trials, registration trials etc. and should be promoted by the seed development community. Data can also be collected from published reports on plant breeding's contribution to sustainability.

Current science cluster applications for SCAP are required to produce metrics that prove their research projects' impact on climate change mitigation and adaptation. Partnerships with funders and promotion of results will be beneficial.

Tactic 3: Arrange lobby days with members of Federal government to highlight the contribution of seed to sustainability and advocate for innovation, enabling regulation.

Tactic 4: Spotlight sustainability at the 2023 Annual Meeting of Seeds Canada.

- Invite international experts and industry leaders to discuss a global approach
- Invite policymakers to highlight government focus and upcoming programs
- Seeds Canada members can talk about what they do in their operations (small, medium, and large operations).

Media and policymakers should be invited to ensure maximum reach and impact. To be involved in government decision-making, Seeds Canada needs to be on the record as being active in this area.

Key Action: Be a catalyst, facilitator, and supporter of sustainability conversations and initiatives in the seed sector.



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Tactic 1: Continue to participate in working groups within Canada and internationally, including ISF and ASTA.

Currently, Lauren is a ISF ESR coordination group member and is taking part in a subgroup to develop an international survey. The goal of the survey is to determine which actions ISF members are taking on sustainability, which areas they see as priorities for ISF and how ISF should promote sustainability. The survey should be completed by the summer 2023, and at that time, Seeds Canada can work to communicate the results and implement findings in our own programming and communications.

Within the ISF coordination group, there are also opportunities for Canada to share our sustainability story and perspectives with a broader audience of industry and policymakers.

Tactic 2: Reach out to other seed partners across the globe to understand their approaches.

Tactic 3: Conduct a Canadian survey to determine where our members are on their sustainability journey and how Seeds Canada can help them to succeed.

Tactic 4: Encourage dialogue with and between members and support when appropriate.

A sustainability discussion board can be established on the membership portal to ensure information sharing and events around sustainability.

Key Action: Partner for impact

There will be many organizations which will promote sponsorship of their sustainability initiatives. It is important that Seeds Canada forms strategic relationships that:

- Do not disparage specific production systems



- Promote the use and reasonable regulation of biotechnology
- Promote the selection of seed genetics as a pillar of sustainable production

Tactic 1: Engage in discussion on mutual benefits of partnering with sustainability-focused organizations and initiatives outside of the seed sector, including:

- Grain Growers of Canada: Roadmap to 2050
- Canadian Agricultural Policy Institute (CAPI)
- Soil Conservation Council of Canada
- Others, as they emerge and develop

Tactic 2: As per our Memorandum of Understanding, liaise with CropLife Canada to develop a joint sustainability communications plan around biotechnology in seed.

Possibly including:

- Joint funding of a CAPI scholar or study
- Media communications plan
- Lobby efforts

Key Action: Develop resources to support members in adopting best practices for sustainable production and delivery of seed and seed technology.

Tactic 1: Work with the seed grower organizations to develop guidelines for sustainable production of seed and promote the sustainability benefits of certified seed use.

Tactic 2: Offer webinars and other resources which bring international best practices to membership.