



# THE FUTURE OF B.C.'S FOOD SYSTEM



## FINDINGS & RECOMMENDATIONS

from the B.C. Food Security Task Force



BRITISH  
COLUMBIA

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# 1. PREFACE

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Dear Premier Horgan:

We wish to thank you for the honour of serving on the Food Security Task Force. It is our great privilege to present you with the following report.

Agriculture is changing. The coming decades will be a time of great challenge and equally great opportunity in the critical systems that feed us every day. The magnitude of these changes is illustrated by the following: In March this year, Mr. Masagos Zulkifli, Minister of the Environment and Water Resources for Singapore, announced that Singapore would aim to produce 30 per cent of its nutritional needs domestically by 2030. This is striking as Singapore has no farmland and no agricultural industry of note.

It is our belief that British Columbia must be equally bold. We face daunting challenges. The United Nations predicts that climate change will decrease global agricultural yields by as much as 25 per cent by 2050, while the population continues to increase. Fewer people will be working in conventional agriculture, as an aging population and increasing urbanization worsens our existing farm labour shortage. Global competition is also intensifying. The Netherlands continues to dominate the agricultural technology (“agritech”) sphere, but Israel, Japan, China and Taiwan are quickly joining the competition to supply both our consumers and our producers. We must act now to position British Columbia as a powerhouse that feeds itself and the world.

We believe that with the right strategic initiatives, British Columbia can and will be a world leader. British Columbia has a booming technology sector. We have a strong agricultural brand that is respected everywhere as high-quality, safe and environmentally sound and our ports are a gateway to sharing our food with the world. We have plentiful electricity and water, a booming technology sector and a beautiful, welcoming and prosperous province that attracts talented workers from around the world. We also have a secret weapon: a half century dedication to prioritizing agriculture through land protection and stewardship.

Our Task Force has been guided by a simple question: How can British Columbia lead the next agricultural revolution? We are proposing four bold yet achievable steps. First, we recommend that British Columbia fully embrace the United Nations Sustainable Development Goals as they apply to the food and agriculture sector. This step will deepen our Province’s commitment to a sustainable world for our children. Second, we recommend that British Columbia develop a dedicated agricultural technology (“agritech”) incubator-accelerator. This recommendation will help establish British Columbia as a source not just of food, but also of the technology needed to grow food in the future. Third, we recommend that British Columbia establish an agritech institute, which will pool knowledge and talent across the academic sector, drawing on and building upon the strengths of our colleges and universities. This recommendation will ensure we have the people needed to guide British Columbia to the forefront of the next agricultural revolution. Finally, we recommend that British Columbia ensures the agritech industry has a place to grow through careful and targeted land use planning. This recommendation will ensure that emerging agritech entrepreneurs can scale their businesses here in British Columbia, providing jobs and economic growth across the province.

Our Task Force was humbled by the talent, dedication and entrepreneurship of British Columbians working in the food industry. In our consultations, we found a hunger for this province to become a world leader in developing a safe and sustainable food system. We would also like to thank our secretariat for their tireless support. Our recommendations will give them the needed tools to face the future with optimism and confidence.

# TASK FORCE MEMBER BIOGRAPHIES

The Food Security Task Force brought together a unique blend of academia, industry, global perspective and innovation thought leadership. The Task Force was supported by staff from the Ministry of Jobs, Economic Development and Competitiveness, the Ministry of Agriculture and the Office of the Premier. The Task Force was appointed by the Premier of British Columbia to carry out this work beginning in July 2019.



## PETER DHILLON (CHAIR)

As a farmer, Peter Dhillon brought passion, vision and global and industry perspectives to the Task Force. Peter plays a leadership role in several business enterprises, including serving as CEO of the Richberry Group of Companies, an agribusiness enterprise with operations in British Columbia and Quebec. Most recently, Peter was appointed to the Board of Directors of the Bank of Canada. In his diverse roles, Peter is exposed to the fast-changing nature of agriculture and wanted to bring a perspective to his fellow farmers in B.C. about the change that will occur in the food system and use this knowledge to help prepare the industry for what is coming next.



## LENORE NEWMAN

Lenore Newman is the Director of the Food and Agriculture Institute at the University of the Fraser Valley (UFV) where she holds a Canada Research Chair in Food Security and Environment. Lenore researches agricultural land use policy, bioengineering in the food system and the role of food and agriculture in the creation of place. Lenore sat on the B.C. Minister of Agriculture's Advisory Committee on Revitalizing the Agricultural Land Reserve and regularly speaks to government and community groups. She has published over forty academic journal articles and two books, *Speaking in Cod Tongues* (2017) and *Lost Feast* (2019)—all related to the future of farmland use and other food-related issue.



## ARVIND GUPTA

Arvind Gupta is a Professor of Computer Science at the University of Toronto and the University of British Columbia. As the founder and CEO of Mitacs Inc., Arvind achieved international success for interweaving graduate education with business and socio-economic needs by bringing together 60 universities with more than 1,000 industrial partners. As a regular contributor on research, innovation, and advanced skills policies, Arvind firmly believes that a smart industrial strategy informs a smart innovation strategy and is pleased that the opportunity afforded to the Task Force to develop these recommendations sets the stage for this to occur in B.C.

## 2. VISION AND CALL TO ACTION: THE FUTURE OF OUR FOOD SYSTEM IN 2050



Agriculture is changing. We believe that B.C. has an opportunity to become a leader in the emerging agritech revolution. Countries like Singapore, Taiwan, and Israel understand the necessity of developing agritech solutions to address constraints such as a lack of land or water. Other countries are using agritech strategies to distinguish themselves as global leaders in food production. The Netherlands, for example, has become the second largest exporter of food and agricultural products despite having a land base that is roughly 1/23rd of B.C., while housing a population nearly 3.5 times as large. While these countries may have a head start, the race is just beginning. There is still an immense opportunity in the agritech sector – and B.C. can be poised to seize it.

Technology already plays a major role in the food system. From the adoption of mechanised farm equipment to the recent rise of cloud-based online food ordering services, technology has shifted industrial methods and social practices around food production, distribution and consumption. **Today, agricultural technology is redefining what it means to be a farmer.** A new generation of farmers is **adapting traditional growing** and harvesting practices to greenhouses, urban rooftops, **shipping containers** and other unconventional sites. These new farms often utilize innovative new technologies, such as robotics, drones, LED lighting, monitoring sensors and farm management software.

B.C. is a recognized producer of high-quality, safe, nutritious agricultural products. With over 300 commodities, from fruits and vegetables, to grains and oilseeds, dairy, livestock, poultry, eggs, fish and seafood, B.C. is the most diverse agricultural province in Canada. Innovation is present and relevant in all commodity areas of the sector.

Agri-tech supports all stages of food production, processing, and distribution. Farmers are increasingly driving research into seed genomics, climate-controlled greenhouses, sensor monitored growing technologies, advanced refrigeration systems and numerous other agritech solutions. They are often at the forefront of meeting shifting consumer demands such as for plant-based alternatives, locally-grown or locally-made food, health food products and environmentally sustainable, traceable protein sources.

As climate adaptation drives agritech development around the world, B.C. also has an opportunity to build on its position as a leader in protecting the environment and mitigating greenhouse gas (GHG) emissions. Our province is already home to more than 150 companies that are active in the agritech sector. In addition to strengths in technology development and an established brand, B.C. has the advantage of land reserved for agriculture that can help to support the development of new growing strategies and demonstrate the agricultural applications of emerging technologies. To share a future where B.C. is a preferred jurisdiction for farmers, food manufacturers, agritech innovators and investment in agricultural businesses, decisive and coordinated action is needed by industry, academia and government.

We believe that the first step is to rethink British Columbia's approach to agriculture and food production. In order to reduce food insecurity and reduce the GHG emissions that lead to climate change, we believe that B.C. should begin with the adoption of the United Nations' Sustainable Development Goals (SDGs). The SDGs provide a framework for sustainable development that centres on social benefit and environmental protection. By incorporating the SDGs into agricultural policy and agritech strategies, B.C. can pursue continued economic growth while simultaneously working towards a just and sustainable future.

Second, we recommend that British Columbia takes steps to foster innovation and agritech development, including establishing a dedicated agritech incubator-accelerator to support budding start-ups and grow existing agritech companies so they become leaders in this sector. The incubator-accelerator will provide physical space for agritech development and testing, while facilitating collaboration between farmers and agricultural producers, technology companies, private investors, academia, and all levels of government. An agritech incubator-accelerator can play a pivotal role in fostering a culture of innovation in B.C. and building a supportive and collaborative ecosystem for the burgeoning agritech industry.

Third, we think it will be important to equip agricultural leaders of the future with the skills and knowledge needed to keep B.C. competitive. We recommend establishing an Institute for Agricultural Excellence to provide focused agritech research and training programs that would supplement the existing capacity and expertise of B.C.'s post-secondary sector. As well as acting as a stand-alone research centre, we envision that an Institute

would coordinate and facilitate collaborative agriculture and agritech research across the of universities and colleges in B.C.

Lastly, we believe that British Columbia must protect land for agriculture and agritech, both today and into the future. B.C. has an advantage in this regard with the Agricultural Land Reserve (ALR), ensuring that the most fertile land is protected for agricultural production. With a significant portion of this land unused or underutilised, we recommend a strategy to bring some of that land into greater production by enabling growth of the agritech sector. A land-use strategy that creates specific agricultural-industrial zones within the ALR would allow B.C. to preserve the ALR while ensuring that land of low soil quality, ill-suited for farming but with good transportation connectivity, is maximized. By designating space for innovative and high-tech agricultural production, B.C. can both increase food security and develop a thriving agritech industry.



## INTRODUCING PRIYA, A FARMER OF THE FUTURE

Priya lives in a mid-rise co-op built of engineered timber in a walkable Vancouver neighbourhood. She starts her morning early with breakfast at a coffee shop up the street, where she treats herself to a wrap filled with B.C. microgreens and locally produced tempeh made of soybeans from the breadbasket of the Peace Region. The oat milk in her London Fog came from oats grown in the Peace as well, though the tea is from new plantations on the Gulf Islands. Priya is a farmer.

After breakfast, she rides the Skytrain to one of the large agritech innovation centres in Surrey. She is working on a breeding program to create more resilient berry varieties for B.C. growers. The hours roll by as Priya analyses the data from her latest trials, but she breaks early to ride the Skytrain over to the Agricultural Institute where she is taking a training course on the latest greenhouse control technologies taught by instructors from industry and universities. Thanks to seamless cooperation between industry, government, and the academic sector, it is easy for her to routinely upgrade her skills to stay abreast of the latest technologies that she can in turn share with other growers through her knowledge transfer and crop consulting company.

After class Priya grabs some exercise with a jog through a re-wilded farm on the edge of Surrey. In the distance the heirloom grape varieties of a local winery grow beside an agricultural drone company's compact offices. The landscape looks very different in 2050; there is an even greater diversity of crops, and many more opportunities to explore the agricultural landscape. Yet food production is fourteen times higher than it was a few decades ago, and still growing.



## 3. FOUNDATION ELEMENTS OF OUR WORK

### MANDATE AND SCOPE

The mandate of the Food Security Task Force was to make recommendations that support food security and the economic growth of the agricultural sector in British Columbia, focusing on the following three areas:

**Increasing the competitiveness, efficiency and profitability of the agricultural sector of British Columbia, through technology and innovation;**

**Growing the agritech industry as a standalone economic sector capable of developing technologies that will be applicable both locally and globally; and**

**Supporting the development and application of technologies that can protect the agricultural sector against the effects of climate change and support environmentally sustainable agricultural practices.**

Developing a vibrant agritech sector is key to achieving this vision. Agritech refers broadly to the use of technology and technological innovation to improve the efficiency and output of agricultural production. We were charged with assessing the opportunities that agritech presents for enhancing the productivity and profitability of the agricultural sector in British Columbia. However, we should note that our mandate does not extend to seafood and aquaculture. While we acknowledge that the aquaculture sector may also benefit from agritech development, the specific applications of agritech within the aquaculture sector were outside of the scope of our mandate.

We engaged with representatives from across B.C.'s diverse commodity sectors, including dairy, livestock, poultry, and horticulture. During our work, we met with farmers, ranchers and processors and learned about the diverse agricultural enterprises in British Columbia, ranging from small-scale farmgate operations to large export-oriented operations. Many farmers expressed a desire to innovate or adopt agritech solutions, yet they often require support to access technologies and adapt them to their needs.

We also had the opportunity to learn about the ongoing work of the Ministry of Agriculture and the Ministry of Jobs, Economic Development and Competitiveness, and particularly about the many different programs that support agricultural production, processing, and distribution in British Columbia. The Ministry of Agriculture assists existing farmers with crop innovation, market development and export readiness, while also enabling new farmers to enter the sector through a land matching program. Their work is bolstered by programming and initiatives, provided by ministries and Innovate BC, and the Technology and Innovation Policy Framework – a roadmap to current and future technological advancements – offered by the Ministry of Jobs, Economic Development and Competitiveness. We are very excited by the new B.C. Food Hub Network initiative developed by the Ministry of Agriculture, which is supporting developments in processing and marketing across the province. We believe that our recommendations will complement this existing programming to ensure that farmers and processors of all scales have the resources and knowledge to access and adopt agritech solutions.

## RECOMMENDATIONS IN-BRIEF

The Food Security Task Force is pleased to make the following four recommendations. They can be found in expanded form with Key Performance Indicators (KPIs) in sections 6 to 9. Each recommendation includes some suggested actions to illustrate how the recommendation might be implemented.

### 1. ADOPT THE UNITED NATIONS' SUSTAINABLE DEVELOPMENT GOALS (SDGs) AND SEEK TO IMPLEMENT THESE IN FUTURE AGRICULTURAL POLICIES.

#### Actions:

- Endorse the SDGs and collect and disseminate appropriate information to policy-makers at all levels of government so that the SDGs guide future strategy and policy development as it pertains to agriculture, agritech and related climate policies.
- Create an Expert Advisory Council mandated to:
  - Identify priority areas for investment in agricultural technologies that reflect B.C.'s strengths and abilities to address the SDGs and support high-value opportunities for rapid technology development and commercialization;
  - Discuss key performance indicators as they relate to the SDGs; and
  - Provide ongoing advice to government regarding policy development.
- Target SDG 13 (climate change) by working with the Climate Action Secretariat to develop programming that will support B.C. farmers to transition to lower carbon practices through technology and innovation.
- Target SDG 2 (Zero Hunger) and **SDG 12 (Sustainable Consumption and Production) by developing novel technologies aimed at halving B.C.'s food waste along the province's entire food supply chain.** Technologies of this type may contribute to the effort to reduce global hunger.



## 2. ESTABLISH B.C. AS A GLOBAL AGRITECH LEADER BY SUPPORTING THE INNOVATION PATHWAY INCLUDING THE DEVELOPMENT, DEMONSTRATION, AND DEPLOYMENT OF NOVEL TECHNOLOGIES.

### Actions:

- Harness the creativity of British Columbians in developing new and innovative agricultural technologies through an incubation-acceleration strategy which includes an incubator for agritech start-ups.
- Ensure alignment between the incubation-acceleration strategy and the broader agriculture and agritech agenda by having the incubator lead serve on the Expert Advisory Council.
- Stimulate demonstration of the most promising agricultural technologies in B.C. through:
  - Linkages between the agritech incubation-acceleration strategy and B.C.-based accelerators;
  - Physical space and a streamlined regulatory framework to rapidly launch large scale agritech demonstration projects; and
  - Where available, provincial funds that can be used to leverage other funding (e.g., industrial, venture capital, federal) aligned with provincial agritech priority areas.
- Develop a policy framework for the deployment of commercial agricultural technologies that embraces the UN SDGs and ensure access to appropriate provincial and federal resources that maximize industrial contributions.
- Facilitate provincial, federal and international linkages to create innovation corridors between B.C. and key jurisdictions to ensure that B.C. is central in the creation and commercialization of new agricultural products and technologies. For example, B.C. should leverage its position as the Asian gateway for agricultural commodities from across Western Canada and the United States.



### 3. CREATE AN AGRICULTURE AND AGRITECH INSTITUTE AS A COLLABORATIVE ENTITY ACROSS POST-SECONDARY INSTITUTIONS TO DRIVE EXCELLENCE IN PRIORITY AREAS AND DEEPEN THE KNOWLEDGE BASE AND TALENT POOL FOR THE AGRICULTURE INNOVATION AGENDA.

#### Actions:

- Create an agriculture/agritech institute that draws on expertise from B.C. post secondary institutions (universities and colleges) and prioritizes training, cutting-edge research and development, acts as a policy think tank, and links to national and international academic networks, all in support of the provincial agriculture agenda.
- Mandate and resource the Institute to:
  - Perform world-class research and development in areas identified as being critically important to the province;
  - Provide advice to government on agriculture and agritech policies, particularly those related to the UN SDGs;
  - Link with the provincial agritech incubator-accelerator strategy to support new enterprises while also ensuring start-ups are aware of international developments in the agritech arena;
  - Act as a gateway for aggregating work-integrated learning opportunities across post-secondary institutions for undergraduate and graduate students;
  - Enhance research collaborations to build upon multiple funding streams through federal, local and industry partnerships; and
  - Develop targeted programs focused on creating the skills and talent needed to support the future of agriculture and agritech.

### 4. ENSURE THERE IS A PLACE TO GROW FOOD AND SUPPORT EMERGING AGRITECH INDUSTRIES BY EXAMINING LAND USE POLICIES AND OTHER REGULATORY CONSIDERATIONS.

#### Actions:

- **Allocate up to a maximum of 0.25% of the Province's Agricultural Land Reserve (ALR) for a broader category of use essentially categorized as agricultural-industrial.** Factors in siting this land include lower soil classification (class 4-7 only), proximity to existing transport corridors and services, and potential for clustering agri-industrial uses near other non-agricultural zones.
- Review allocations and selection factors for allocated zones every three years to ensure appropriate land use and space designations and to assess if the new agricultural-industrial designation has achieved the intended outcomes of increasing investment and developing the agriculture and agritech industries.
- Establish a Commissioner for Agri-Industrial Lands mandated to:
  - Establish and oversee the new zones in consultation with potential land holders, municipal governments and the Province, including the intended industrial lands inventory;
  - Spur rapid establishment of agritech and agri-innovation enterprises, to attract companies that align with agri-industrial vision to these new zones of opportunity, and to ensure the process to relocate or establish in a new zone is seamless;
  - Create a consultation process with the Agricultural Land Commission (ALC) in areas of mutual interest.
  - Encourage maximum uptake and productivity on the newly classified land by considering regulatory or policy instruments that can be used to catalyze industry growth.

### AGRITECH SUPPORTS AND DIVERSIFIES OUR AGRICULTURE SECTOR

As part of her work as a crop and innovation consultant, Priya is excited to meet a haskap berry grower named Ted from Northeastern B.C. Ted has requested advice from Priya about how he might be able to diversify his operations to capitalize on a business opportunity. He shares with Priya that while at a conference in Vancouver, hosted by the Agritech institute, he was approached by a company that is interested in accessing his locally grown berries to set up a cold-pressed juice processing operation to take advantage of the nutritional benefits of haskap, but that he explained to the company that he wouldn't be able to produce enough of the crop to sustain the needs of his current customers and support this operation. Excited, Priya tells him that with innovative growing technologies that could significantly increase the amount of product he could grow, there may be ways to support or expand his primary product base and meet the demands of the processing facility.

Priya shares information about haskap berries that she has compiled in her lab in the lower mainland, showing how different controlled growing techniques can produce the same nutritional profile, grade, and colour of product as traditionally grown haskap, only in a shorter timeframe, with certain technologies like lighting and climate control. She recommends that Ted begin a small indoor growing trial and gives him the information of a company that she works in partnership with, that is situated in Northern B.C. and provides indoor growing equipment and technology setup for growing a variety of crops in the northern environment. She will return to see him when the infrastructure has been set up to discuss a plan for how to track and monitor the trial. If the results are positive, Priya will then continue to work with Ted to transition the operation indoors and scale up size and capacity.



## PRINCIPLES AND STRATEGIC APPROACH

We were focused on providing recommendations that would contribute to food security, taking the United Nations Food and Agriculture Organization's definition as our guiding principle. The FAO defines food security as existing when "all people, at all times, have physical and economic access to sufficient, safe and nutritious food that meets their dietary needs and food preferences for an active and healthy life" (World Food Summit, 1996).

This definition considers the importance of food security to achieving economic, nutritional and societal well-being. Accordingly, we consistently applied the principles of "People, Planet and Profit" to our work as we developed our recommendations, assessing each to ensure it would benefit people (in B.C. and globally), protect the planet and help B.C. farmers and the provincial economy remain competitive. These principles are designed to ensure that each of our recommendations will support socially just and environmentally sustainable economic growth in British Columbia. Core elements and desired goals/outcomes considered within each of these areas are outlined in this section.



### PEOPLE

- British Columbians in all parts of the province, including those in rural and remote areas, have access to a local, healthy, fresh and consistent food supply, including those in rural and remote areas – and to good job opportunities resulting from the growth of the agriculture and agritech industries;
- Underrepresented groups, such as women and Indigenous people, have access to agritech training and other opportunities within the sector; and
- Innovative solutions are created to promote social good, reduce food waste and address other social and environmental problems.



### PLANET

- The farmers of today and the farmers of the future are leaders in sustainable agriculture;
- Technologies are developed to lower sector GHG emissions;
- The carbon footprint of the agriculture and food sector is reduced by ensuring sufficient local food production and decreasing reliance on foods imported from significant distances; and
- Opportunities are identified to diversify protein sources, including through innovative plant-based products.



### PROFIT

- Opportunities are facilitated for agriculture, food and agritech to become significant contributors to the provincial economy;
- Productivity and efficiencies are found that will enhance the competitiveness of the food and agriculture industry;
- Pathways are created to increase margins and profitability for farmers and ranchers;
- B.C.'s brand of safe, sustainable and traceable food supports a price premium in the global market while locally produced foods of all types remain available and accessible to local consumers; and
- Value is added in strategic areas along the supply chain to create value from food or by-products that would otherwise be wasted.

Our recommendations are designed to align with the Government of British Columbia's mandate to foster quality economic growth, which is growth that generates steady increases in real wages, healthy increases in per capita real government revenue without raising tax rates and benefits the entire province. They are also designed to align with the CleanBC plan, and where possible to enable reduced sector-wide GHG emissions even as agricultural production expands to meet growing domestic consumption and export sales.

## OUR RECOMMENDATIONS ALIGN WITH THE PRINCIPLES OF QUALITY ECONOMIC GROWTH IN TERMS OF:

### CleanBC

Reducing GHG emissions from B.C.'s agriculture industry and reducing the carbon footprint of the food we eat.



### COMPETITIVE BUSINESS CLIMATE

Opportunities for current and future farmers, food producers and innovators in agriculture to grow their business and contribute to growing B.C.'s economy.




### RECONCILIATION WITH INDIGENOUS PEOPLE

Incorporating traditional knowledge in agriculture, fisheries and food production; increasing the availability of fresh, locally-grown foods for remote and rural Indigenous communities.

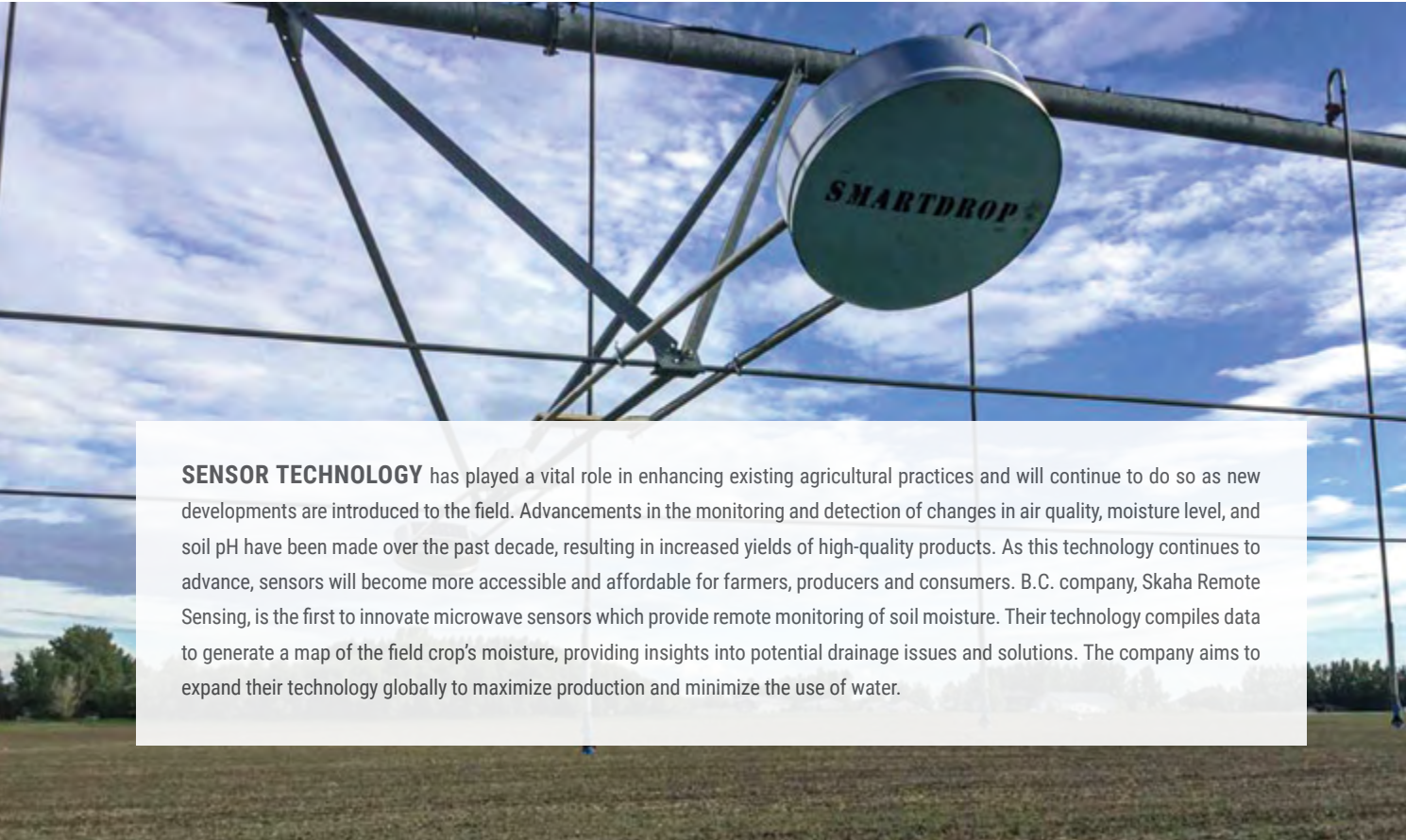


### TECHNOLOGY AND INNOVATION

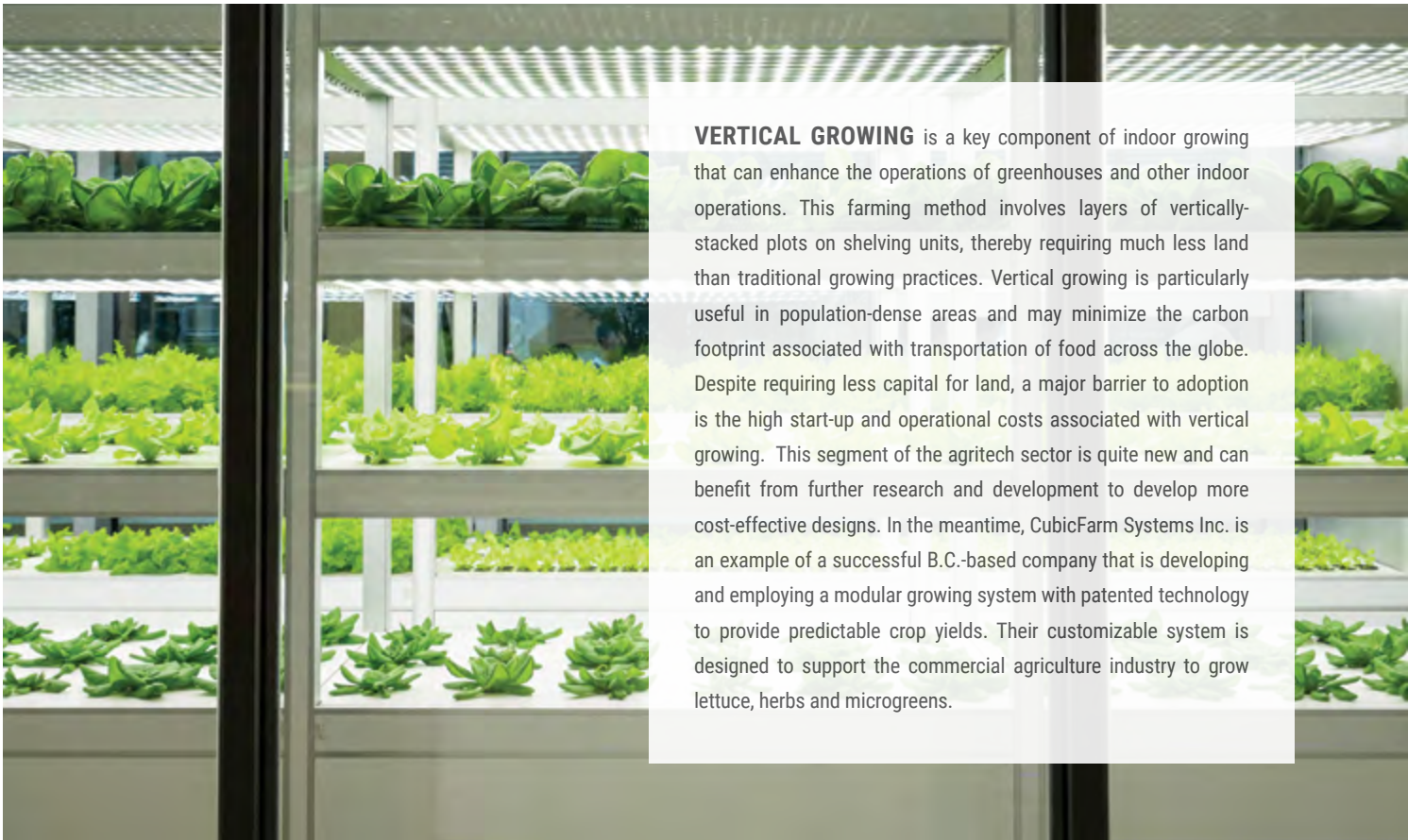
Concentrating on agriculture as one of B.C.'s innovation clusters; developing an agritech sector that can solve B.C. agricultural and food security problems while creating knowledge and innovations that can be sold to other food-producing regions of the world.



**INDOOR GROWING** allows for the production of crops in a highly-controlled, closed environment. This approach to food production has the potential to transform food systems by providing a steady, year-round supply of crops, which is not possible for traditional outdoor agriculture in most northern climates. While indoor growing will not displace outdoor growing, it can support a more sustainable food supply and be established physically closer to consumers. Fresh food can lose nutritional components during transportation, while local indoor grown produce can be picked closer to ripening, maximizing nutrient density and minimizing carbon footprints. Because food grown in hydroponic and aeroponic systems applied in indoor production have lower nutrient uptake due to lack of soil, operators must strategically apply nutrients and fertilizer solutions to yield the same nutrient-dense foods as classic soil-based agriculture.



**SENSOR TECHNOLOGY** has played a vital role in enhancing existing agricultural practices and will continue to do so as new developments are introduced to the field. Advancements in the monitoring and detection of changes in air quality, moisture level, and soil pH have been made over the past decade, resulting in increased yields of high-quality products. As this technology continues to advance, sensors will become more accessible and affordable for farmers, producers and consumers. B.C. company, Skaha Remote Sensing, is the first to innovate microwave sensors which provide remote monitoring of soil moisture. Their technology compiles data to generate a map of the field crop's moisture, providing insights into potential drainage issues and solutions. The company aims to expand their technology globally to maximize production and minimize the use of water.



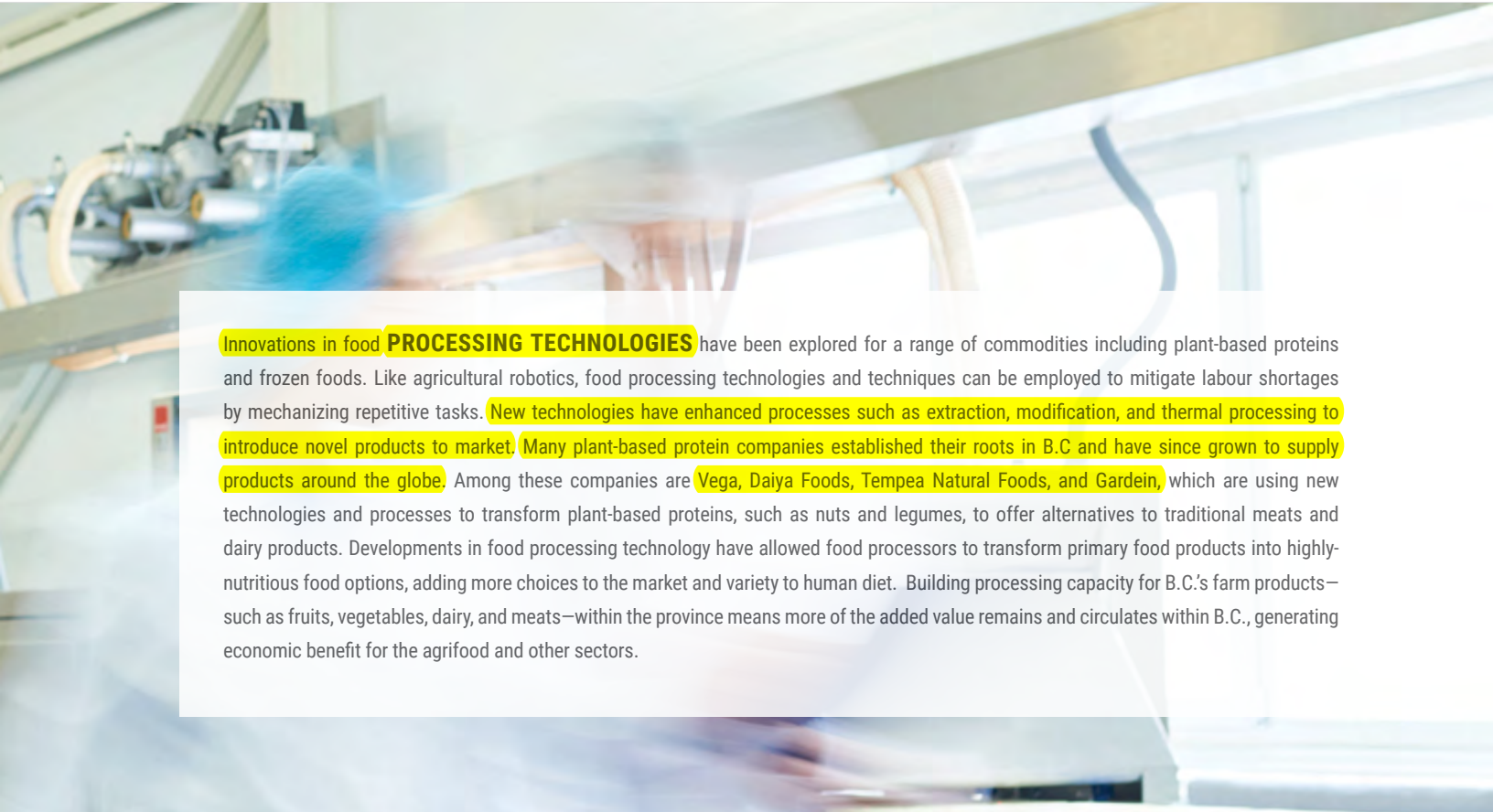
**VERTICAL GROWING** is a key component of indoor growing that can enhance the operations of greenhouses and other indoor operations. This farming method involves layers of vertically-stacked plots on shelving units, thereby requiring much less land than traditional growing practices. Vertical growing is particularly useful in population-dense areas and may minimize the carbon footprint associated with transportation of food across the globe. Despite requiring less capital for land, a major barrier to adoption is the high start-up and operational costs associated with vertical growing. This segment of the agritech sector is quite new and can benefit from further research and development to develop more cost-effective designs. In the meantime, CubicFarm Systems Inc. is an example of a successful B.C.-based company that is developing and employing a modular growing system with patented technology to provide predictable crop yields. Their customizable system is designed to support the commercial agriculture industry to grow lettuce, herbs and microgreens.




**ROBOTICS** will play an integral role in the future of farming. Automated agriculture can allow farms to operate with fewer staff, providing a solution to the labour shortages that the industry currently faces. While there are many innovations underway, there are a few B.C.-based companies specializing in robotics, from an autonomous robot that monitors crop and greenhouse operations to detect presence of early stage diseases and pests to a robotic system for greenhouse nurseries that can substitute or assist human operators with heavy manual tasks. Robotic technology has been proven to enhance farm operations by serving as reliable tools to increase efficiency, allowing farm operators to tend to other tasks requiring direct human involvement.



**AGRICULTURAL GENOMICS** involves the exploration of genetic information of organisms (e.g., plants and animals) that can be used to breed advantageous traits, such as tolerance to disease and increased nutritional value. Most of the current research and support is provided by Genome Canada and in the province, its subsidiary, Genome BC. As an example, 70% of cheese in North America is made with vegetable rennet as a curdling agent. Vegetable rennet is produced using genetically modified bacteria. Commercial cheese production at current levels would not be possible using traditional techniques. Vegetable rennet also produces cheese suitable for vegetarians and those following kosher diets.



Innovations in food **PROCESSING TECHNOLOGIES** have been explored for a range of commodities including plant-based proteins and frozen foods. Like agricultural robotics, food processing technologies and techniques can be employed to mitigate labour shortages by mechanizing repetitive tasks. **New technologies have enhanced processes such as extraction, modification, and thermal processing to introduce novel products to market.** Many plant-based protein companies established their roots in B.C and have since grown to supply products around the globe. Among these companies are **Vega, Daiya Foods, Tempea Natural Foods, and Gardein,** which are using new technologies and processes to transform plant-based proteins, such as nuts and legumes, to offer alternatives to traditional meats and dairy products. Developments in food processing technology have allowed food processors to transform primary food products into highly-nutritious food options, adding more choices to the market and variety to human diet. Building processing capacity for B.C.'s farm products—such as fruits, vegetables, dairy, and meats—within the province means more of the added value remains and circulates within B.C., generating economic benefit for the agrifood and other sectors.



**WASTE REDUCTION TECHNOLOGY** and integrated agriculture can foster environmental and economic sustainability for farm operations **by diverting wastes and resources through alternate streams** within their own operations. Manure from poultry and livestock operations is often applied to crops in an effort to promote organic soil, however excess nutrient run-off can contaminate nearby water sources (e.g., streams), creating threats to marine ecosystems and water supplies. In B.C., this issue is being tackled by Boost Environmental Systems, which is pioneering a microwave heat system to reduce manure to easily-digestible volumes and components.

**CELLULAR AGRICULTURE** involves producing food products from cell cultures through growth and replication of tissues. These ventures share motivations of some plant-based protein companies which aim to nourish the growing population while minimizing environmental impacts. Canada is in early stages of exploring cellular agriculture and progress continues to be made; Genome BC is currently conducting research to determine the real and perceived impacts of cellular agriculture, including the public perception and policy barriers for the dairy industry. In addition, Vancouver-based biotechnology company, **Appleton Meats, is exploring opportunities to grow ground beef without the need of livestock.** They are developing a method to produce a consistent meat yield with the same high-quality protein, fat, and tissue as conventional meat. At this stage, they are testing many prototypes and anticipate a market-ready product within the next few years for Canadians. This method of lab-based food production can be better for animal welfare and the environment as the meat and dairy industry require significant inputs and contribute large amounts of methane.



Pests are unavoidable nuisances to agricultural operations. However, novel **PEST MANAGEMENT** approaches and improved solutions are helping to mitigate damages caused by insects, rodents, birds, etc. Vancouver-based company, Semios, has turned to new technology in its approach to pest control. Their network-connected pest traps are equipped with cameras to capture and send photos of pests directly to farmers. If a pest is deemed a threat, growers can apply a pheromone product to a targeted area using a remote-controlled dispenser, pre-installed in the orchard. The natural product developed by Semios disrupts a specific pest's mating patterns, preventing it from reproducing and thus reducing its ability to damage crops. Another B.C.-based leader in agritech is Terramera. The company recently launched Rango, a plant-based pest control product that can deter a broad range of pests and diseases. Semios and Terramera are great examples of how B.C. can invent solutions to agricultural pests and can contribute to the province's reputation for high-quality and safe food products.



## WHY DO WE NEED A STRATEGY?

Our food systems are entering a period of tremendous change. With 40 per cent of the Earth's land surface already dedicated to the production of food and significant population growth expected, the global agricultural sector no longer has the option of continuing business as usual. Farmers are leading the movement towards sustainable food production as they embrace new technologies and seek innovative ways to feed the growing global population. As a result, there has been a shift towards using land efficiently, growing more food in a smaller space and using fewer inputs. Farmers are rediscovering old crops, developing entirely new crop categories and exploring increasingly efficient ways of doing business.

Necessity is driving many of these changes. Climate change and biodiversity loss pose significant challenges to global food systems. At home and around the world, the agricultural sector is grappling with serious labour shortages, which are worsening as the labour pools continues to age. Deepening globalization has opened new markets, but domestic producers must compete with established agricultural powerhouses and emerging leaders in the world market. Meanwhile, consumer tastes are changing. While emerging technologies can help address these challenges, they will also profoundly change the way we produce and procure food.

Agriculture is one of the oldest industries on the planet. In a world where technology has completely transformed the way that we live together and connect with one another, in some ways, agriculture is one of the last sectors to be disrupted. The global population is growing rapidly, and B.C. alone is expected to welcome another million people by 2050. In order to keep up with population demands, global agricultural production will have to increase by an estimated 38 per cent by 2030 and 60 per cent by 2050 (FAO 2012).



In British Columbia, existing food production would not be able to meet the dietary needs of forecast population growth while also meeting the greenhouse gas reduction goals of CleanBC. While the carbon footprint of B.C.'s agricultural sector is relatively small, the agriculture industry globally produces significant emissions along the supply chain. Continuing to grow and transport food as the world does today to feed the growing global population will not be environmentally sustainable or efficient. To compound these problems, climate change is having profound impacts on some food growing regions, making it increasingly important to protect and sustain local agricultural production to support long-term food security. Agritech that can increase food production while reducing GHG emissions will be transformational for B.C., and for other parts of the world.

Consider British Columbia's reliance on imports of fruit and vegetables from jurisdictions like California that are experiencing their own climate crisis, including long-term drought. B.C. imports an estimated \$7.3 billion worth of food products from the rest of Canada and \$8.8 billion of food products from the rest of the world, including over \$2 billion of fruits and vegetables from California on an annual basis (BC Stats, 2019). Global shifts resulting from climate change and policies in other jurisdictions could have a major impact on the availability of imports in the future of our food system. Technology can enhance our domestic food security and provide a marketable asset through which B.C. innovators can contribute to the food security needs that will arise in other jurisdictions.

From an economic perspective, B.C. needs more focused actions to fully realize the opportunity that agriculture and food present for our economy. The agriculture sector, including seafood and food and beverage processing, is a relatively small portion of B.C.'s economy, currently contributing approximately 2.1 per cent to provincial GDP (B.C. Ministry of Agriculture, 2018). Developments in agritech can unlock further potential. Agritech presents opportunities to increase profits for those already operating in the sector while also creating new opportunities for new entrants. Agritech will offer opportunities for municipal and Indigenous governments looking to diversify their local economies, provide new employment opportunities, and increase year-round access to nutritious, affordable, locally-grown foods including in rural and remote communities. This will ultimately bolster the provincial economy, creating revenue that can be reinvested into services that improve the standard of living for British Columbians.

By taking steps to develop and implement an agritech strategy now, British Columbia will be positioned to become a global agricultural leader. Our province has the opportunity to be the place that develops technologies to suit the needs of our own industry and agriculture industries around the and to unlock the potential from our agriculture sector, creating a renewed economic opportunity that can employ highly skilled workers throughout the province in food production, processing and agritech.





## B.C. SHOULD AND CAN BE A LEADER.

B.C. can become a major contender in the rapidly transforming agricultural landscape. The global investment space for agritech is growing quickly. According to AgFunder, in 2018, global investments in food and agritech reached \$17 billion USD – a 43 per cent increase from 2017. In addition, the opportunities for increased revenues and job creation are evident – in B.C., revenues and employment are expected to grow by 8 per cent and 7.5 per cent, respectively, by 2025 (MNP, 2019).

## THE OPPORTUNITY - WHAT WILL A STRATEGY DO?

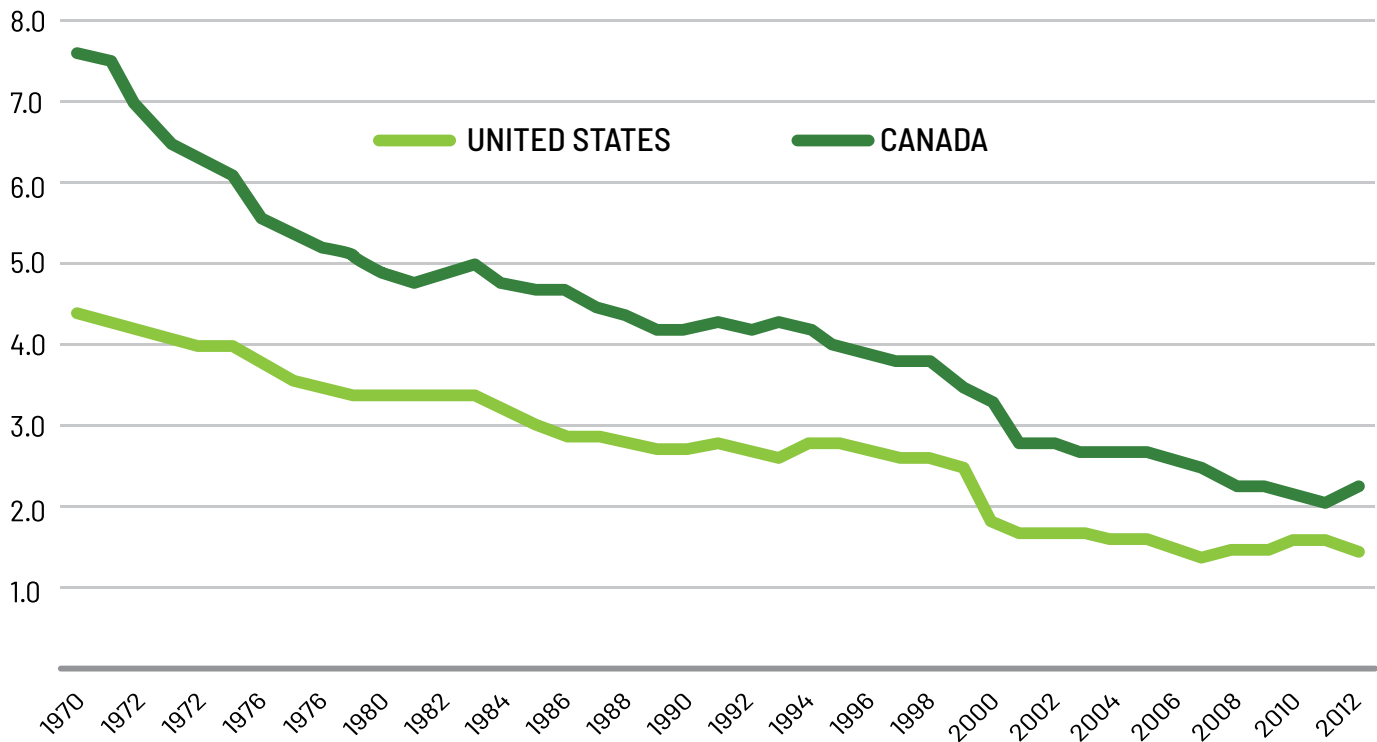
We believe that implementing an agritech vision will realize significant benefits for British Columbia and the agricultural industry. Based on extensive research and consultations, we believe there are opportunities for B.C. to significantly grow its existing agricultural sector, unlock new revenues, create skilled employment opportunities and establish an entirely new economic sector that can lead the world in agritech development.

Our recommendations go hand in hand with setting an ambitious target for growth, forecasting that agriculture's share of B.C.'s economic base can grow from 10.3 per cent to 15 per cent by 2035. We predict this would be the result of increasing production, adding value to food products, and enabling seamless efficiency by supporting logistics, supply chain development and market access for the fast-growing, tech-enabled food and agriculture sector. In addition, agritech development will diversify the technology sector and provide a net positive return to the province. A growing agritech sector will support good jobs for university graduates and existing farmworkers who want to diversify their skills and economic opportunities. We believe that

B.C. can grow and develop a minimum of ten world recognized agritech companies that are anchored in B.C. and that, by the year 2035, will have developed into B.C. based multinational operations that employ hundreds of people.

Increasing food production in British Columbia requires a whole systems approach that considers what markets our food will serve and what returns it will generate. We must not produce more solely for the sake of increasing production and with the hope to be able to sell it to market. Food waste already represents a major loss within the food system – over \$31 billion of food is wasted in Canada per year, which represents approximately 40 per cent of food produced. The agricultural sector requires a targeted growth strategy that will allow us to produce sufficient food to meet our needs while also increasing exports that command a price premium in overseas markets. We have the opportunity to return more prosperity to B.C. farmers and increase the standard of living across the province by raising the value of goods and services we export.

## PERCENT OF EMPLOYMENT IN AGRICULTURE



Source: U.S. Bureau of Labor Statistics, International Labor Comparisons, June 2013

Agriculture-related labour challenges are historically rooted and are not unique to Canada or B.C. Over time, increases in agricultural innovation and resulting efficiency gains have reduced the labour intensity of the sector. With increasing urbanization, employment in agriculture has been steadily declining since the 19th century in both Canada and the U.S.

In 1921, a high proportion of the Canadian workforce (33.3%) held occupations in agriculture (Statistics Canada, 2018). More recently, this percentage has dipped into single digits, sitting at under 2% (1.8% of the labour force in 2008). These statistics are comparable with the United States. The Canadian Agricultural Human Resource Council (CAHR) attributes these declines to issues such as an aging workforce and retirements, declining interests in the field and the rural nature of agriculture (more and more people are moving to cities to live and work). According to RBC's Farmer 4.0 report, the sector will continue to grapple with the widening discrepancy between the supply and demand of labour, hence, the need for technology adoption to be part of the solution.



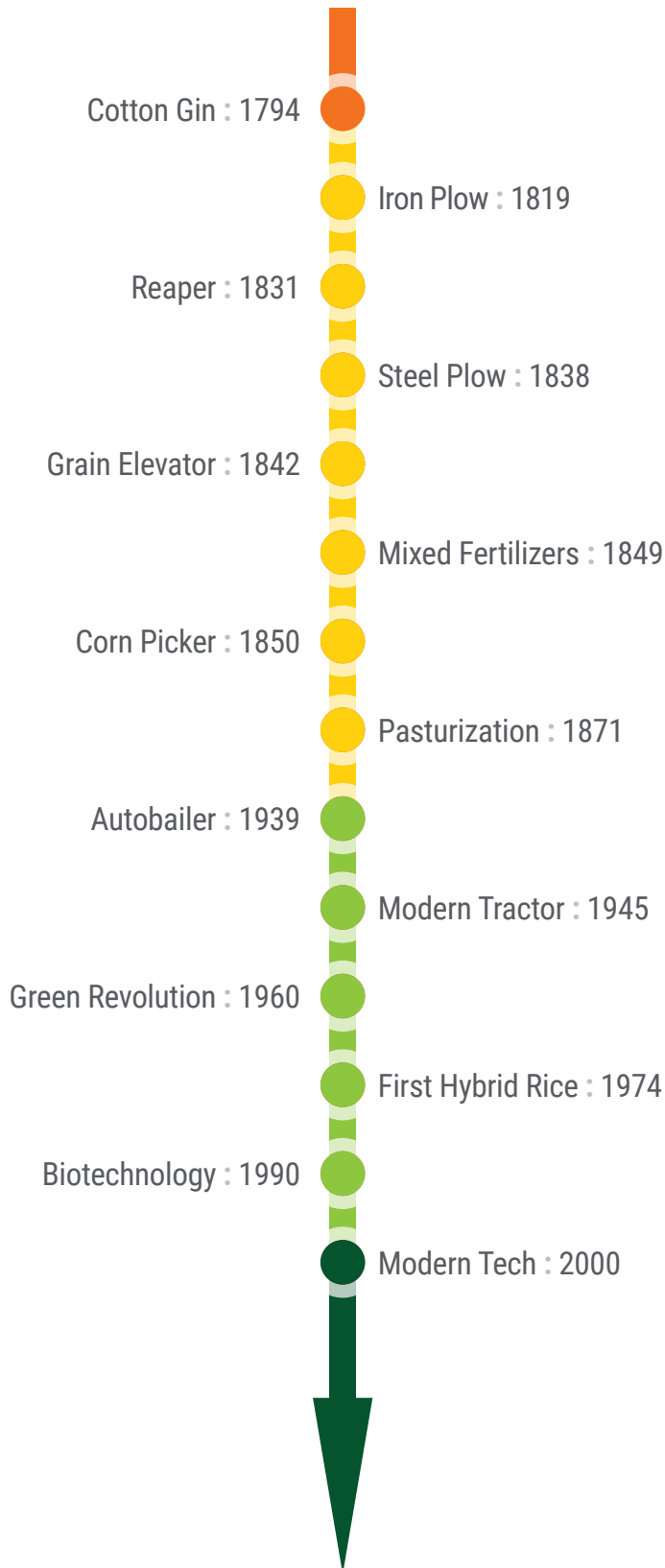
According to CAHR, the global demand for Canada's food products has been expanding while the labour force continues to shrink, resulting in a labour gap that is expected to double by 2025. Nearly three-quarters of the labour gap has been filled by foreign workers. Despite this support, current challenges are hindering sector growth; with over 16,500 jobs unfilled in Canada in 2017, the sector lost \$2.9 billion in revenues. In addition to economic losses, of the 41 per cent agricultural producers who were unable to fill all positions, 56 per cent claimed to experience delays to production, 55 per cent experienced production losses, and 46 per cent experienced loss in sales.

The seasonal, highly cyclical nature of the sector, and the income levels associated with traditional labour-intensive occupations in the sector (such as piece rates for hand-harvested crops) compound the labour shortage issue. Technology can lead to the redefinition of a new sector opportunity that can support year-round income for skilled workers in agriculture, creating new pathways for seasonal or temporary workers and a new generation of farmers that can help fill the labour gap.

Throughout history, innovation and technology have been integrated into farming operations to improve the efficiency and productivity of growing food. In modern times, RBC's report highlights that advanced technologies have been adopted by 95% of farms, bringing in over \$1 million. Adopting new equipment and technologies has never been unusual for farmers; most farms adopt the industrial and technological changes that apply to their businesses as quickly as practical—from the days of horse-drawn plows to today's reality of being able to monitor crop health through a smart phone. Applying agritech is part of the reason why the agriculture value per worker has been increasing, helping Canada and B.C. remain a leader in agriculture and food production.

## INNOVATION IN AGRICULTURE AND THE EVOLUTION OF INNOVATIVE PRACTICES AND TOOLS DATES BACK CENTURIES.

The timeline below highlights some of the key innovations that took place over the past 300 years in the United States.



At the turn of the 20th century, fertile land started to become scarce and more people began to move to urban areas, levelling off agricultural production. In response, President Theodore Roosevelt established the Country Life Commission in 1908 to investigate reasons for stalled production and to recommend structural changes that could increase agricultural efficiency and yield. The Commission largely assumed that industrialization was necessary, and met with resistance from rural communities, the country did not experience significant industrialization until the first World War.

After the Industrial Revolution, crops began to require fewer workers, better soil replenishment and improved livestock care, resulting in agricultural productivity. The period of time known as the 'Green Revolution' (1950s/60s) experienced the development of high-yielding varieties of cereal grains, expansion of irrigation infrastructure, modernization of management techniques, distribution of hybridized seeds, synthetic fertilizers, and pesticides. That revolution opened a new door to innovative practices. By 1990, the first food product produced through biotechnology was sold.

Advances in technology and farming practices have helped farmers become much more productive and grow crops efficiently in areas most suitable for agricultural production. The 20th century was the turning point that introduced the use of machinery, fertilizer and pesticide technology. As a result, food largely became an affordable and accessible commodity in developed countries.

Today, we are experiencing the next 'Green Revolution', which will supercharge the existing tools, practices and techniques farmers have available so they can continue to produce and select technology options that suits their needs. Linking so many technologies means that waste will be limited, productivity will be maximized, and the environment will be protected as much as possible.

## 4. SECTOR CONTEXT

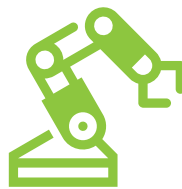
### B.C. AGRICULTURE, FOOD AND AGRITECH SECTOR – A STRONG SECTOR WITH MAJOR POTENTIAL TO BE UNLOCKED

Agriculture is a major sector of the economy, providing employment for over 63,000 people in B.C. (Statistics Canada, 2018). B.C. produces high-quality foods for both domestic consumption and global export, and commodities like berries, salmon, trout and wheat are gaining market share in countries like China, Japan, South Korea, Taiwan, Ukraine and Vietnam. However, even as the province is cultivating an international reputation for safe and sustainable food and agricultural products, the full potential of the agricultural sector remains unrealized. Through bold thinking and a strategic roadmap, we can increase the value of agricultural exports, create new economic growth opportunities within the sector, and make British Columbia into a global agricultural leader.

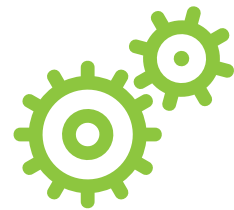
The Task Force has identified three key opportunities:



VALUE-ADDED PRODUCTION



INNOVATION &  
TECHNOLOGY DEVELOPMENT



STRATEGIC  
PRODUCTION INCREASES

AGRICULTURE, SEAFOOD  
& FOOD / BEVERAGE:

**2.1% of B.C.'s GDP**  
**(\$5.1 billion)**



TOP FIVE EXPORT PRODUCTS :



Salmon



food preparations for manufacturing  
& natural health products



Blueberries



Baked goods



Mushrooms

TOP TRADING COUNTRIES:



USA



China



South Korea



Japan



Hong Kong

## VALUE-ADDED PRODUCTION

B.C. is the most diverse agricultural landscape in Canada, with over 200 primary agriculture products and 100 fish, shellfish and marine plant species. Although we produce a wide range of agricultural products, we do not produce high volume commodity crops at the same scale as other provinces. For example, Saskatchewan and Alberta together produce two-thirds (64 per cent) of Canada's total grain and oilseed revenues (B.C.'s share is <1 per cent), while Quebec and Ontario together produce 78 per cent of Canada's total value of non-greenhouse vegetable revenues (B.C.'s share is <10 per cent).

B.C. produces high-value crops from intensive agriculture, quality fruit and seafood, and a range of cereal based products and canola from the Peace Region. B.C. contributes to over one-third (35 per cent) of Canada's total revenues for fruit. In addition, B.C. is a leading jurisdiction in food processing, with almost 3,000 food processing companies producing value-added meat, seafood, dairy, fruit and vegetable products, beverages, sauces, and bakery items. These companies employ over 30,000 British Columbians and produce over \$10 billion in sales per year .

Food processing has the potential to add significant value to our crops: processing increases the shelf life and captures the nutritional value of perishable food. Food processing can include developing a high value niche product, such as health foods, granolas or cereal bars. Food processing could also include monetizing the waste stream from food that would otherwise not make it to market, such as drying or juicing off grade fruit.

Extracting additional revenue from B.C. grown commodities through innovative processing techniques and new technologies can be a major economic stream in the years ahead. New technologies and practices can uncover new products the serve the demands of customers around the globe. B.C. has strengths it can leverage in having a recognizable brand for health foods and products, and with an increasing demand for vegan and specialty goods, B.C. can meet this niche. B.C. can also look at opportunities to add value to commodities that need to enter the province from elsewhere in Canada on their way to export position at our ports.

British Columbia's location on the Pacific West Coast means we have access to overseas markets where B.C. products may be able to command a price premium as B.C.'s brand for safe, sustainably produced and high-quality food products is further developed. B.C. occupies a strategic position within the wider Canadian agricultural economy. Major grain terminals at the Port of Prince Rupert and the Port of Vancouver facilitate the flow of wheat and other grains grown in the prairie provinces. As new methods of cold chain storage are developed, more agricultural products are being exported via B.C. than ever before. We can capitalize on the competitive advantage that our location and proximity to overseas markets already give us by developing innovative value-added processes.

Wheat, oats and other grains grown in the prairie provinces can be processed into high-value goods. As more consumers shift to plant-based proteins for all or a portion of their diet, an opportunity is being created for new product development. Capitalizing on plant-based production through value-added processing in British Columbia will meet the needs of domestic consumers while also stoking global demand for BC brand.

The Ministry of Agriculture is developing a B.C. Food Hub Network, which aims to foster growth and innovation in the agricultural sector by improving access to processing facilities, equipment, technology, technical services and business supports. The B.C. Food Hub Network will facilitate food processing for producers across the province and crate access to supply chains and markets, which will increase the revenue generating potential of the agriculture and food processing sectors. In concert with other programs of the Ministry of Agriculture, the B.C. Food Hub Network will support the development of food and agricultural products that can be patented and attributed to B.C.

FARM TYPE	BC REVENUES	BC'S SHARE OF CANADIAN TOTAL REVENUES
Grain and oilseeds	\$ 105,585,855	0.4 %
Livestock and animal products	\$ 2,008,662,632	16.1 %
Fruits, vegetables and others	\$ 1,836,791,433	6.6 %

Source: Statistics Canada, 2018: <https://www150.statcan.gc.ca/t1/tbl1/en/cv.action?pid=3210013601>



### B.C.'S THRIVING WINE INDUSTRY


Each year, B.C.'s wine industry contributes approximately \$2.8 million to the provincial economy and exports \$9 million worth of product to international markets (\$7 million to China). B.C. is gaining an international reputation for wine, with over 900 wineries who are earning 'best in' category awards at international competitions, making the province well on its way to achieving industry's vision to be recognized as one of the world's premier wine regions (BC Wine Institute). Canada manufactures more icewine than all other countries combined, and B.C. is a top producer of Canadian icewine – a luxury to countries like China.

B.C.'s diverse topography and unique climatic conditions allow for over 80 different grape varieties to be grown across the province – from Vancouver Island, which provides a long growing season, to the Okanagan, whose stable climate boasts over 80% of the province's vineyard acreage. The Summerland Research and Development Centre is supporting innovative research relating to the biochemistry and sustainable production of grapes and wine. Innovation in the sector is being further developed and recognized through federal commitments such as recent funding (\$1.75 million over five years) for a BC Beverage Technology Access Centre, at Okanagan College in Penticton, that will provide research, testing, proof-of-concept and marketing assistance to the wine, beer, cider and spirits industries.



Modern, global consumer demand for food is shifting to local, minimally processed and “whole” foods where B.C. will have a strengthen in developing consumer trusted foods predicated on our brand for wholesome, sustainable and quality. The emerging plant-based protein opportunity is prime for the taking in B.C.

Plant-based protein can be a contributor to reducing climate change impacts while meeting the dietary needs of a growing world population, using less water, land and energy than animal-based protein, while also meeting emerging consumer preference and lifestyle choices and the religious traditions of some portions of our diverse, multicultural population. Plant-based protein products are increasingly seen as the next big opportunity in food, providing a new revenue stream that can complement those of other parts of the agriculture industry. We are seeing impacts to consumer demand in major areas of the food sector—in dairy and health products, fast-food chains and increasing variety of products available in the local grocery store protein department.



There are several characteristics that make B.C. well-positioned to focus on plant-protein products. First, we have a strong food processing sector with a reputation for high-quality products that cater to modern consumer trends. Second, we have access to key markets through our rail and port transport corridors. And finally, we have a larger and diverse population and the highest demand for premium food products including within the plant protein and health product categories than the prairies. This gives us the advantage of being able to “test market” before looking to export goods.

With this opportunity in mind, we met with the **Protein Industries Canada Supercluster (PIC) to learn more about how to integrate B.C. within the Pan-Canadian strategy.** PIC is one of the selected Canadian priorities for a national innovation strategy and received \$153 million for four years, starting in April 2019, from the federal government to support development in production and value-added processing technologies in plant-based protein across Canada. PIC is using a Pan-Prairie Academia–Western Canada working group to increase collaboration and strengthen the Canadian brand strategy for the food sector by developing metrics, attribute, reliable information sources, and emphasis on nutritional value. **The PIC funding program has had two successful calls for submission and is looking to increase program exposure in B.C.** PIC is using a Pan-Prairie Academia – Western Canada working group to increase collaboration and strengthen the Canadian brand strategy for the food sector.

## INNOVATION AND TECHNOLOGY DEVELOPMENT

B.C. is home to over 150 companies that are developing and producing world-class agritech solutions for the agriculture and aquaculture sectors. B.C. already has a thriving technology sector, but there are opportunities specific to agritech that will allow the sector to generate significant economic growth. By 2025, revenue from B.C. agritech producers are projected to grow by 8 per cent, totalling up to \$205 million, and agritech employment is projected to grow by 7.5 per cent, totalling up to 1,230 jobs (MNP, 2019). In addition, by 2025, it is anticipated that total federal, provincial, and municipal tax revenues will be \$20.8 to \$31.4 million and that agritech export revenues will be \$56.4 to \$93.9 million (MNP, 2019).

These projections highlight that there is anticipated growth of the sector in the short term. This also considers the jobs and revenues that are strictly attributed to the technology component of the agritech opportunity and does not consider the induced and related jobs/revenue impacts on the agriculture and food sectors.

In support of encouraging innovation within the agriculture, food and agritech sectors, the Province of B.C. (Ministry of Agriculture) provides significant cost-shared funding with the Government of Canada (Agriculture and Agrifood Canada) through the Canadian Agriculture Partnership (CAP). From 2018 to 2023, CAP provides over \$25 million of funding for B.C. innovation programming, such as the:

- **Canada/BC Agri-Innovation Program (CBCAIP):** Under the CBCAIP, industry, academia, value-added food processors, retailers and others can access funding for late-stage research, pilot and demonstration projects, and for the commercialization and adoption of innovative products, technologies and practices for the agriculture and food sector.
- **AgriTech Innovation Challenge:** The Ministry of Agriculture, in partnership with Innovate BC, developed the AgriTech Innovation Challenge to identify innovation solutions to problems faced by B.C.'s agriculture and food industry.
- **Agriculture Venture Acceleration Program (AVAP):** AVAP, delivered by Foresight Accelerator, provides mentorship, coaching and market validating training support to early stage entrepreneurs across the province.

### **SPROUT KITCHEN REGIONAL FOOD HUB AND BUSINESS INCUBATOR**

is being developed in Quesnel, in collaboration with the Ministry of Agriculture, and will serve farmers and processors in the North Cariboo region. Sprout Kitchen will be a shared use processing facility with membership-based access to specialized processing equipment, such as a pressure steamer, tilting kettle, dehydrator, juicer, honey extractor and more. Access to shared processing space and equipment, combined with business, product development and food safety services, creates opportunity for food entrepreneurs to innovate and grow without having to invest in their own infrastructure. Sprout Kitchen aims to connect farmers and processors, generate sustainable growth and foster innovative businesses in the agricultural and food economy of the North Cariboo. The BC Food Hub Network will create opportunities for collaboration at regional food hubs, like Sprout Kitchen, and between regions through the network of food hubs and with the UBC Food and Beverage Innovation Centre.



**CUBICFARM SYSTEMS INC.** designs agricultural technology for large-scale commercial production of leafy greens, sprouts, and herbs. Their machines originate from the Netherlands and they now have installations across Canada and the United States. CubicFarm offers cost-competitive vertical farming solutions featuring a patented conveyor system, hydroponic technology and LED lighting. The modular design allows for flexibility and scalability, while minimizing the risk of disease transfer between produce. A hallmark of CubicFarm's systems is that they only require approximately a quarter of the labour required by their vertical farm competitors. The CubicFarm operators are also equipped with a custom tech-based application that allows for remote control and monitoring of each of the growing chambers to regulate temperature, humidity, carbon dioxide, airflow, irrigation and nutrient delivery. By leveraging the innovative components of CubicFarm's products, each system can produce over 15 million heads of lettuce, 9 million plugs of basil, and 150,000 pounds of microgreens, per year. By reducing the amount of required labour, land, pesticides and water, the company is able to cultivate an efficient and sustainable farming option to minimize inputs and maximize food production.

In the context of climate change and global population growth, technology solutions are necessary to support the amount of food that will be required to feed the world. B.C. can innovate in the areas that will be in high demand in the fastest growing populations, such as India, Africa, and Asia. Fields such as urban growing offer particular promise, offering the opportunity to grow traditional crops (not just produce) in unconventional methods that don't require a large land base, may not require soil, and can be tended without a dedicated or significant workforce. Capturing this opportunity would allow B.C. farmers and agritech companies to sell their technologies to jurisdictions around the world, supplying other countries with the tools and knowledge about how to grow food in this new way. (insert vertical growing link video here).

Development of technology has the potential to provide employment for people throughout B.C. as tech will need to be developed and tested across a diversity of landscapes and crops. B.C. agritech companies that have been successful to date are providing employment for a range of technical and skilled professionals. One example is B.C.-grown, Terramera,

which started as a one-person operation in 2010 and has since grown to a \$200+ million company with a couple hundred employees. Terramera has an ambitious agenda to reduce synthetic chemical loads in agriculture by 80 per cent while increasing global yields by 20 per cent by 2030.

Technology exports have huge potential for B.C. agri-businesses and the economy, particularly when intellectual property (IP) remains in B.C. to generate ongoing revenue. Companies with proprietary export products and services are able to remain in B.C. and create high-quality jobs and contribute to cluster development, while attracting investment and generating revenue for the provincial economy. Positioning B.C. entrepreneurs in the agriculture sector to be able to offer proprietary technology and associated deployment, upgrade and operating services to global corporations will build our province's reputation for knowledge and expertise in agritech – similar to the Netherlands. Leveraging the federal government's IP Strategy and incorporating IP / patent services to B.C.'s incubation-acceleration strategy will be key to ensuring our competitiveness and economic growth of the sector.



## STRATEGIC INCREASES IN PRODUCTION

New technologies and innovations have the potential to maximize productivity and increase crop yields, potentially creating a new industry driven by next-generation growing techniques. While upfront investment is always required to deploy new technology or infrastructure, many pre-harvest technologies can enhance the economics of traditionally grown crops by increasing the amount, quality, and consistency of production. In the future, technology will enable the production of any crop, anywhere, anytime. Applied to and embraced in the B.C. context, this could see net new revenue streams from products that are not traditionally grown in B.C., or where growing is limited to certain times of the year. For example, closed containment growing systems, soil-less agriculture, and indoor crops could mean that high-value crops like blueberries could be grown throughout the year, effectively doubling a farmer's revenues. This would also support a new brand for B.C. as a consistent, year-round supplier of quality goods and enable access to new markets and customers as B.C. suppliers would find themselves now able to be able to meet the demand for the consistent quantity and quality required.

Technology can further enhance and ensure food safety and traceability and promote new environmentally conscious growing methods – all elements that can further promote a B.C. brand and build the potential for the sector to export goods year-round, becoming global customers' product of choice. Technology can also enable improved methods of storing and handling fresh goods, leading to longer shelf life and a greater window for products sales in a variety of market opportunities.

Growing more food in B.C. also means more food for British Columbians. Through new growing practices, farmers could increase their output and profits while producing high quality foods for local grocery stores, restaurants, and consumers. The new practices that could support farm-to-table or farm-to-supplier fresh supply in B.C. could take the form of container farms, vertical farms or urban space farms.

Increasing production needs to go hand in hand with considering market strategies and logistics. While technology could significantly increase production from the province, growing more food without a market could contribute to food waste and sector emissions rather than having the intended outcomes of increasing profits, creating export-ready products, and increasing the supply into the local market.





**SQUARE ROOTS** is a New York-based urban farming enterprise, founded in 2016. The company promotes food security by assembling indoor farm units with minimal inputs that feature an innovative data-based platform. Refurbished shipping containers serve as the foundation to Square Roots' farms which are equipped with climate-controlled technology, hydroponic systems, vertical plots, and full-spectrum LED lighting. Farmers communicate via a cloud-based platform, sharing knowledge on how to grow more with fewer resource. Each site includes ten farming containers which, in total, can occupy less than two acres of land and produce the same yields as twenty acres of traditional outdoor farmland. Each site produces approximately 50,000 pounds of produce per year, bringing a continuous supply of local and fresh foods to urban centres. In 2019, Square Roots embarked on a partnership with Gordon Food Service (GFS), a leading North American foodservice distributor, with the goal of building more indoor farms on or near urban GFS distribution centres. Given GFS operates in B.C., the Province has the potential to house a Square Roots or equivalent type farm in the future.

## CRITICAL SUCCESS FACTORS

Our report and recommendations are intended to encourage the Province to take a leading role in capitalizing on the agritech opportunity. However, as we recognize that parts of what will be needed in order to achieve this opportunity will fall outside of the purview of the provincial government, we have identified factors that will be critical to the success of this opportunity and rely on participation from others.

### A collaborative, consortium approach:

A purposeful, collaborative approach that brings together representatives of organizations operating in agriculture and agritech will be necessary to coordinate priorities, maximize resources and leverage strengths to develop a prosperous, successful, and resilient sector. Yet we heard throughout engagements that the sector is fragmented with different firms and agencies all working narrowly, while at times unintentionally competing against one another, and often missing an opportunity to create a stronger voice and larger scale opportunity than could be achieved by simply working together. While we chose not to offer a specific model for governing a collaborative, consortia approach in B.C., all the recommendations weave a common thread of finding a way to work better together for the benefit of all in the system and this principle is the critical underpinning of the opportunity. In leading agritech and agriculture jurisdictions, a model of collaboration, such as the Top Sector approach in the Netherlands, was inherent to the success.

The Task Force studied models of collaboration in various jurisdiction that create a strong competitive and dynamic agrifood an agritech sectors. These models all provide an operating framework and organizing structure that commits industry, academia and government to working together to achieve common goals that have been prioritized to meet challenges and opportunities within the sector.



### THE DUTCH TOPSECTOR / TRIPLE HELIX APPROACH

To maintain its competitive edge in the global markets, the Netherlands implemented the Topsector approach that identifies priority sectors in the economy that will not only bolster the country for strong economic growth, but also target societal issues like aging population and climate change. The Topsector approach uses a world-renowned operational framework between industry, academia and government—also known as the Triple Helix—as a form of collaboration designed to promote innovation, attract talent, and ensure solid international presence in priority sectors. Each Topsector has a Board of Chairs that consist of representation from each partner and is responsible for identifying priorities for each sector, disseminating these priorities to their associated stakeholders and making funding decisions on project proposals.

### AUSTRALIA COOPERATIVE RESEARCH CENTRE MODEL

The Australian Government believes that innovation plays a critical role for Australia's future. To support innovation in the economy, government introduced the Cooperative Research Centres (CRC) program in 1990. The CRC program is designed to support Australian industries to become competitive and productive by partnering industry with the research sector to solve industry-identified challenges. Each year, the CRC program supports around 2,000 Australian researchers and over 1,000 PhD students.

### ONTARIO AGRI-FOOD INNOVATION ALLIANCE

The University of Guelph and Ontario Ministry of Agriculture, Food and Rural Affairs (OMAFRA) have a long-standing partnership, over 125 years of working together to help support the agrifood sector and rural economic development in the province. The vision and strategic outcomes of the partnership focus on assurance in food / public safety, increased Ontario's ability to produce food, support global and domestic competitiveness, support innovation development and adoption and create opportunity for the future generations. The Innovation Alliance collaborates on offering research, laboratory, and veterinary capacity programs that create opportunity for addressing sector challenges and providing skills training for future needs of the labour force.

### THE (CAROLINA) RESEARCH TRIANGLE

The Research Triangle is a region in North Carolina in the US that contains three major research institutions: North Carolina State University, Duke University and the University of North Carolina and Chapel Hill. This close proximity of institutions enabled the development of the Research Triangle Park, which is now the one of the largest high-tech R&D parks in the country. The Park was created in 1959 by government, nearby academia and local business to help the State's economy shift from traditional industries after WW2 by working together, leveraging the regional strengths and keep graduates in the state. The Park is now home to over 300 companies, employing 55,000 people and an additional 10,000 contractors.

## THE AGRICULTURE AND FOOD INDUSTRY

While a collaborative model will underpin the strategy for success, the industry will need to take a leading role to drive the necessary change: developing the farmers of the future, helping to focus the resources in the system on the challenges, and championing and showcasing innovative practices within their own businesses. The necessity to foster technology and innovation within the food system exists in all shapes and formats. It can be large scale infusion of high tech, or it could be small innovations and ways of critically rethinking the business of the traditional economy to support future competitiveness and new opportunity streams. Farms of all sizes should be invited and encouraged to participate in this change process to the best of their abilities.

## PARTNERSHIP WITH THE FEDERAL GOVERNMENT

Agriculture is a shared jurisdiction under the Canadian Constitution, which means that federal, provincial and territorial governments share responsibility through regulations, programs, advisory services and strategic investments. As a provincially appointed body, we crafted our recommendations to speak to the provincial government, addressing the foundational elements to creating a sound agritech ecosystem that are within provincial control and jurisdiction. We have also developed this document to inform the federal government that B.C. is positioned and ready to make a major impact in the agritech space, to the benefit of both the provincial and national economy, beginning to identify how activities in the B.C. agritech sector can also help bolster the economies of other provinces and resources that cross provincial boundaries. B.C.'s work to grow the agritech sector and unlock new value for the present and future agriculture and food sectors is closely aligned with priorities of the federal government and partnerships to advance this sector between the federal/provincial government should be pursued.

## INVESTMENT

Our report provides the framework for the Province and other partners to realize the opportunity. It is inevitable that investment will be needed to achieve the opportunity, whether that comes through re-deploying resources from other areas to this priority or from new funding. Although we respect that the process of defining the amount and types of investment needed is the domain of the provincial and federal government agencies, we identify that there will need to be investment, over time, from governments, the agricultural industry into their own research, development and innovation priorities, and from private sources such as venture or other types of capital. The actions identified in our report will create the platform for this investment.



## 5. OUR PROCESS AND WHAT WE HEARD

### OVERVIEW

Our recommendations are informed, in part, by consultations with stakeholders in industry, government, and the academic sector in B.C. and abroad. We began with regional consultations in the Lower Mainland / Fraser Valley, Vancouver Island, Okanagan, Peace, and Cariboo regions. We also ran an online engagement process. These consultations highlighted both concerns and hunger for opportunity. Concerns included adapting to a changing climate, the challenge of finding skilled labour, a lack of knowledge and training in the agritech area, and competition from other jurisdictions. However, there was also widespread interest in the opportunities posed by agritech, including the ability to tap new markets, take advantage of trends such as interest in plant-based foods, and put technology into the field to increase productivity and competitiveness.

Based on feedback from these stakeholders, we conducted fact-finding in known regions of excellence outside of B.C. We traveled to Guelph in Ontario, Saskatoon in Saskatchewan, and to the Netherlands. We also engaged with key policy leaders in Ottawa and the UN's Food and Agriculture Organization. The following section highlights how each individual recommendation was supported by the results of our engagement strategy, and then provides detailed exploration of what we heard.

### KEY STAKEHOLDER INPUT

#### RECOMMENDATION ONE:

**Adopt, implement and apply the United Nations' Sustainable Development Goals across all agricultural policies.**

Current and potential future impacts of climate change were identified as one of the most pressing threats facing the B.C. agricultural sector. During our consultations, farmers expressed concerns about the impacts of climate change. The effects are being felt across the province, and with their severity increasing, farmers communicated the urgency of addressing environmental degradation. Farmers were also worried about side effects of climate change such as drought, salt intrusion from rising ocean levels, and soil degradation.

This concern over the environment was echoed by academics and representatives from NGOs. In addition to addressing climate change, they stressed that B.C. must do more to address the Sustainable Development Goals. While visiting the Netherlands, we were deeply impressed by the meaningful adoption of the SDGs. This informed our discussions in Ottawa, where we discussed the importance to B.C. of working toward a more sustainable future. We then engaged the Food and Agriculture Organization (FAO) in Washington, DC on the mechanics of this process. Based on these consultations, we recommend that the SDGs be adopted as a guiding principle in B.C. policy development.





## RECOMMENDATION TWO:

**Establish B.C. as a global agritech leader by supporting the entire innovation pathway including the development, demonstration, and deployment of novel technologies.**

As the B.C. agricultural industry operates within an increasingly globalized market, many producers are struggling to cope with international competition. While producers from other markets have adopted innovative production methods and targeted agritech solutions, B.C. farmers worry that they are being left behind. During our consultations, we heard concern about the lack of support for adopting innovations and the impact this is having on the agricultural sector.

Incubation and acceleration emerged as a critical element from the beginning of our process. Industry stakeholders noted the absence of a comprehensive ecosystem for supporting entrepreneurs. We learned that B.C. producers are reaching out to agritech incubators and extension experts in Saskatchewan and Ontario for assistance, which reinforced our concern over the lack of support in our province.

Each of the global leaders in agriculture have programs in place to support agritech innovation at all stages of development. In the Netherlands, we learned about the 'golden triangle' of industry, government, and the academic sector, which has allowed them to become the world's second-largest agricultural exporter. B.C. needs a program to provide similar support for agritech innovation. As a result, we recommend that B.C. build an agritech incubator-accelerator.

### RECOMMENDATION THREE:

#### **Create an agriculture and agritech institute as a collaborative entity across post-secondary institutions to drive excellence in priority areas and deepen the knowledge base and talent pool for the agriculture innovation agenda.**

The B.C. agricultural sector is facing a serious shortage of skilled workers. At the same time, young people who are interested in entering the sector struggle to access training opportunities. We believe there is an opportunity for B.C. universities to offer a wider array high quality agricultural research and training programs to meet industry demands and allow students to become leaders in their fields.

As a result of labour shortages and the seasonal nature of many agricultural tasks, B.C. farmers are looking for ways to increase mechanization and adopt new harvesting technologies. During our consultations, we learned that there is significant interest in developing and testing high-tech agricultural innovations. Most of the agricultural technologies currently being adopted in B.C. are imported from the Netherlands, but farms identified some challenges adapting these technologies to local needs. As a result, farmers emphasized the need for made in BC agritech solutions.

Strong academic sectors provide clear advantages to the agricultural industries in provinces like Saskatchewan and Ontario. Globally, world leaders such as the Netherlands and Japan have dedicated agritech programs and institutions with strong government support. Our consultations with academics across B.C. suggested that more government support for agritech research and education would be valuable, along with addressing our fragmented institutional framework. This supports our recommendation that B.C. needs a dedicated agritech institute capable of training skilled workers, developing innovative technologies and coordinating agricultural research throughout the province.

### RECOMMENDATION FOUR:

#### **Ensure there is a place to grow food and support emerging agritech industries by examining land use policies and other regulatory considerations and incentives.**

If the B.C. agricultural sector is to remain globally competitive, it needs a place to grow. Innovative food companies and agritech start-ups are developing products that can support food security and designing technologies capable of addressing climate concerns, yet they are stifled by space constraints. Land shortages are preventing B.C. companies from scaling up, driving some out of the province entirely.

This lack of space was highlighted in almost every consultation we held across the province. While B.C. must protect its agricultural land base, restrictions on land uses are severely hampering innovation and adoption of new methods related to agricultural production.

While exploring potential solutions, we found that the Netherlands has developed a policy approach that combines an emphasis on protecting agricultural production with a flexible land-use approach designed to encourage agritech innovation. We believe that the same method can be encouraged here. We recommend creating agritech zoning within the ALR. This approach would maintain the current boundaries of the ALR, thereby reserving land for agricultural production while allowing additional uses designed to encourage agritech innovation.



## RECURRING THEMES

A full summary of meetings and engagements is appended and a summary of the online engagement is available here. A few highlights are explored below grouped by theme.

### “TIME IS NOW”

Agriculture is changing. Though the sector is diverse, there was unanimous agreement in the necessity and timeliness of engagement over agritech. Our engagement process garnered strong interest both inside and outside of British Columbia. Several industry stakeholders stressed the need to work quickly if we are to compete with powerhouses such as the Netherlands and up and coming agritech players such as Singapore and Israel. Policy makers in Saskatchewan and Ontario and representatives from federal organizations such as Western Economic Development commended our approach as forward thinking and a model for other jurisdictions. The message was clear: agritech’s time has come.

Why? The Conference Board of Canada reminded us that the modern Canadian agricultural enterprise is “not your grandmother’s farm”. At operations such as Windset Farms in the Lower Mainland we saw this firsthand. They are using mechanization to overcome the critical labour shortages in the sector. Both Windset and the Conference Board stressed the need to engage the public in the exciting evolution of agriculture. Agritech is a critical element of the production of safe and sustainable food, yet the same public that embraces smartphones and cloud computing is hesitant of advances in agricultural production. As we heard, “we need to tell our stories better”.



### “SUSTAINABILITY IS ESSENTIAL”

The agricultural industry is a critical pillar of the The transition to a sustainable economy. Across the province, we heard growing concern over the impacts of climate change. We arrived in Fort St. John during one of the worst harvests on record: extreme weather prevented farmers from bringing in their crops before the snow fell. At the Summerland Research and Development Centre, we learned about the shifting range of cherry production, which is both a challenge and opportunity for growers. On B.C. farms, climate adaptation is happening now, and impacts are being felt with increasing frequency and severity.

In the Okanagan, we also learned about the challenges of preventing food waste. Our consultation with the academic sector supported this finding; Canada leads the world in food waste, a title we need to shed! In the Netherlands we saw strong commitment to achieving the SDG commitment to cut food waste in half by 2050. In general, the Netherlands has committed to meeting SDGs. We also learned that sustainability does not always mean self-sufficiency. In Saskatchewan, Western Economic Development Canada presented the idea of an agricultural corridor across the prairies to British Columbia’s ports. Saskatchewan has forty percent of Canada’s farmland, and the most sustainable way to ship grains and plant proteins is in dry form to tidewater. B.C. could then process these foods and ship value-added products from our ports.

## “INNOVATION BUILDS LEADERS”

A vibrant agritech sector requires a thriving innovation ecosystem. In Ottawa, David Jones of Xylon Biotechnologies lamented that “we are a country of pilot projects”. Taking our good ideas global requires what the CEO of Terramera described as assistance in “scaling to the next level and beyond”. In Kelowna, we saw firsthand how incubation spaces can bring success to all regions of B.C., and our consultation with Genome BC demonstrated the power of provincial-federal cooperation in the innovation space. Genome BC is eager to expand its presence in the agritech sector. They are one of many enthusiastic potential partners for agritech development.

Agritech innovation speaks to all regions and scales. In Fort St. John, there was strong support for expansion of the government’s Food Hub Network initiative and adaptation of agritech even on small farms. An organic vegetable grower in Comox showed us micro-scale cooling technology that helped their farm minimize food waste. We also found venture capitalists willing to work with British Columbia businesses. A contingent from the Netherlands composed of government, venture funders, and industry came to Canada looking for companies for investment and partnership potential and were not able to find the future-forward companies they were looking for. In Rotterdam, we learned about an urban agritech hub loosely based upon opportunity districts in London and Seoul.

## “STRONG ACADEMICS: STRONG FARMS”

The academic sector plays a strong role in the successful agritech sectors we visited outside of B.C. At Guelph, Canada’s “food university”, we found excellence grounded in a “field to table” approach to agricultural research. Guelph is supported by provincial

funding through the Ontario Ministry of Agriculture, Food and Rural Affairs (OMAFRA), but in return, researchers are encouraged to solve pressing problems identified by industry and government. In Saskatoon, the Global Institute for Food Security is semi-independent from the university yet serves as a home for “as needed” research collaboration across disciplines. Inside the university, a targeted research chair program supports provincial agricultural priorities. Though successful, both Guelph and the University of Saskatchewan noted a lack of agricultural engineering expertise in Canada. In the Netherlands Wageningen University is one of the world’s leading agricultural institutes. It forms part of the Dutch “golden triangle” approach to agritech: industry, government and academia work together in the “top sector” areas of food and agrifood, and horticulture.

We held a round table in Vancouver with nine representatives of small and large B.C. post-secondary institutions. They delivered a strong message that world-class talent exists at numerous sites around the province, but the challenge is a lack of collaboration across silos. They suggested that B.C. be a global leader on targeted sub-sectors of agriculture and that institutions collaborate to solve problems as they arise. There is a need for a “long game” in developing expertise locally. They also urged us to think outside of production, giving the example of food waste as an area where we could excel.





## “A PLACE TO GROW”

Producers in B.C. voiced support for the principle of the ALR, but expressed frustration at the limitations, specifically with respect to processing. This was true of in-person consultation and the results of the online engagement. Agritech entrepreneurs strongly expressed the need for more industrial land in the Lower Mainland, or a relaxation of the limitations to activities on the ALR. Many Vancouver-based companies presented lack of space as a critical challenge. We also heard that other jurisdictions are actively courting B.C. agritech businesses with offers of space and resources.

From the Business Council of BC (BCBC), Canada Business Council, government and industry, we heard a strong message that the Port of Vancouver is a critical asset to the agritech sector. We also heard this in Saskatchewan, in regard to the need to ship raw commodities through an agricultural corridor to B.C. and then on to the world. BCBC highlighted a review of the ALR as priority and noted the lack of industrial space as a key factor. They stressed that business is highly innovative, if we give them the space to be innovative.

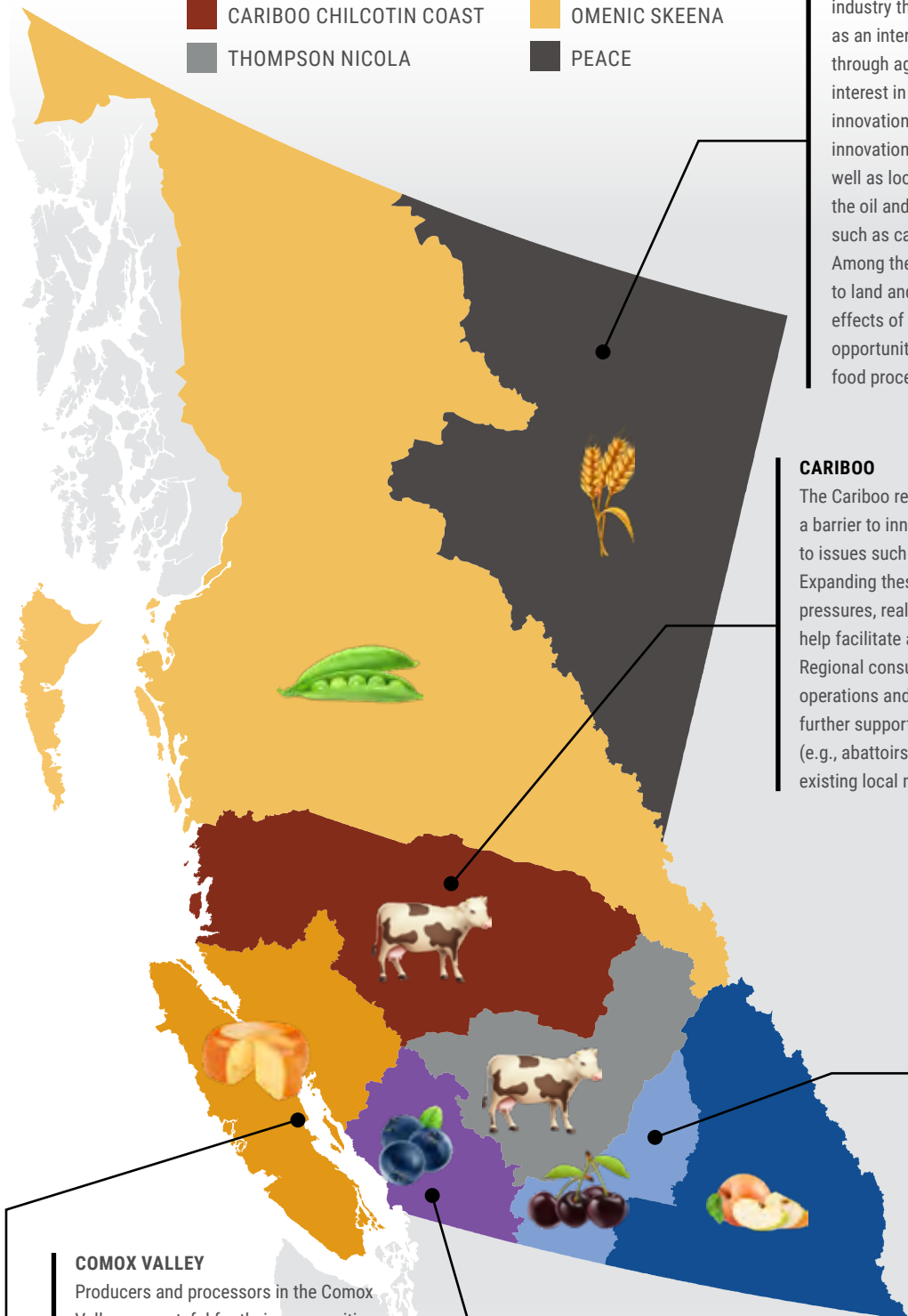
In the Netherlands, we saw how their “green heart” combines the best of agricultural land protection with flexibility to encourage agritech development. However, the Netherlands, like B.C., remains challenged by availability of land. The Dutch government is trying to free up additional land by lowering the amount of agricultural land used for animal fodder and forage. As the primary use of the ALR in the Lower Mainland is for animal fodder and forage, we should monitor their progress. The Dutch currently reap twenty billion dollars in farm gate sales annually from the 1,500 square kilometers of the green heart, a much higher rate of return than we are currently realizing from the ALR.

## “COLLABORATE AND COOPERATE”

A key finding from our consultation process was the critical role of collaboration in building a thriving world-class agritech sector. In Ontario, the cooperation between the provincial government, Guelph, and industry plugs into a vibrant incubation and acceleration culture. In Saskatchewan, resources are much more modest, but their focus on a few key commodities bridges federal, provincial, and industry funding. The University of Saskatchewan provides critical support for these commodities. In B.C., the Summerland research station is an excellent example of research support for industry. Through focus on a few key areas they “do a lot with a little”.

The Task Force heard, repeatedly, that the alignment between industry, government and academia is crucial to the success of sectors that are thriving and highly competitive. In the Netherlands, the “triple helix” or “golden triangle” was repeatedly identified as the reason why the sector is so successful. While the concept is not new, the Task Force heard in the jurisdictions how it is an embedded part of the way that business is done, and it is a known and deeply woven in principle

- VANCOUVER ISLAND/COAST
- OKANAGAN
- SOUTH COAST
- KOOTENAY
- CARIBOO CHILCOTIN COAST
- OMENIC SKEENA
- THOMPSON NICOLA
- PEACE



**PEACE**

The Peace engagement highlighted the region's desires to focus on conserving the agriculture industry that exists today within the region, as well as an interest in further diversifying the economy through agriculture. Stakeholders expressed interest in supporting and pursuing modest innovations that will enhance production and innovation in new supply chain opportunities, as well as looking at opportunities for synergy with the oil and gas sector to support food production, such as capturing waste heat and co-generation. Among the barriers to sector growth are access to land and capital, transportation costs, and the effects of climate change. The region also identified opportunities for growth which include expanding food processing and value-added food production.

**CARIBOO**

The Cariboo region identified connectivity challenges as a barrier to innovation and communication, contributing to issues such as fragmented industry coordination. Expanding these networks could help alleviate these pressures, realize R&D partnership opportunities and help facilitate agritech implementation and adoption. Regional consumers are interested in sustainable operations and buying local, however it was noted that further support, such as greater access to Infrastructure (e.g., abattoirs) is necessary for ranchers to supply existing local markets and expand into other markets.

**OKANAGAN**

The Okanagan engagements revealed barriers to exporting product and accessing markets to remain competitive. Research centres like AAFC Summerland are key to supporting long-term innovation priorities. Among the challenges are the effects of climate change which are shifting growing patterns. Addressing land access and challenges with regulations resonated with many stakeholders during the engagements. There is a strong potential for agriculture value added and agritech in this region.

**COMOX VALLEY**

Producers and processors in the Comox Valley are grateful for their communities and the lifestyle that small-scale farming provides. Many stakeholders indicated interest in developing / maintaining sustainable operations with an emphasis on local inputs to produce high-quality products for their customers. However, supply chain barriers in the region inhibit innovation and growth.

**LOWER MAINLAND**

Companies in the Lower Mainland strongly recognize the economic benefits of exploring innovative technologies and are taking risks to develop and implement agritech solutions. They identified a lack of support for farmers to adopt commercialized agri-technologies as a barrier. Stakeholders in the region believe the industry's diversity is a competitive advantage but capitalizing on this requires better infrastructure to develop niche product markets. Developing a strong and consistent BC brand is a suggestion that emerged continue the growth and success of the sector.


## GLOBAL CONTEXT

In conducting our consultation, we considered B.C.'s and Canada's positions within the global context. We sought to gain advice and confirmation of our interpretations from those in other jurisdictions about the viability of B.C. becoming the supplier of choice for technology in some of these jurisdictions, recognizing that there are other areas with similar advantages to B.C.

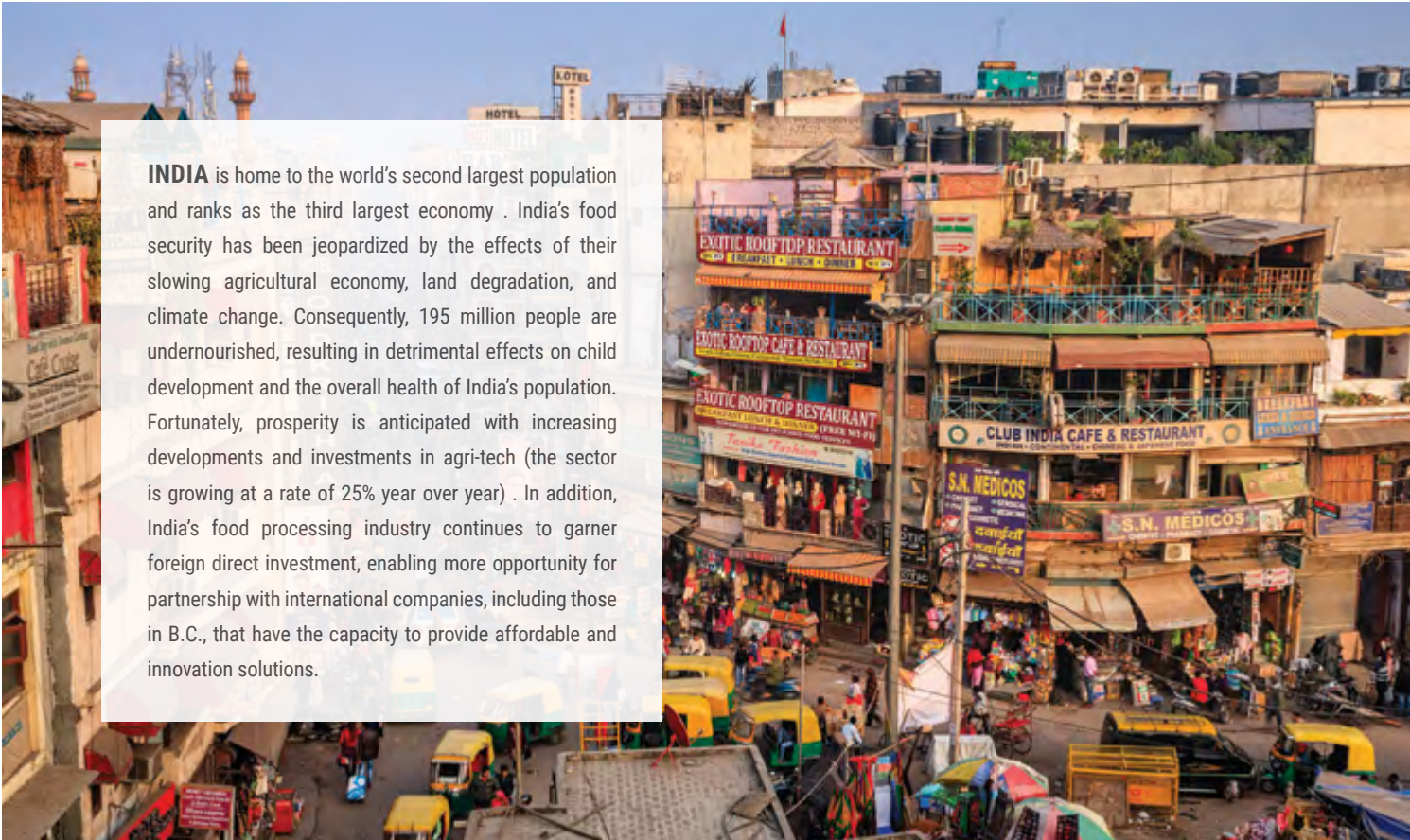
Consultations with representatives in international jurisdictions provided input that Canada and B.C. do and will continue to have a strong brand that leads to opportunity to do business in agriculture, food and agritech in key market areas that will have increasing demands for goods and technologies. There are other jurisdictions with similar natural advantages to B.C. that could capture the agritech opportunity. Natural resource endowments, diversity in crops, strengths in technology are not unique to B.C. Our province will face competition from and find collaborators among other jurisdictions participating in this space. We believe that much of the success and advantage for B.C. will be in developing key partnerships for innovation and knowledge exchange and being "next out of the gate" as an ambitious leader intending to make a significant play in the global agritech space. British Columbia's advantage will become our strong reputation and brand, our ability to connect with other jurisdictions including markets that will have a demand for technology, and the political will and provincial ambition to lead this opportunity.

Based on these targeted consultations, focused on the global context, we have highlighted India, China, Japan and Africa as key emerging markets that B.C. can look to for developing strategic partnerships to meet the needs of growing populations/middle classes that will need to sustain themselves through technologies and innovative growing and processing practices.

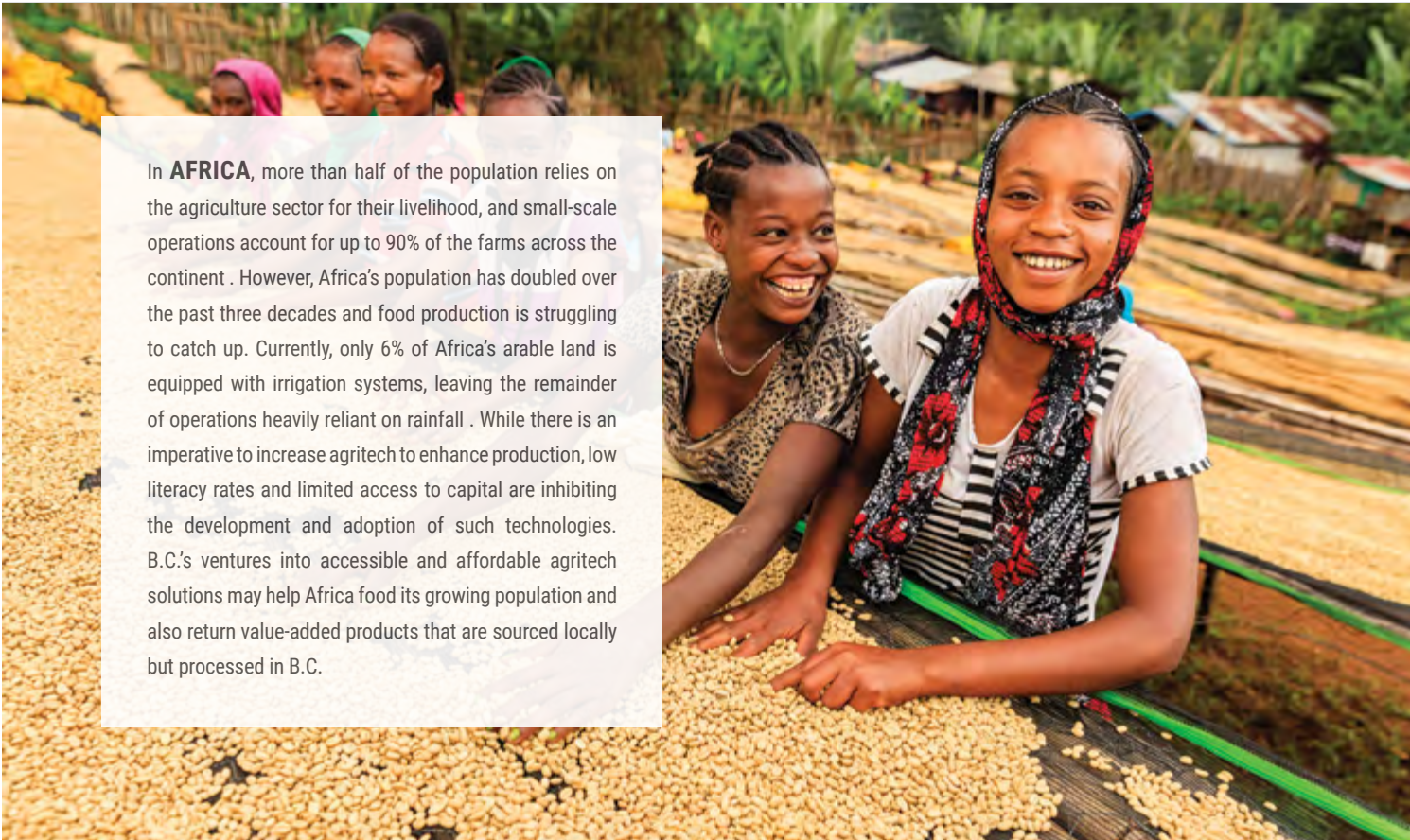
The Netherlands will and should remain a key partner in developing innovation jointly with B.C., to mutually support developing companies, trial technologies between the two areas and collaborate on climate solutions. B.C. will continue to build its partnership in the Cascadia Innovation Corridor and build opportunities for companies to gain exposure and facilitate trials in Washington, Oregon and California.

A woman with dark hair tied in a bun, wearing a white lab coat over a light blue shirt, is looking down at a tablet computer. She is standing in a vertical farm with multiple levels of green plants growing in orange metal racks. The background shows more of the farm's structure and plants.

**CHINA** has the second largest economy in the world, is the third largest importer of agriculture and food products, and is B.C.'s second largest trading partner. In 2017, B.C. exported \$421 million worth of agricultural and food products to China, including valuable items such as crab, pork products, and cherries. With an ever-expanding population, China is experiencing increased challenges with domestic production, particularly for staple foods such as grains and soy beans. Flawed quality control, production short cuts and urbanization are putting more pressures on the Chinese food supply system. Chinese companies have expressed interest in collaborating with Canadians to innovate in food technology and products.



**INDIA** is home to the world's second largest population and ranks as the third largest economy . India's food security has been jeopardized by the effects of their slowing agricultural economy, land degradation, and climate change. Consequently, 195 million people are undernourished, resulting in detrimental effects on child development and the overall health of India's population. Fortunately, prosperity is anticipated with increasing developments and investments in agri-tech (the sector is growing at a rate of 25% year over year) . In addition, India's food processing industry continues to garner foreign direct investment, enabling more opportunity for partnership with international companies, including those in B.C., that have the capacity to provide affordable and innovation solutions.



In **AFRICA**, more than half of the population relies on the agriculture sector for their livelihood, and small-scale operations account for up to 90% of the farms across the continent . However, Africa's population has doubled over the past three decades and food production is struggling to catch up. Currently, only 6% of Africa's arable land is equipped with irrigation systems, leaving the remainder of operations heavily reliant on rainfall . While there is an imperative to increase agritech to enhance production, low literacy rates and limited access to capital are inhibiting the development and adoption of such technologies. B.C.'s ventures into accessible and affordable agritech solutions may help Africa feed its growing population and also return value-added products that are sourced locally but processed in B.C.



**JAPAN** is well-known for innovative technology and its application to agriculture has been heavily researched since 1970. The Japanese population spends 25% of their income on food, compared to just 15% in North America. However, like many other countries, their food system is constrained by population growth, a shrinking agricultural workforce, and climate change. Following the 2011 climate disasters of the Great East Japan Earthquake and Tsunami, the demand for safe, untainted foods has increased, as well as support for agritech development. The adoption of indoor growing is popular in Japan but is constrained by lack of talent and expensive electricity. Despite the strides toward increased efficiency and production, volumes of all main commodities are declining. Fortunately for other nations, Japan imports 60% of their food and have invested in food processing operations abroad. B.C. can leverage its reputation of high-quality and safe foods to advance agritech partnerships and trade with Japan.

Now Canada's Ambassador to China, **DOMINIC BARTON** penned the 2017 Growth Papers as Chair of the Economic Advisory Council to the Premier Minister. These papers raised significant awareness for agriculture and agritech, calling out the sector to have significant potential to be unlocked and generate economic revenues for Canada.

**GOLDY HYDER** is the President and CEO of the Business Council of Canada, an entity that has been offering strategic investment and trade support to Canadian businesses for 43 years. In a discussion with the Task Force, Goldy agreed that the food sector is an important part of Canada's current and future economy, bringing in new dollars through exports and creating quality, well-paid jobs. Goldy expressed his excitement and support for B.C. to take a lead role in the opportunity of agriculture and agritech sectors of Canada.

**NADIR PATEL**, High Commissioner of Canada in India, has extensive experience in Canadian economics and trade flows from current and previous roles. Nadir told the Task Force that there is already a presence of Canadian agritech companies in India, but work needs to be done to strengthen the trade partnership. He believes Canadian agritech companies have the potential to help countries like India find solutions to food sector challenges associated with climate change, growing populations and shifting consumer demands.



### **POSITIONING TO MEET THE GROWING DEMAND FOR SAFE, SUSTAINABLY PRODUCED PROTEINS IN EMERGING MARKETS**

Global food consumption is expected to rise steadily at 2 per cent per year, with 90 per cent of the growth coming from emerging markets. The demand globally for meat proteins is expected to double from 2010 to 2050, from 227 million metric tonnes to 464 million metric tonnes. While consumer trends in North America are incorporating more plant-based alternatives, the demand for high quality meat proteins is on the rise in other jurisdictions. In 2018, Canada's beef industry exported \$2.75 billion (398,580 tonnes) of beef, representing 38 per cent of domestic slaughter. Asia is a key beef market with increased consumption and higher prices paid for Canadian product. Canadian exports of beef to Japan reached a record high in 2018.

B.C.'s international exports of animal products have steadily increased since 2011. In 2018, B.C. exported \$365 million worth of animals and animal products (meat, eggs, dairy) to over 70 markets, representing a 25% growth over 2017. Primary markets of these products include the U.S. (55 per cent), Japan (13 per cent), China (12 per cent) and the Philippines (5 per cent).

Pork that is processed in B.C. accounts for almost a third of B.C.'s animal-related exports (\$107 million) – with Japan, China and Taiwan being primary markets. Pork is a staple of the Chinese diet, with the average person consuming 30kg per year (in comparison to the average Canadian who consumes 16 kg per year). China is struggling with a chronic pork shortage, due to widespread outbreak of African swine fever, and therefore relies heavily on imports to satisfy local demand. With a global reputation as a safe and reliable supplier of pork products – combined with strong industry marketing, quality control and animal care support – B.C. is positioned to continue to benefit from increased global demand for its pork and other meat products.

**THE NETHERLANDS** packs a heavy punch in the global food market considering its modest size. In terms of land areas, the Netherlands is ranked 131st in the world. In terms of food, the country ranked second largest exporter of agricultural products in the world, with a 18.2% market share of food exported or a total of \$31 billion USD annually. Only the US had a higher export value, however the US is approximately 227 times the size of the Netherlands. This success as a global leader in agricultural production is due agricultural intensification (increased production per unit of input), focus on high-value products (horticulture production, dairy and eggs, and animal-based proteins), investment in R&D (private-public partnership), strong supply chain logistics, and agricultural land protection mechanisms.

Because of its small land base and limited amount of resources, the Dutch rely heavily on technology and innovation to maintain international competitiveness, increase agricultural intensification, and improved sustainability—the Dutch agriculture sector has the lowest environmental impact per kg of product of all countries in the world. The Dutch agritech sector generates over \$10 billion USD export dollars and adds 50% in value to the agriculture sector. Key technologies that have enabled the Netherlands to be a world leader in food production include precision farming like vertical growing to reduce resource inputs, data analytics to monitor or predict most effective production practices, sensor technologies to collect data for better decision-making for farmers and automation/robotics along the full value-chain of food production.

The agritech sector relies on strong partnership between industry and academia, working together to solve sector challenges to help keep the farmer competitive and combat climate change. The Netherlands is home to Wageningen University, internationally recognized for its agricultural R&D and strong collaborative approach with private sector. Fostering and strengthening this relationship is a priority for the Dutch government, who use tools like facilitating networks and creating incentives to increase collaboration among sector stakeholders.

Leveraging market access and strong supply chain logistics (physical and virtual) is ingrained in the Dutch business culture. The Netherlands claims to be the gateway to European markets, using an open market approach, business friendly fiscal plan, and a multilingual labour market to maintain their competitiveness in export markets. With three-deep-water ports, including Europe's largest, the Rotterdam, the Dutch move more than 580 million metric tons annually. Further, they are home to the second largest airport in the EU, the Schiphol Airport, and have another six international airports within a 1.5 hour drive.



**the Netherlands**  
Capital Amsterdam



**THE DUTCH TOPSECTOR APPROACH** How has this tiny country managed to position itself at the top? To maintain its competitive edge in the global markets, the Netherlands implemented the Topsector approach—which does not only bolster the country for strong economic growth, it also targets societal issues like aging population and climate change.

**THERE ARE 9 TOPSECTORS:**

- |                                      |                |
|--------------------------------------|----------------|
| 1. High tech systems and materials   | 6. Energy      |
| 2. Horticulture & starting materials | 7. Agri & food |
| 3. Creative industry                 | 8. Water       |
| 4. Life sciences and health          | 9. Logistics   |
| 5. Chemical                          |                |

The Topsector approach uses a world-renowned operational framework between industry, academia and government—also known as the Triple Helix—where this unique form of collaboration is designed to promote innovation, attract talent, and ensure solid international presence in priority sectors. Each Topsector has a Board of Chairs that consist of representation from each partner. This Board is responsible for identifying priorities for each sector and disseminating these priorities to their associated stakeholders—consensus-based decision making like priorities, is critical to the success of the Topsectors. The Agri & Food Topsector has identified priorities like healthier diets, food waste, more sustainable protein sources and circular economy, and have aligned with the UN SGDs. The success of the Topsectors is not only due to the Triple Helix—it is also attributed to the cross-fertilization between sectors that produce clear value, which collectively work to address big societal issues.

**ISRAEL'S** success story in agriculture deserves global recognition. Despite its low endowment in arable land (20%) and debilitatingly low water supply, the country has been able to almost triple its farming land base and increased food production almost 16 times since 1948. Today, Israel produces 95% of its own food requirements.

Primary contributor to this success is the strong partnership between farmers, industry, and technological research. R&D accounts for approximately 17% of Israel's budget for the agriculture sector. Key technology advancements to support food security include: computer-controlled irrigation, automated early-stage warming for irrigation leaks, thermal imaging for crop water management, biological pest control and new crop varieties. Israel is home to a large and growing precision agritech sector, comprised of more than 450 companies offering data collection and analytics to help local and international farmers be more efficient and productive.

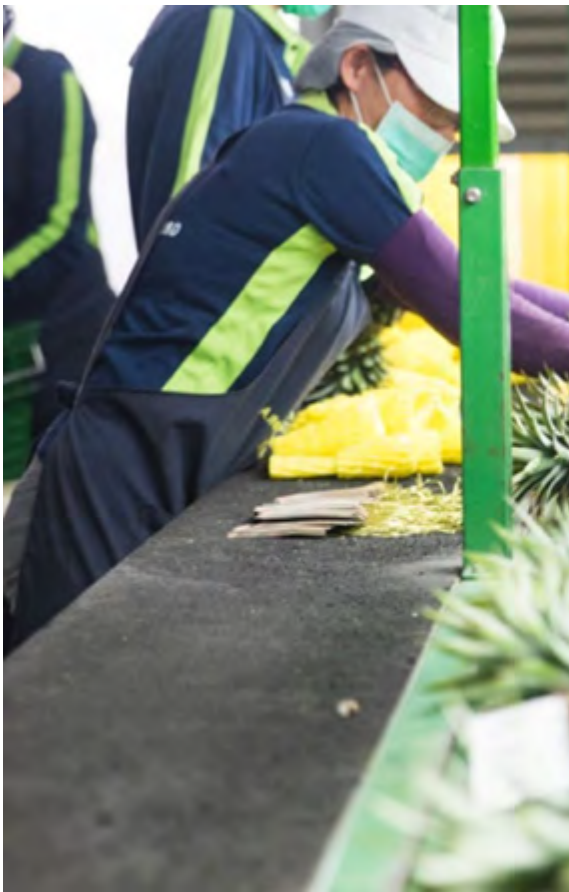
An example of an Israel-based agritech company is the cloud-based AKOLOGic farm management system from Kibbutz-based Agricultural Knowledge On-Line, which gives farmers constant updates on regulatory guidelines through a single dashboard.



**CALIFORNIA** is a world leader in agriculture and technology, making it one of the major players in the global agritech market. Agritech research and talent in California are supported by numerous accelerators, incubators, research centres and university programs. Village Capital and THRIVE are among some of the best ag-accelerators in the world. Research centers and institutes, along with agri-programming offered at UC Davis and UC Berkeley have attracted and retained new researchers and talent, making California an ideal location for agritech start-ups.

The agritech sector benefits from having the largest agriculture economy in the US (California 2017 agriculture exports totaled over \$20B USD, approximately 14.9% of total agriculture exports in the US) and established investor and start-up community familiar with high technology and innovation occurring in Silicon Valley. Large multinational agricultural and pharmaceutical companies, like Monsanto or Bayer, are investing the California sector, through targeted investment, acquisitions of start-ups and supporting accelerator services.





**TAIWAN** is an agricultural paradox. While the country is largely self-sufficient in key crops like rice, as well as exports massive quantities of high-quality produce, Taiwan's land-base and climate is less than ideal for agriculture. A large portion of the farm land is broken up into steep, small plots and the soil has been stripped of natural nutrients due to centuries of over-cultivation. Taiwan experiences extreme weather like heavy flooding and typhoon seasons.

And yet, the country's agriculture sector continues to flourish. This is because Taiwan has fully embraced the Farming 4.0 model. Focused R&D investment into the critical challenges of the sector, leveraging the country's competitive advantages in specific food commodities and taking advantage of its strategic location and transportation logistics. Engineering is already a strong skill-set in the country, including areas like electrical, robotics and data analytics—making the Taiwanese labour force poised to be the next generation farmers.



Located in southern Ontario, **GUELPH** brings together all the key ingredients for a prospering, innovative agriculture sector—a world renowned research and development centre at the University of Guelph, and a cluster of government and industry support services. The surrounding area of Guelph (County of Wellington) is 75% agricultural land and is considered one of the most productive and fertile agricultural land in Ontario. In the region, there are more than 90 companies employing 6,500 people in a broad array of areas within the sector including government, education, agritech, biotech, supply chain, equipment, associations, R&D, and marketing. The Guelph cluster has a strong research presence that includes University of Guelph, Ontario Agriculture College, OMAFRA research farms that facilitates innovation ecosystem.



## 6. SUSTAINABLE DEVELOPMENT

Part of our mandate was to look at growing British Columbia's economy through agriculture, which involved carefully considering how to balance goals that would grow the sector's share of the provincial economy with the elements that go along with simply producing more food. Agriculture and food production cannot be considered in an economic sense without considering their impacts on the planet, and the benefits and complexities of the sector as it relates to people.

We were inspired by the United Nations' Sustainable Development Goals (SDGs) and their application to agriculture. Considering the SDGs as the key focus for growing the agriculture and agritech economies provides a consistent, balanced, environmentally and socially responsible framework for growing the sector.

### Why BC Should Adopt the SDGs as the Guiding Framework for New Agrifood Policy

The seventeen Sustainable Development Goals (SDGs) form the core of the 2030 Agenda for Sustainable Development, which was adopted by all member states of the United Nations in 2015. This Agenda identifies that sustainable development includes not only addressing the environment, but also interconnected social and economic issues, so that it encompasses all aspects of human life and activity. The SDGs were designed to address the most pressing issues facing humans around the globe, such as poverty and climate change, while also being proactive in preventing such problems in the future. In other words, the 2030 Agenda and the SDGs serve as "a plan of action for people, planet, and prosperity," taking both urgently needed short term action and shifting the world to a resilient path in the long term.

In Canada, both public and private entities have already begun working toward achieving the SDGs, both domestically and in collaboration with international partners. As part of developing this strategy, in 2019, the Government of Canada engaged with thousands of Canadians through a series of in-person and online consultations, as well as gleaned perspectives on SDG business priorities from over 500 businesses and organizations. Through these engagements, the government found widespread support across Canada for coordinated action to achieve the Sustainable Development Goals. They found that many entities in Canada's private sector have already begun to innovate their business models to generate sustainable social and environment value, in addition to economic. The government also found that many academic institutions are already aligning their research, teaching, and outreach activities with the SDGs. The engagement sessions also indicated that Canadians saw the need for collaboration among multiple levels of government and Indigenous groups to achieve the SDGs, and realized that there are strong links and synergies between Canada's domestic and international actions related to the SDGs. While Canada's national strategy for the SDGs is still in development, the interim report indicates the important role that provincial governments will have in the strategy, as many areas encompassed by the SDGs are under provincial jurisdiction.

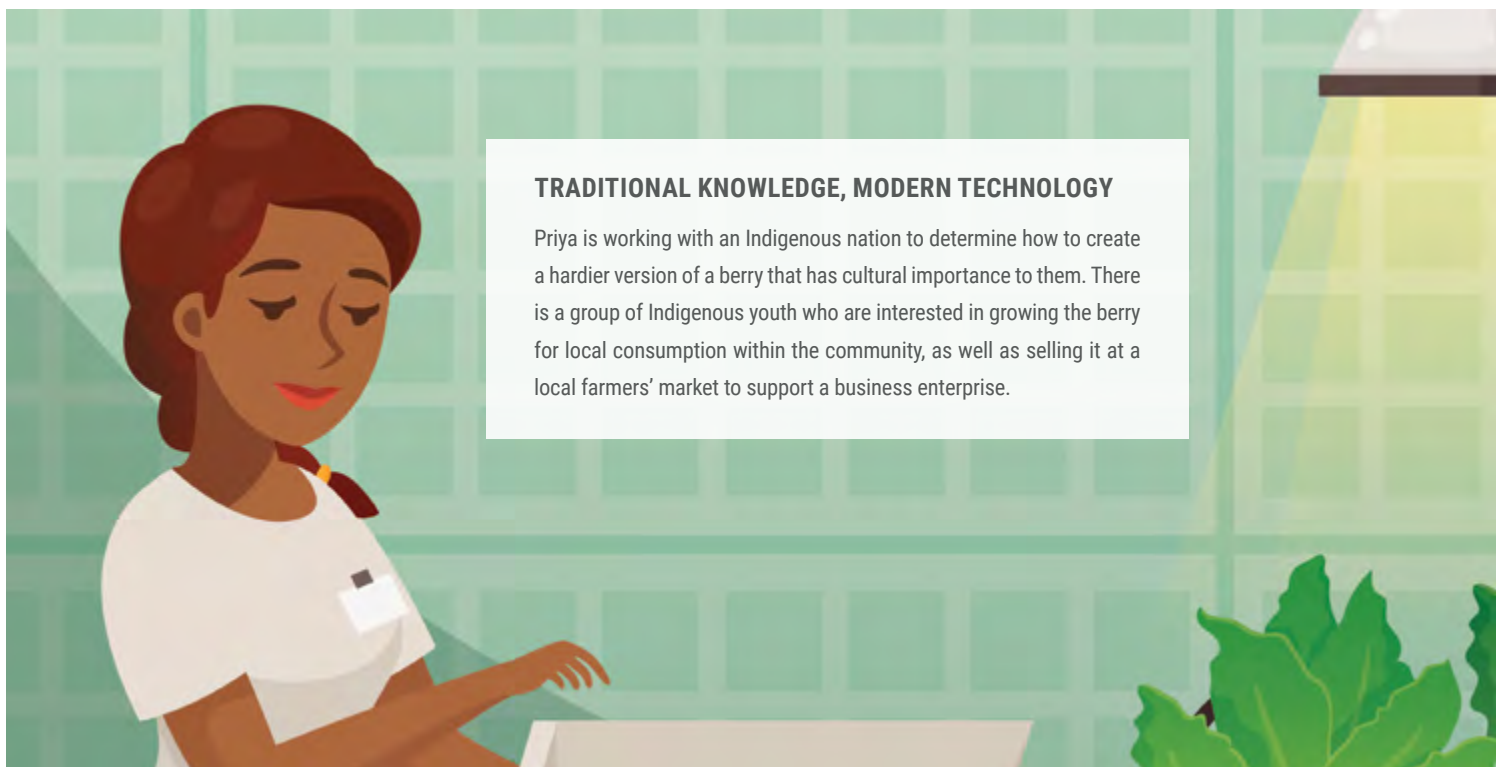
As identified by the Government of Canada, the SDGs are universal and applicable to every country; in other words, they are as relevant to Canada as they are to any other country in the world, and to every Canadian as to every resident of all other nations. While most British Columbians are fortunate in that they do not live in poverty or experience food insecurity, global challenges such as climate change, depleting fisheries and polluted waters, and international economic instability threaten the capacity to continue to support widespread high standards of living and quality of life. The SDGs aim to increase resiliency for all populations, and to ensure that those who are currently able to meet their needs for healthy and comfortable lives can continue to do so.

A common misconception is that environmental protection and economic growth cannot co-exist; that is, a choice must be made between what is good for business (e.g., profit, job creation) and what is good for the planet (e.g. reducing pollution, increasing biodiversity). Examples from both within Canada and around the world, detailed in this report, demonstrate that this is not the case. That said, in order to maximize benefits and synergies across interests while minimizing trade-offs, the Sustainable Development Goals must not be pursued in isolation from one another, but rather as part of an integrated whole. For example, using more fossil fuels to power transportation to distribute food from where there is excess to where there is shortage could help

increase food security (part of Goal 2), while compromising Goal 13, which calls for combatting climate change.

The 2030 Agenda calls for “developed” countries such as Canada to take the lead on improving sustainable production and consumption through adoption of policies “which increase productive capacities, productivity and productive employment; financial inclusion; sustainable agriculture, pastoralist and fisheries development; sustainable industrial development; universal access to affordable, reliable, sustainable, and modern energy services; sustainable transport systems, and quality and resilient infrastructure.”

For the Government of British Columbia, developing and implementing agrifood policies guided by the SDGs has the clear benefit of ensuring that these policies contribute to integrated and synergistic efforts to increase not only provincial food systems sustainability, but also global resilience across sectors. Aligning with the SDGs will also help position the BC government and its partners as leaders in the global implementation of SDG-focused policies and actions. Furthermore, this will place BC “ahead of the game” in Canada, in anticipation of the finalization of a national SDG strategy, when the provinces will receive an official call to action from the national government to contribute to Canada’s work on the SDGs.



#### TRADITIONAL KNOWLEDGE, MODERN TECHNOLOGY

Priya is working with an Indigenous nation to determine how to create a hardier version of a berry that has cultural importance to them. There is a group of Indigenous youth who are interested in growing the berry for local consumption within the community, as well as selling it at a local farmers’ market to support a business enterprise.



## RECOMMENDATION 1:

### ADOPT THE UNITED NATIONS' SUSTAINABLE DEVELOPMENT GOALS (SDGS) AND SEEK TO IMPLEMENT THESE IN FUTURE AGRICULTURAL POLICIES

#### Actions:

- Endorse the SDGs and collect and disseminate appropriate information to policy-makers at all levels of government so that the SDGs guide future strategy and policy development as it pertains to agriculture, agritech and related climate policies.
- Create an Expert Advisory Council mandated to:
  - Identify priority areas for investment in agricultural technologies that reflects B.C.'s strengths and abilities to address the SDGs, and support high-value opportunities for rapid technology development and commercialization;
  - Discuss key performance indicators as they relate to the SDGs;
  - Provide ongoing advice to government regarding policy development;
- Target SDG 13 (climate change), by working with the Climate Action Secretariat to develop programming that will support for B.C. farmers to transition to lower carbon practices through technology and innovation.
- Target SDG 2 (Zero Hunger) and SDG 12 (Sustainable Consumption and Production) by developing novel technologies aimed at halving BC's food waste along the province's entire food supply chain and that can contribute to the effort to eliminating global hunger.

#### Key Performance Indicators (KPIs):

- A provincial agriculture, agritech, and climate change policy framework that incorporates the UN SDGs. Some critical measures or indicators are:
  - B.C. agriculture greenhouse gas emissions (SDG 13)
  - B.C. food waste at each stage of the food supply chain (SDG 12)
  - Exports of B.C. food to other jurisdictions (SDG 2)
  - Development and deployment of novel agricultural technologies (SDG 9)
  - Involvement of traditionally under-represented groups in the agritech agenda including youth, women and Indigenous British Columbians (SDGs 5 and 10)

## SUSTAINABLE DEVELOPMENT GOALS (SDGS)

The following list overviews how the recommendations of the Task Force have the potential to contribute to the seventeen SDGs.



### GOAL 1. End poverty in all its forms everywhere

While this SDG calls to end poverty on a global scale, growing the agriculture and agritech sectors in British Columbia also support B.C.'s Poverty Reduction Strategy through increasing the availability of affordable, locally grown food, increasing employment opportunities and bolstering economic activity which will in turn provide incremental government revenue to support poverty reduction programming.



### GOAL 2. End hunger, achieve food security and improved nutrition and promote sustainable agriculture

All of our recommendations support achievement of this goal.



### GOAL 3. Ensure healthy lives and promote well being for all at all ages

While British Columbia produces a diverse range of fruits, vegetables, grains, livestock, dairy and other foods, production tends to be concentrated in a few areas of the province and is subject to growing seasons. By employing technology to increase the availability of healthy foods produced within British Columbia, our recommendations will actively contribute to the health of the population and improve the availability of fresh, nutritious food in rural and remote parts of the province.



### GOAL 4. Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all

By increasing capacity in the education sector related to agriculture, food systems, and agrifood technologies, our recommendations will help to ensure that more British Columbia residents can access appropriate learning opportunities to equip them to enter, thrive, and advance in the agrifood sector.



### GOAL 5. Achieve gender equality and empower all women and girls

Women are already leaders in British Columbia's agriculture and food sector, as exemplified by Minister Lana Popham and the hundreds of female farmers and agribusiness leaders around the province. Our recommendations will provide more sector opportunities to be accessed by women.



### **GOAL 6. Ensure availability and sustainable management of water and sanitation for all**

While British Columbia has long been known for its abundance of clean water, climate change and other human-generated impacts create challenges into the future. Task force recommendations around education, innovation, and land use will have secondary benefits of contributing to the maintenance of a safe and clean water supply and reducing the amounts of agricultural and food waste requiring management through sanitation.



### **GOAL 7. Ensure access to affordable, reliable, sustainable and modern energy for all**

Our recommendations for innovative research have the potential to build capacity for research and development into how agrifood waste can become part of sustainable energy solutions and for increased efficiencies in energy use in food systems.



### **GOAL 8. Promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all**

Recommendations for establishing a dedicated land area for agri-industrial development will create opportunities for more processing and agriculture-related industries to develop, locate, and expand in B.C., generating stable, skilled job opportunities for individuals across the province.



### **GOAL 9. Build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation**

The careful establishment of a dedicated land area for agri-industrial enterprises will increase capacity for growth in this sector, and public-private partnerships will ensure that B.C. is a leader in agritech innovation to support this sector



### **GOAL 10. Reduce inequality within and among countries**

Education and support for initiatives which can create good jobs have the potential to lead to the reduction of inequality in B.C. and increase the standard of living for all British Columbians.



### **GOAL 11. Make cities and human settlements inclusive, safe, resilient and sustainable**

By supporting revitalized use and protection of agricultural land, the recommendations will potentially increase the sustainability, resiliency, and safety of the peri-urban areas in which much of B.C.'s most productive farmland sits.



### **GOAL 12. Ensure sustainable consumption and production patterns**

Our recommendations will support achievement of this goal in several ways. Innovation and education in the agrifood sector will support more sustainable food production in the province.



### **GOAL 13. Take urgent action to combat climate change and its impacts\***

British Columbia has taken significant steps to address and mitigate climate change through the introduction of the CleanBC plan, making B.C. relatively unique in the world in terms of having a detailed, actionable plan to meet legislated GHG reduction targets. Our recommendations build on the importance of climate change to the province's food producers and general population. Recommendations which support innovation and increased local opportunities for processing and other agri-industrial activities via revised land use policies all have the potential to support climate change mitigation and adaptation.



### **GOAL 14. Conserve and sustainably use the oceans, seas and marine resources for sustainable development**



### **GOAL 15. Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss**

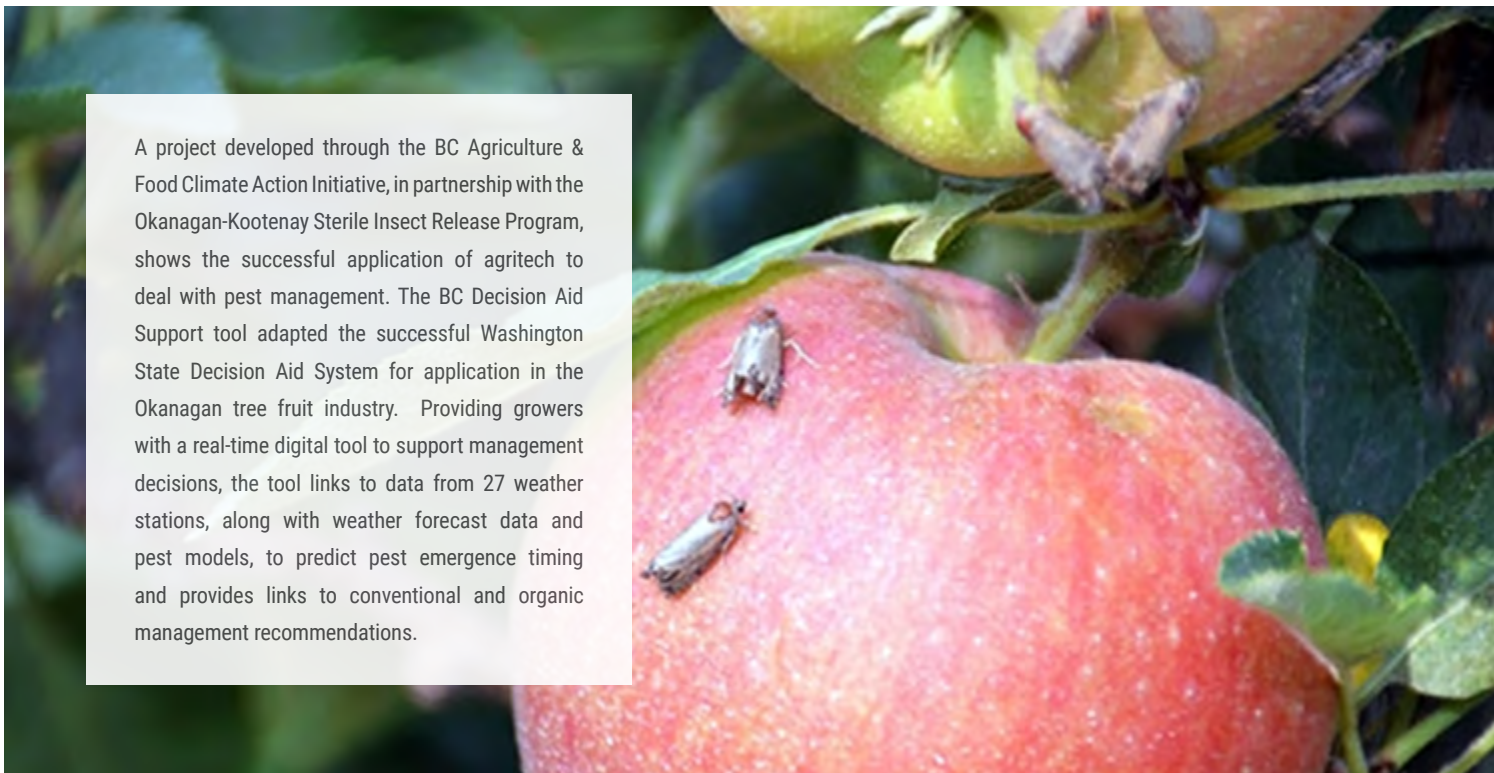


Within Canada, an estimated \$31 billion worth of food is wasted annually (Value Chain Management International Inc., 2014); the value of this loss is compounded when the fuel, water, labor, and other resources used to produce the food are factored in. The FAO defines food waste as occurring at the retail and consumer/household level, however food loss occurs at other stages along the supply chain, such as when food is unable to get to a consumer or market. Fruits and vegetables, crucial for human health and B.C.'s agrifood economy, are among the foods most vulnerable to loss and waste. A key target for SDG 12 on sustainable consumption and production is cutting the rate of food loss and waste in half by 2030. Global experts argue that significantly reducing food waste is a necessary step in sustainably feeding the world's growing population (SDG 2), and that it can also contribute to other SDGs, such as combatting climate change (SDG 13) by reducing greenhouse gas emission, land conservation (SDG 15), and sustainable management of water and sanitation (SDG 6). As well as contributing to these sustainability goals, reducing food loss and waste has the potential to positively affect both the bottom line for producers and household finances for consumers (citation: FAO food waste report). Building on work already being done at the municipal, regional and provincial level in BC, increased capacity for education and innovation have the potential to realize both the environmental and economic benefits of reducing waste in the agriculture and food system.

## CLIMATE CHANGE

As we conducted our work, the challenge of climate change was never far from our minds. Climate change for agriculture brings increased variability in weather patterns and heightened frequency and intensity of extreme weather events such as drought, flooding, and extreme heat, resulting in increased management complexity. Major extreme weather events, such as B.C. wildfires and flooding in 2017 and 2018 have had catastrophic impacts on the sector and on the profitability and livelihoods of farmers and ranchers. In the Lower Mainland, the salt wedge in the Fraser River has migrated further upstream, restricting access to irrigation water in Delta when water demand is greatest during the height of the growing season.

Climate change in agriculture is a serious issue. We heard from commodity groups that were already feeling significant threats from climate change. Supporting farmers and ranchers as they adapt to these conditions and, including through expanded access to relevant technologies will need to be a primary focus of B.C. agritech development.

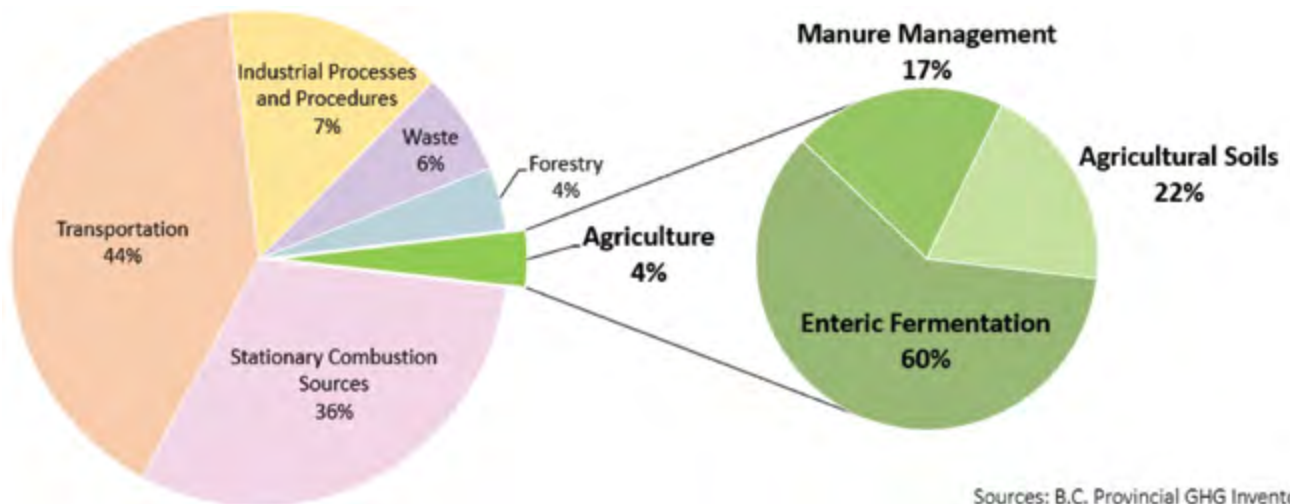


A project developed through the BC Agriculture & Food Climate Action Initiative, in partnership with the Okanagan-Kootenay Sterile Insect Release Program, shows the successful application of agritech to deal with pest management. The BC Decision Aid Support tool adapted the successful Washington State Decision Aid System for application in the Okanagan tree fruit industry. Providing growers with a real-time digital tool to support management decisions, the tool links to data from 27 weather stations, along with weather forecast data and pest models, to predict pest emergence timing and provides links to conventional and organic management recommendations.

In addition to adaptation, climate change action also requires all industrial sectors to play a part in reducing greenhouse gas emissions. The agriculture industry in B.C and globally, like all industrial sectors, has a carbon footprint that can be reduced through technology and innovation. While the B.C. agriculture sector has a comparatively small emissions footprint relative other sectors, at just 3.7 per cent of total provincial emissions, there are opportunities for emissions reductions that can play a role in contributing to emissions reductions goals, as well as creating technologies that can help transition the sector where emissions may be more intensive. From precision applications of fertilizers, to deficit irrigation that only uses as much water as is minimally required for crop health, to looking at energy efficiency and co-generation opportunities and nutrient management techniques – technology can significantly shift the way that the industry does business in order to support its transition to become a leading low carbon sector.

Working with agricultural partners, our recommendations will support the development and adoption of agri-technologies that meet the needs of farmers facing climate change challenges, while also supporting the sector’s transition to B.C.’s low carbon economic growth.

**B.C. Agricultural GHG Emissions: 2017 Total, 2390 kilotonnes CO2e**



Sources: B.C. Provincial GHG Inventory 2017

The **CLIMATE ACTION INITIATIVE (CAI)** was established through a partnership between the BC Agriculture Council and the Investment Agriculture Foundation of BC in 2008. This initiative was designed to offer tools and resources that can increase the capacity of agriculture to adapt to climate change. In 2013, the CAI developed the Regional Adaptation Program, which facilitates the development of adaptation plans specific to a region and supports the implementation of projects to achieve priorities, strategies and actions identified in the plan. The Regional Adaptation Program is funded by the governments of Canada and B.C. under the Canadian Agriculture Partnership. It helps strengthen collaborative relationships across the agriculture sector, and with government, to improve knowledge and sharing of informational resources. Between 2013 and 2018, six regional plans and 41 regional projects were completed under the Program, with more than 400 individuals participating in the planning process. In the Cariboo, Delta, Fraser Valley, Okanagan and Peace regions, projects are still ongoing. Three new regional adaptation plans have recently been developed or are underway: Bulkley-Nechako & Fraser-Fort George (completed August 2019); Kootenay & Boundary (completed July 2019); and Vancouver Island (estimated completion summer 2020).



**Climate Action Initiative**  
BC AGRICULTURE & FOOD



## 7. INNOVATION

All sectors and economies are being fundamentally restructured through the rapid development and deployment of innovations. Innovation is critical to driving the growth and resiliency of national and regional economies. In agriculture, farmers have innovating since the dawn of time, with pronounced shifts in the industry resulting from the domestication of plants and animals, the automation of work, innovations such as crop rotation, and the mass scaling of genetic and chemical applications. But the trend is expected to accelerate. Agriculture occasionally undergoes rapid disruption due to advances in technology with seed hybridization and chemical fertilizer being two examples. A further disruption is happening now. According to the OECD, “Innovation, which encompasses investments in R&D and the adoption of new products, processes and production practices, technologies and business strategies, will be key to helping the sector respond to these changing global forces by producing consumer-oriented products in a sustainable way, while remaining competitive at home and abroad. Science and technology, in particular, has a critical role to play in helping the food and agriculture sector achieve greater competitiveness, improve environmental performance, and contribute to the health and well-being of Canadians” (OECD, Report on Innovation, Agriculture Productivity and Sustainability in Canada, 2015).

During our engagements across B.C., Canada, and in other countries, we heard about the vital interplay between industry, academia, and government in stimulating innovation and technology development for the agritech sector. Major international firms, seeing the potential for developing and deploying agricultural technologies are increasingly investing in agritech R&D. In countries such as the Netherlands, they are also intricately linked to the start-up scene, acting as mentors and customers for novel innovations.



We were heartened to observe that B.C. boasts a solid foundation for rapid agritech development:

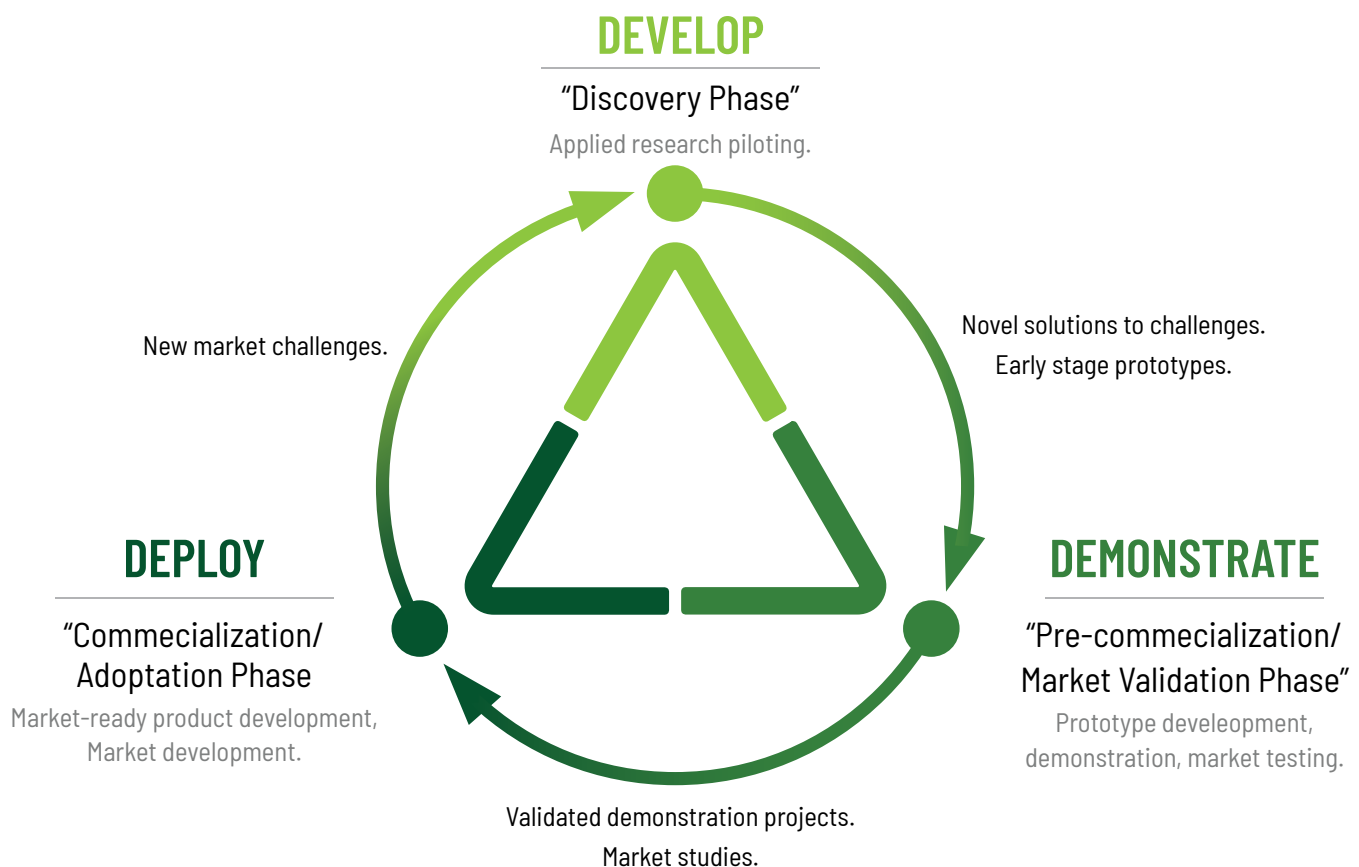
1. While current B.C. based agritech companies are nearly all quite small, we observed an entrepreneurial spirit and drive rivaling any we encountered internationally.
2. Some larger agriculture sector firms have begun prioritizing R&D as they see a transformation of their industry. These firms are usually supported by government funding programs.
3. B.C. is a global leader in many of the core technologies that are fueling the agritech revolution including artificial intelligence, robotics, sensor networks, material sciences, genomics, and data science.

This presents B.C. with a tremendous opportunity to strategically grow its presence in agritech. But the road ahead will not be easy. Countries such as the Netherlands, Israel, and Japan are investing heavily to become agritech world leaders. For example, the Netherlands has prioritized agriculture and agritech for nearly a century and much of the leading technology for agriculture now comes out of the Netherlands.

We propose that B.C. “jump ahead” and position itself to be a leader in technologies that will define the agriculture sector 5-10 years from now. The key features of a successful strategy are a virtuous cycle consisting of:

- Develop technologies by fostering linkages between B.C.’s technology and agriculture sectors to address challenges facing agriculture and to ensure novel productivity enhancing cutting-edge ideas and technologies address these challenges within the B.C. context.
- Demonstrate technologies in a real-life setting to ensure scalability and applicability. It is imperative that such demonstration projects be of a size and scale to showcase efficacy of the technology so that it can be readily marketed.
- Deploy technologies into firms including ensuring the expertise is within these firms to maximally leverage these technologies. While initially we expect deployment will be within B.C. firms, over time we expect deployment will happen around the world.

As new technologies are deployed, new challenges will be identified which will require further technology development thus helping B.C. maintain leadership in the agritech space.



Stakeholders told us that the agritech sector in B.C. is highly fragmented. There are many small start-ups scattered throughout the Lower Mainland and across the province developing agritech, clean tech and high-tech solutions. Similarly, there is research occurring in post-secondary institutes that is divorced from the agritech sector. Despite these developments, a lack of coordination means that B.C. is not maximizing its full potential to draw on its natural advantages, leveraging its strengths, and building on successes. Establishing avenues for information sharing, for prioritizing, and for developing core expertise are all critical if B.C. is going to lead the world in developing key agritech solutions. In moving towards the development of an innovation strategy for the B.C. agriculture and agritech sector, this recommendation is intended to identify the need for such a strategy to encompass activity that occurs along the entire innovation continuum.

At the heart of this innovation strategy is the ability to harness the creativity of people so they can quickly realize new opportunities. Leading jurisdictions have created purpose-built incubators and accelerators to ensure novel ideas with a business case can be turned into start-ups. In the agritech space, it is also critical that space be made available to demonstrate technologies at scale. Such space must simulate an actual agricultural setting and such spaces are becoming ever more common place in leading jurisdictions. As well, recognizing the extremely high-risk, high-reward of these demonstration projects, it is incumbent that requisite government funding be made available. Advanced technology deployment often requires a co-funding model whereby governments act to de-risk adoption while ensuring the private sector provides maximal funding.





**INCUBATORS AND ACCELERATORS** are organizations dedicated to helping start-ups achieve success. Incubation comes first, and then companies may “graduate” to an accelerator. Successful agritech jurisdictions have standalone focused incubators and accelerators for agritech entrepreneurs. Incubators offer support for companies operating within a specific sector or vertical and usually require a physical, dedicated space where resources are available to the entrepreneurs, including mentorship that can be instrumental to helping the start-up achieve success, and access to resources that are key to growing a business.

### Within an incubator, entrepreneurs

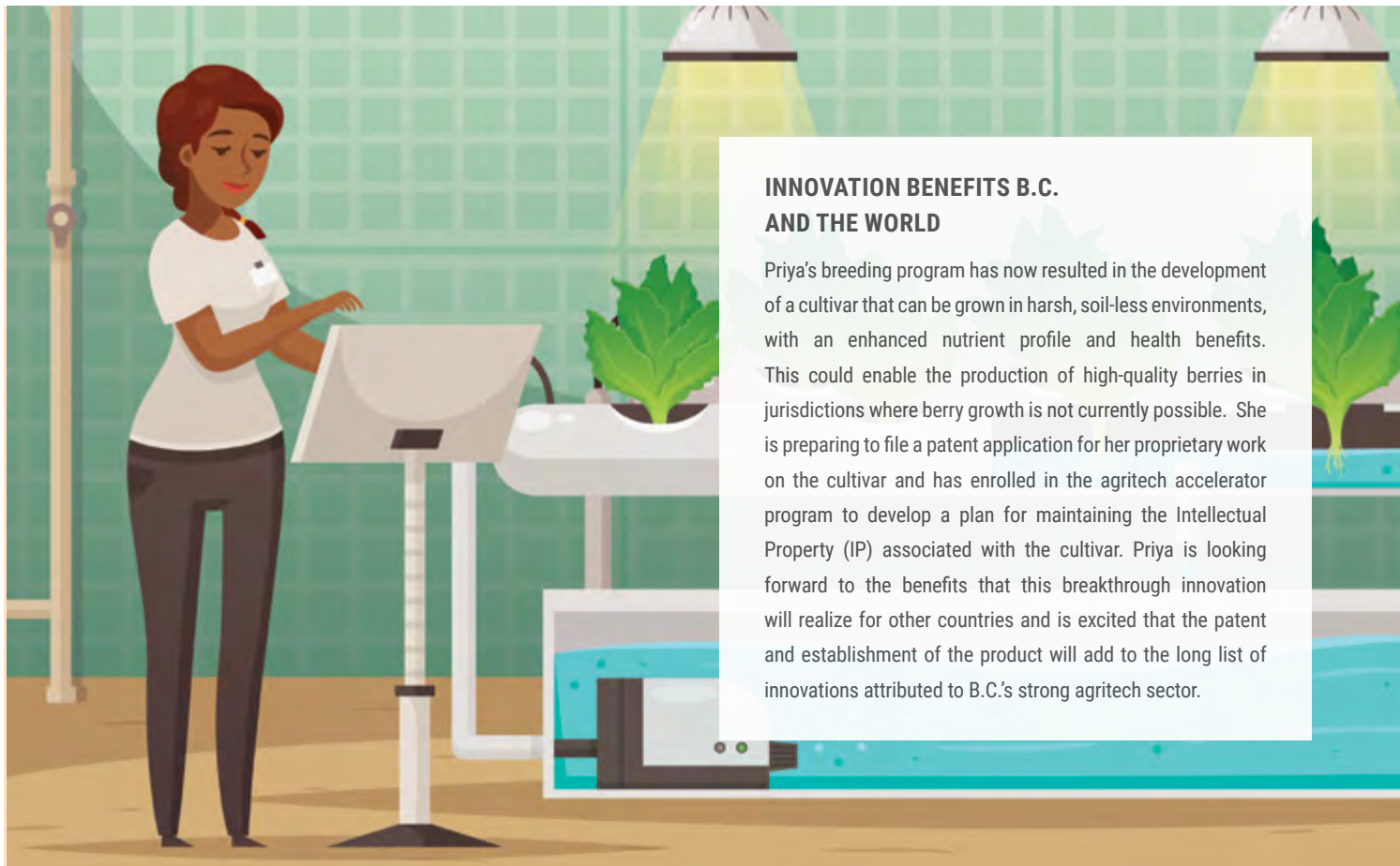
- Meet other entrepreneurs creating “collisions” so that a start-up team gets created. There are many examples of co-founders finding each other in an incubator.
- Learn how to test for market fit
- Create a business plan
- Learn about intellectual property and how best to protect their ideas/technologies
- Can incorporate a start-up, join with another start-up to bring together their resources
- Learn about government funding (in B.C., this includes SRED, NRC-IRAP, BC venture capital tax credit, Mitacs, etc.)
- Meet investors including angels, venture capitalists, etc.

### Incubators are often organized as co-working space:

- We observed that successful agritech jurisdictions have standalone agritech accelerators. Access to other experts within the sector is also a key feature of incubators. In some models, startup companies have an “in residence” period within the physical space of the incubator and larger companies also have a company presence within the incubator, renting out space. This allows the small companies to access the larger companies to help hone their technologies and business models to suit the needs of larger companies that could become investors or partners, and allows the larger companies access to an innovation pipeline. This model also supports a model that could be financially self-sustaining over time.
- Traditionally incubators want to house start-ups only at an early stage. Once the start-up is established they normally push the firm to an accelerator or relocate to their own space

## Accelerators

- An organization (for-profit or not-for-profit) dedicated to helping early stage start-ups “accelerate” their growth and become viable firms.
- Accelerators tend to be broader in their sectoral reach, focused much more on the firm.
- Often have a mentor network similar to an incubator but with mentors having expertise in growing firms. Often these mentor networks are far larger and with better expertise than those in an incubator (but there is a lot of variability around this).
- Rigorous application process where start-ups must show a minimum viable product, market fit, basic business plan, and dedicated entrepreneur(s) ready to put serious effort into building the firm.
- Within an accelerator, a start-up is pushed to obtain funding, test the product in the market and adjust accordingly, meet funders. Accelerators will make introductions to VC’s and private capital to get their firms properly resources. Accelerators with physical space charge for that space similar to co-working space. But also, many firms associated with an accelerator will have their own space or be located in co-working space.
- Accelerators often have their own seed fund:
  - When selecting a start-up, the Accelerator may allocate some of this fund
  - The Accelerator receives equity in exchange for seed funding
  - The Accelerator may choose to bring other funders for seed funding
  - Accelerators have varying terms for their funding
  - The Accelerator mentor network often provides funding to firms in the Accelerator
- Normally a firm will stay in the accelerator until it receives VC funding. Some firms will join more than one accelerator.



### INNOVATION BENEFITS B.C. AND THE WORLD

Priya's breeding program has now resulted in the development of a cultivar that can be grown in harsh, soil-less environments, with an enhanced nutrient profile and health benefits. This could enable the production of high-quality berries in jurisdictions where berry growth is not currently possible. She is preparing to file a patent application for her proprietary work on the cultivar and has enrolled in the agritech accelerator program to develop a plan for maintaining the Intellectual Property (IP) associated with the cultivar. Priya is looking forward to the benefits that this breakthrough innovation will realize for other countries and is excited that the patent and establishment of the product will add to the long list of innovations attributed to B.C.'s strong agritech sector.

## RECOMMENDATION 2:

### ESTABLISH B.C. AS A GLOBAL AGRITECH LEADER BY SUPPORTING THE INNOVATION PATHWAY INCLUDING THE DEVELOPMENT, DEMONSTRATION, AND DEPLOYMENT OF NOVEL TECHNOLOGIES.

#### Actions:

- Harness the creativity of British Columbians in developing new and innovative agricultural technologies through an incubation-acceleration strategy which includes an incubator for agritech start-ups.
- Ensure alignment between the incubator-acceleration strategy and the broader agriculture and agritech agenda by having the incubator lead serve on the Expert Advisory Council.
- Stimulate demonstration of the most promising agricultural technologies in B.C. through:
  - Linkages between the agritech incubation-acceleration strategy and B.C.-based accelerators
  - Physical space and a streamlined regulatory framework to rapidly launch large scale agritech demonstration projects; and
  - Provincial funds that leverage other funding (e.g., industrial, venture capital, federal) and are aligned with provincial agritech priority areas.
- Develop a policy framework for the deployment of commercial agricultural technologies that embraces the UN SDGs and ensure access to appropriate provincial and federal resources that maximize industrial contributions.
- Facilitate provincial, federal, and international linkages to create innovation corridors between B.C. and key jurisdictions so that B.C. is central in the creation and commercialization of new agricultural products and technologies. For example, B.C. should leverage its position as the Asian gateway for agricultural commodities from across Western Canada and the US.

#### Key Performance Indicators (KPIs):

- Pipeline of agritech enterprises of varying sizes (e.g., start-ups, growth companies, revenue-generating businesses) across the province;
- Demonstration projects in B.C.;
- Food products available for local consumption and export to other jurisdictions;
- Venture capital funds attracted to B.C. agritech firms; and
- Revenue and employment generated by B.C. agritech firms.



## 8. ACADEMIA & TALENT

During our consultations, we met large numbers of young people interested in, or already involved with, agriculture or enthusiastic about getting into the sector. Many saw farming through the lens of emerging technologies, through changing farming practices to mitigate green-house gases, and the desire for healthy living.

At the same time, in all jurisdictions that aspire to national and global leadership in agriculture and agritech, we found that academia plays a foundational role. Leading academics help address challenges facing the sector, act as a neutral body for policy prescriptions and advance new thinking about future agricultural needs. Academia also trains the next generation of talent for the sector while providing critical platforms for skilling and re-skilling the existing workforce. From the University of Saskatchewan, to Guelph to Wageningen in the Netherlands, agricultural research was a critical component of the overall sector strategies.

This overwhelming interest from youth and the need for research leadership are instrumental in our recommendation to leverage higher education as part of an agri-tech strategy. B.C. is blessed with world-class research institutions and applied technical programs, but they are disjointed compared to those in leading jurisdictions. In nearly every area of importance to creating a world-class agritech sector, B.C. boasts significant expertise. Taking a leadership role in agritech will require a coordinated effort that pools expertise and effort across institutions to create vehicles for collaboration in research and training.

We came away impressed at the academic structures created elsewhere to support provincial and national agritech strategies. We believe it is imperative that we leverage the strength of our academic sector to create a collaborative institute model where common research priorities are identified and experts from across the province come together to address challenges. We recommend that this institute would also become the focal point for developing novel training programs for undergraduate and graduate students, ensuring the next generation is well versed in new technologies and methodologies. Importantly, the institute would act as a natural focal point for national and international linkages, ensuring that B.C. has access to leading academic thinking in the sector.

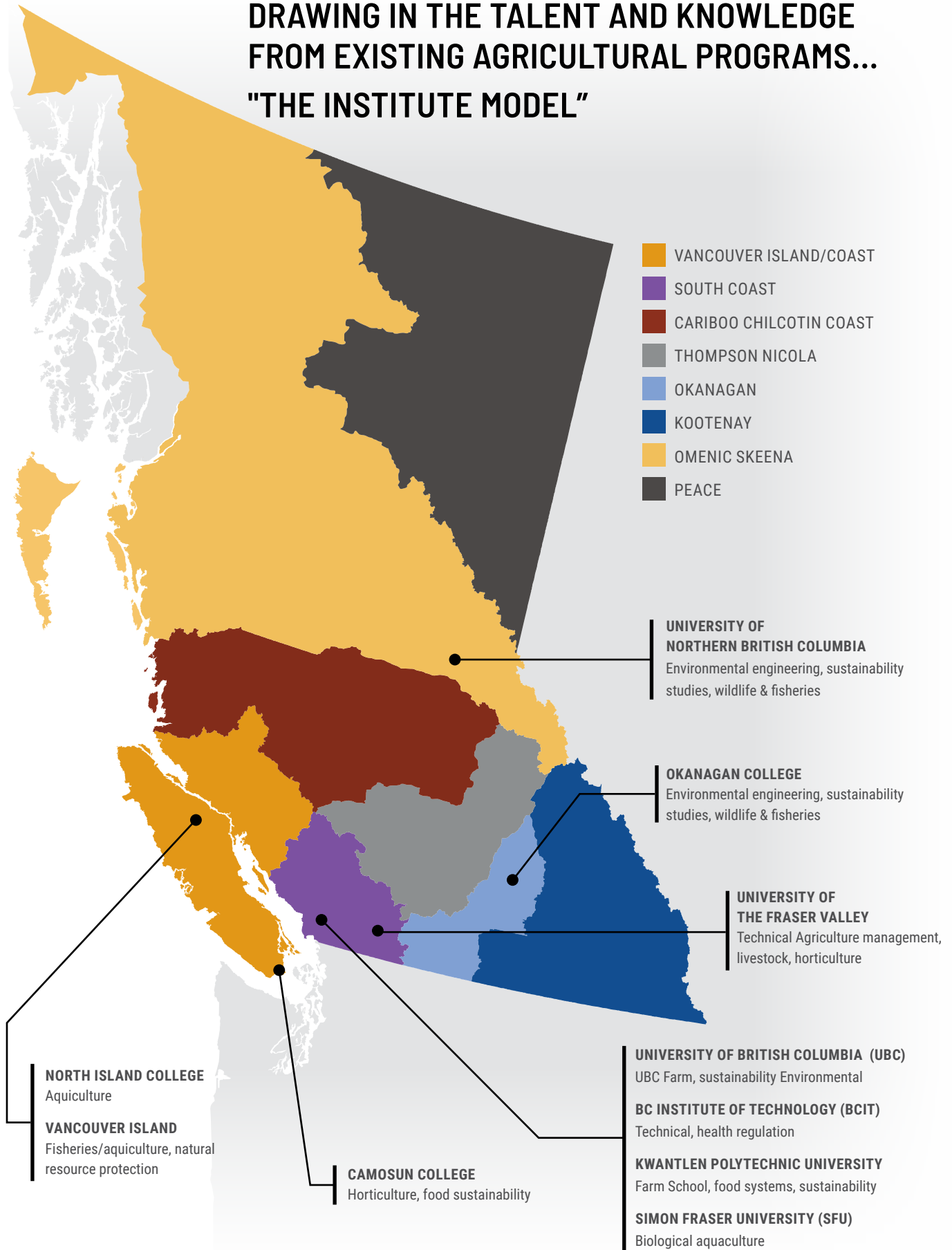
Investments in the academic sector, combined with the focus on an incubation strategy, will attract a critical mass of talent from throughout the province and other parts of the world (researchers, scientists, post-docs, graduate students, and thought leaders) to constantly infuse and re-infuse the generation of knowledge and ideas into the food and agriculture industry.

Though some of the leading jurisdictions centralize the vast majority of their agricultural programming at one institution, we do not advise that approach in British Columbia. The agricultural regions of the province are highly diverse, and the universities and colleges of British Columbia can support their region in achieving excellence. However, a vehicle for collaboration is needed and we suggest that the Institute can be that vehicle.

Training for mid-career agriculture workers will also be critical so they can seamlessly apply new technologies as these are introduced. The institute model would allow rapid identification of such skills needs and ensure timely and relevant program delivery. Programming must also be inclusive so that it reaches all ages, regions, and demographics thus allowing the broadest possible participation in the agritech economy. The reality is that as agriculture becomes a technology driven sector, the farmer of the future will also require the skills of a mathematician (to analyze data) and of an engineer (to optimally deploy new technologies).

Done right, this new model of collaboration and coordination would address a gap in the current academic agritech space, namely the distribution of talent through the province making it difficult to address research and training of highest need. And finally, coordinating and leveraging B.C. research dollars through the institute can make a serious impact.

# DRAWING IN THE TALENT AND KNOWLEDGE FROM EXISTING AGRICULTURAL PROGRAMS... "THE INSTITUTE MODEL"



## RECOMMENDATION 3:

**CREATE AN AGRICULTURE AND AGRITECH INSTITUTE AS A COLLABORATIVE ENTITY ACROSS POST-SECONDARY INSTITUTIONS TO DRIVE EXCELLENCE IN PRIORITY AREAS AND DEEPEN THE KNOWLEDGE BASE AND TALENT POOL FOR THE AGRICULTURE INNOVATION AGENDA.**

### Actions:

- Create an agriculture/agritech institute that draws on expertise from B.C. post secondary institutions (universities and colleges) and prioritizes training, cutting-edge research and development, acts as a policy think tank, and links to national and international academic networks, all in support of the provincial agriculture agenda.
- Mandate and resources the Institute to:
  - Perform world-class research and development in areas identified as being critically important to the province;
  - Provide advice to government on agriculture and agritech policies, particularly those related to the UN SDGs;
  - Link with the provincial agritech incubator-accelerator strategy to support new enterprises while also ensuring start-ups are aware of international developments in the agritech arena;
  - Act as a gateway for aggregating work-integrated learning opportunities across post-secondary institutions for undergraduate and graduate students;
  - Build research collaborations to build upon multiple funding streams through federal, local and industry partnerships; and
  - Develop targeted programs focused on creating the skills and talent needed to support the future of agriculture and agritech.

### Key Performance Indicators (KPIs):

- Participation across post-secondary institutions in the institute;
- Graduate programming that cuts across post-secondary institutions; and
- Experiential and work-integrated learning opportunities.



## 9. STRATEGIC LAND USE & INDUSTRY DEVELOPMENT

The Agricultural Land Reserve (ALR) has been at the centre of agricultural land use planning in British Columbia for nearly half a century and will continue to play a central role in the development of agriculture and agritech in British Columbia. The ALR and the Agricultural Land Commission Act that established it has changed and evolved over time along with the agriculture industry. The ALR was established at a time when policies to control urban sprawl were being implemented or expanded in regions around the world; British Columbia recognized that agriculture needs a place to grow.

Bill 42, the Land Commission Act, was one of the most ambitious provincial zoning acts in Canadian history. The bill passed on April 18th, 1973, establishing a land commission with the power to purchase land for four different kinds of land reserve: an agricultural reserve, a greenbelt reserve, a residential land bank, and an industrial land bank. The commission was also given the power to create a series of agricultural reserves through zoning alone. The Minister of Agriculture described the purposes of the act as follows (Smith, 2012):

1. To curtail the loss of prime farmland
2. To ensure the benefits of improvements such as drainage went to farmers
3. To ensure a local food supply
4. To reinforce the work of other preservation groups
5. To help young people enter farming
6. To create green belts around urban areas
7. To bank land for future development including potential industrial areas

The reserves, as they were called, were initially determined by the provincial government through the Agricultural Land Commission with input from municipal governments, who submitted plans to the commission for consideration. To do this, the commission drew on wartime aerial photos and the Canada Land Inventory (CLI), a survey of agricultural capacity [cite Smith 2012]. The CLI's existence lent much needed scientific credibility to the reserves.

Two other factors went into the formation of the agricultural land reserves. The Land Commission included some land of poor agricultural capacity to prevent fragmentation of the land base in order to avoid pockets of farmland and development intermingling, which had been shown to decrease agricultural viability. Municipalities were also asked to plan for enough industrial, commercial and residential expansion space to last at least five years. Once all the plans were complete, the ALRs came into force in the mid 1970's. Very quickly, the commission began talking about the reserve as a single provincial whole, what we now know as the ALR. Additionally, some land was purchased outright and leased to farmers on twenty-year leases. In the Lower Mainland, the ALR covered one quarter of the available land and closer to half of the relatively flat land in the Fraser Basin. At the time no real plans were developed for what would happen if and when the banked industrial and residential lands were exhausted.

British Columbia has the potential to be a leader in the area of agricultural technology; however, a lack of available flexibly-zoned land has created a bottleneck for scaling this new area of the economy. To relieve this bottleneck, the committee recommends that up to a quarter of a percent (0.25%) of the ALR be made available for agricultural-industrial activities at the discretion of a commissioner of agricultural-industrial lands to be created to oversee the province's agricultural industrial land strategy.

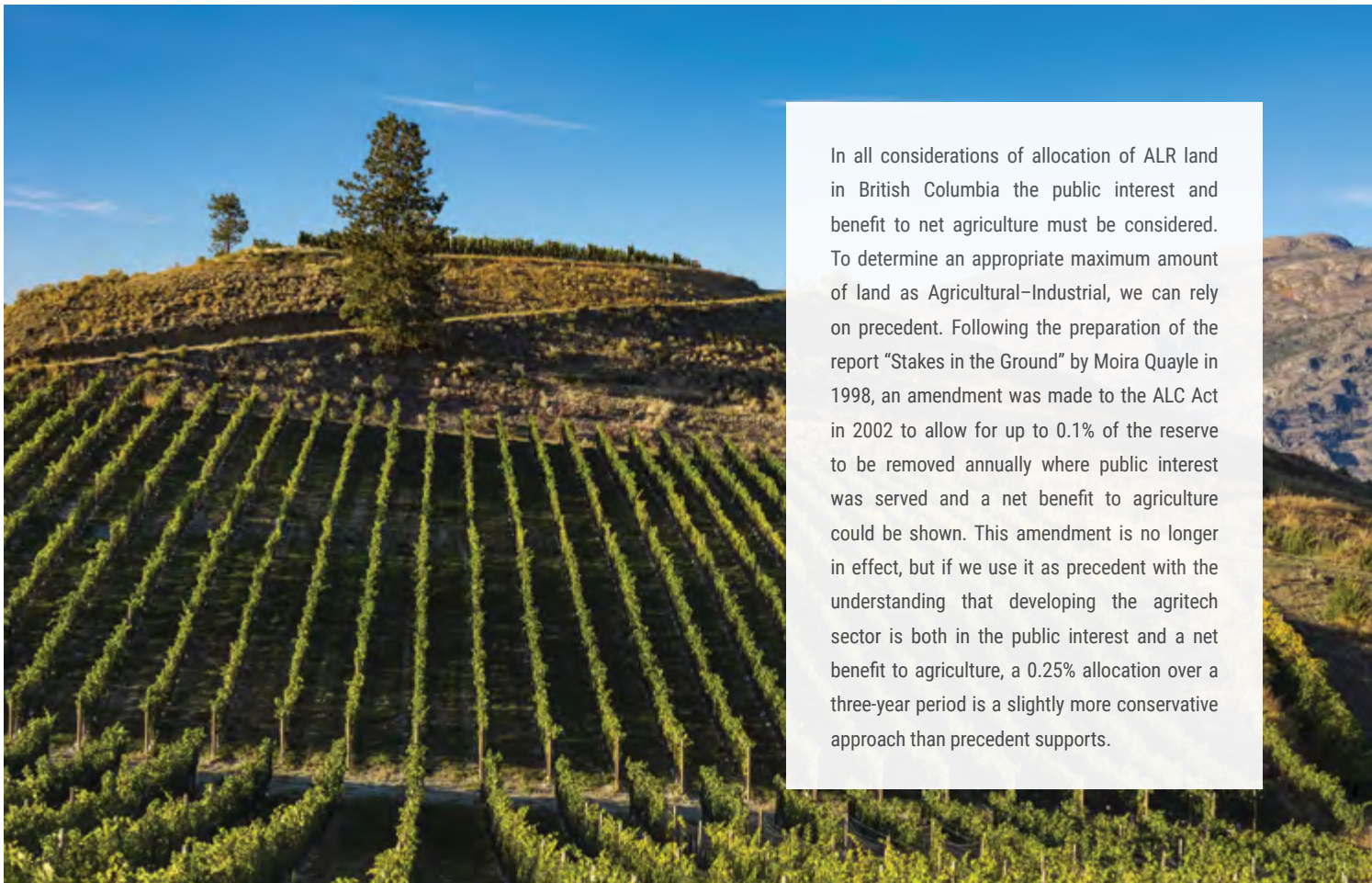
Creating a dedicated area for agricultural-industrial activity will give businesses in food and agritech a strategic place to locate and will invite the growth of the industry. Currently, agri-industrial businesses need to compete with other industrial businesses to operate on industrial land. There is also a pronounced shortage of industrial land within the lower mainland. This is compounded by the existing regulations which do not allow for large scale processing (unless fifty percent of materials are grown on site), or concrete bottom agriculture (which would support indoor growing). Activities such as technology development or manufacturing would also not be compliant with permissible uses on ALR land.

During engagement, the Task Force heard that development of the agritech opportunity is not likely to occur without enhanced flexibilities for agri-industrial activities to occur within the ALR. The creation of the new zone would encourage the clustering of companies in areas that would be in proximity to agricultural “living labs”. Currently, some of the most successful agritech companies are located in more urban areas such as North Vancouver, downtown Vancouver and Kelowna. By identifying and inviting companies to the agri-industrial zone, this will encourage the development of companies that are a part of the agricultural sector, rather than the technology sector writ large, increasing the likelihood that applied technologies with real relevance to the sector will be developed and creating the space for this companies to co-locate and intermingle in a cluster model.

In addition to creating a place for agritech companies to locate and grow, the new zone will support new economic growth from a value-added agriculture and processing sector. Currently, processing can only occur within the ALR if at least 50 per cent of the product being processed has been grown within B.C. By creating more flexibility around what can be processed and where, B.C. has a much greater potential of realizing the ambitious targets that have been identified for food processing nationally (Barton, 2017).

While there are some places in the province where there is an existing industrial land supply to support the development of agritech and value-added industry, creating a dedicated zone will create an optimal clustering effect and support strategic land use. In areas of the province where there is existing industrial space for ag-industrial, there is no requirement to create the new zone, or for industry to locate within the zone should they prefer an available piece of industrial land.

By creating a new zone that is intended to support activities that will support the agriculture and food industries achieve their maximum potential, B.C. would be taking a bold approach to take a targeted/pronounced step towards establishing a strong, globally recognizable agritech industry. This process must be approached with the same care and attention that has been shown over the last half century of agricultural land management in British Columbia.



In all considerations of allocation of ALR land in British Columbia the public interest and benefit to net agriculture must be considered. To determine an appropriate maximum amount of land as Agricultural-Industrial, we can rely on precedent. Following the preparation of the report “Stakes in the Ground” by Moira Quayle in 1998, an amendment was made to the ALC Act in 2002 to allow for up to 0.1% of the reserve to be removed annually where public interest was served and a net benefit to agriculture could be shown. This amendment is no longer in effect, but if we use it as precedent with the understanding that developing the agritech sector is both in the public interest and a net benefit to agriculture, a 0.25% allocation over a three-year period is a slightly more conservative approach than precedent supports.



## RECOMMENDATION 4:

### ENSURE THERE IS A PLACE TO GROW FOOD AND SUPPORT EMERGING AGRITECH INDUSTRIES BY EXAMINING LAND USE POLICIES AND OTHER REGULATORY CONSIDERATIONS.

#### Actions:

- Allocate up to a maximum of 0.25% of the Province's Agricultural Land Reserve (ALR) for a broader category of use essentially categorized as agricultural-industrial. Factors in siting this land include lower soil classification (class 4-7 only), proximity to existing transport corridors and services, and potential for clustering agri-industrial uses near other non-agricultural zones.
- Review allocations and selection factors for allocated zones every three years to ensure appropriate land use and space designations and to assess if the new agricultural-industrial designation has achieved the intended outcomes of increasing investment and developing the agriculture and agritech industries.
- Establish a Commissioner for Agri-Industrial Lands mandated to:
  - Establish and oversee the new zones in consultation with potential land holders, municipal governments and the Province, including the intended industrial lands inventory;
  - Spur rapid establishment of agritech and agri-innovation enterprises, to attract companies that align with agri-industrial vision to these new zones of opportunity, and to ensure the process to relocate or establish in a new zone is seamless; and
  - Create a consultation process with the Agricultural Land Commission (ALC) in areas of mutual interest.
- Encourage maximum uptake and productivity on the newly classified land by considering regulatory or policy instruments that can be used to catalyze industry growth.

#### Key Performance Indicators (KPIs):

- Rules, regulations, and process for determining new agricultural industrial zones established;
- Independent commissioner appointed;
- Process for selection, approval, and monitoring of projects on new zones established;
- Evaluation of project outcomes and alignment of projects to provincial priority areas; and
- Monitoring of zoning over time to ensure alignment with agritech industry growth.

## 10. APPENDICES

A. List of stakeholders engaged by the Food Security Task Force

B. Reference and video library

### APPENDIX A. LIST OF STAKEHOLDERS ENGAGED BY THE FOOD SECURITY TASK FORCE

#### Industry & Business Associations/Non-Profit Organizations

DATE	LOCATION	ORGANIZATION	REPRESENTATIVE
July 27	Victoria, BC	AgFunder	Rob Leclerc, CEO
Aug 27	Vancouver, BC	BC Food and Beverage	James Donaldson, CEO
Aug 27	Vancouver, BC	Small Scale Food Processors Association	Candice Appleby, Executive Director
Aug 27	Vancouver, BC	Genome BC	David Charest, Senior Manager, Agrifood and Natural Resources; Quinn Newcomb, Executive Director, Corporate Development; Lisey Mascarenhas, Sector Director, Agrifood and Natural Resources
Aug 27	Vancouver, BC	BC Agricultural Council	Reg Ens, Executive Director; Stan van der Waal, Chair
Sept 16	Saskatoon, SK	Protein Industry Supercluster	Tiffany Stephenson, Chief Marketing Manager; Meghan Gervais, Intellectual Property Manager
Sept 26	Kelowna, BC	BC Cherry Association	Sukhpaul Bal, President
Sept 26	Kelowna, BC	BC Fruit Growers	Glen Lucas, General Manager
Sept 26	Kelowna	BC Fruit Packers Co-op	Gary Heintz, CEO
Oct 7	The Hague, NL	FME Agri & Food / FME-GMV (Dutch Food Systems)	Moniek Gunnewiek, International Business Manager
Oct 8	Wageningen, NL	Topsector Agri & Food	Willemien van Asselt, International Coordinator
Oct 8	Wageningen, NL	Food Valley	Wouter de Heij, CEO
Nov?	Ottawa, ON	Bioenterprise	Dave Smardon, CEO
Nov 28	Vancouver, BC	BC Business Council	Greg D'Avignon, President & CEO; Ken Peacock, Executive Vice President & Chief Policy Officer
Nov 28	Vancouver, BC	Foresight Accelerator	Jeanette Jackson, CEO; Catriona Power, Director, Cluster Initiative
Nov 28	Vancouver, BC	BC Fruit Growers	Pinder Dhaliwal, President; Peter Simonsen, Vice President
Dec 17	Vancouver, BC	Business Council of Canada	Goldy Hyder, President & CEO
Dec 17	Vancouver, BC	Greater Vancouver Board of Trade	David Crawford, Vice President
Dec 17	Vancouver, BC	David Suzuki Foundation	Stephen Cornish, CEO; Tom Green, Policy Analyst



## Companies/Farmers

DATE	LOCATION	ORGANIZATION	REPRESENTATIVE
Aug 12	Abbotsford, BC	Vitalus	Elena Middlemass, Manager, Corporate Initiatives
Aug 12	Delta, BC	Windset Farms	John Newell, COO
Aug 12	Pitt Meadows, BC	Cubic Farms	Dave Dinesen, CEO; Jo-Ann Ostermann, VP-Lead Produce
Aug 12	Vancouver, BC	Terramera	Karn Manhas, CEO; Steve Slater, VP; Laura McIntyre, Communications Director
Aug 13	North Vancouver, BC	Ecoation Innovation Solutions	Saber Miresmailli, CEO
Aug 14	Courtenay, BC	Amara Farms	Arzeena Hamir & Neil Turner, Owners
Aug 14	Courtenay, BC	Eatmore Sprouts	Carmen Wakeling, Owner; Ryan Powell, GM
Aug 14	Courtenay, BC	Tree Island Dairy	Scott DiGustini & Merissa Myles, Owners
Sept 26	Lake Country, BC	Coral Beach Farms	Gale Krahn, Horticulture Manager
Sept 26	Kelowna, BC	SunRype	Lynn Heinrich, Business Development/Marketing Manager for US markets
Sept 26	Kelowna, BC	Sun City Cherries	Gordon Sandhu, Owner
Sept 26	Kelowna, BC	FloraMaxx Technologies	Ashish Dave, President & CEO
Sept 26	Armstrong, BC	Fieldstone Organics	Tony Van Den Tillaart, GM
Sept 26	Kelowna, BC	Summerhill Pyramid Winery	Gabe Gipes, VP (also director of BC Organics Association)
Sept 26	Kelowna, BC	Little Creek Dressing	Donna Denison, Owner
Oct 8	The Hague, NL	Bioprocess Pilot Facility (BPF)	Raimo van der Linden, Business Development Manager
Oct 8	The Hague, NL	World Horti Center	Joep Hendricks, Director
Oct 9	Wageningen, NL	Delphy	Jeroen van Buren, Manager, Consultancy and Education
Dec 10	Fort St. John, BC	BC Cattlemen's Association	Dave Harris & Helen Harris, board members
Dec 10	Fort St. John, BC	BC Grain Producers Association	Jennifer Critcher, director
Dec 10	Fort St. John, BC	Northern Co-hort Peace River Forage Association of BC	Bess Legault, program coordinator
Dec 10	Fort St. John, BC	BC Haskap Association	Darren Shankel, Vice President
Dec 10	Fort St. John, BC	Peace Region Forage Seed Association	Tobin Dirks & Blair Hill, directors
Dec 10	Fort St. John, BC	South Peace Grain Clean Co-op	Jocelyn Shuman, marketing & administration
Dec 10	Fort St. John, BC	City of Fort St. John	Lori Ackerman, Mayor
Dec 10	Fort St. John, BC	Peace River Regional District	Brad Sperling; Karen Goodlings; Tony Zabinsky; Rob Fraser; Keith Bertrand; Leonard Hiebert – elected directors
Dec 10	Fort St. John, BC	Sweetwater Parkland Farmer's Institute	Brian Durler; Jim Strasky
Dec 16	Williams Lake, BC	Artique Farm (dairy)	Thomas Winker, owner
Dec 16	Williams Lake, BC	Beef producer	Krista Pooley
Dec 16	Williams Lake, BC	Cow/calf producer	Chad Seelhof
Dec 16	Williams Lake, BC	Livestock producer	Wiley Bystedt
Dec 16	Williams Lake, BC	Puddle produce (vegetables)	Brianna van de Wijngaard, owner
Dec 16	Williams Lake, BC	Cariboo Cattlemen's Association	Angela Abrahao, coordinator

## Government

DATE	LOCATION	ORGANIZATION	REPRESENTATIVE
Aug 27	Vancouver, BC	Western Economic Diversification	Gerry Salembier, Assistant Deputy Minister; Grace Kim, Regional Director, Agriculture Canada
Sept 16	Saskatoon, SK	Western Economic Diversification	Jalil Abdul, Assistant Deputy Minister
Sept 16	Saskatoon, SK	Saskatchewan Industry	Dan Prefontaine, President; Erin Hiebert, Manager, Food Food Development Centre (Food Centre) Safety & Skills
Sept 19	Ottawa, ON	Department of Finance	Paul Rochon, Deputy Minister
Sept 19	Ottawa, ON	Agriculture and Agrifood Canada	Tom Rosser, Assistant Deputy Minister
Sept 19	Ottawa, ON	Innovation, Science and Economic Development Canada	Sheryl Groeneweg, Director General

Sept 26	Kelowna, BC	Regional District of Central Okanagan	Stephanie Slaman, Business Development Officer
Oct 7	The Hague, NL	Canadian Embassy and Trade Commissioners of the Netherlands	Sameena Qureshi, Senior Trade Commissioner
Oct 7	The Hague, NL	Ministry of Agriculture, Nature and Food Quality	Guido Landheer, Vice Minister
Nov 28	Vancouver, BC	Trade Commissioner of Canada in India	Nadir Patel, Trade Commissioner
Jan 8	Victoria, BC	Food and Agriculture Organization of the United Nations Office for North America	Thomas Pesek, Senior Liaison Officer
Jan 8	Victoria, BC	Food and Agriculture Organization	Florian Doer, Associate Professional Officer of the United Nations Office for North America

## Post-Secondary Institutions/Research Bodies

DATE	LOCATION	ORGANIZATION	REPRESENTATIVE
Sept 16	Saskatoon, SK	The Global Institute for Food Security	Steven R. Webb, Executive Director and CEO
Sept 20	Guelph, ON	Elora Research Station (Dairy, Beef and Crop Science)	Dr. Malcolm Campbell, VP of Research
Sept 20	Guelph, ON	University of Guelph	Dr. Rebecca Hallett, Professor, School of Environmental Sciences, and Associate Dean (Research and Graduate Studies), Ontario Agricultural College (OAC); Dr. David Ma, Professor and University Leadership Chair, Human Health & Nutritional Sciences, College of Biological Science, Director, Guelph Family Health Study; Dr. Kate Parizeau, Professor, Geography, Environment, & Geomatics, College of Social and Applied Human Sciences
Sept 20	Guelph, ON	University of Guelph	Meat Lab, various
Sept 20	Guelph, ON	University of Guelph Arrell Food Institute	Dr. Evan Fraser, Professor, Canada Research Chair in Global Food Security and Director of Arrell Food Institute; Dr. Maria Corradini, Professor and Arrell Chair in Food Quality; Alice Raine, Director, Operations, Arrell Food Institute
Sept 20	Guelph, ON	University of Guelph	Dana McCauley, New Venture Creation, Research Innovation Office; Jeanna Rex, Graduate Studies, Arrell Food Institute
Sept 27	Summerland, BC	AAFC Summerland Research Centre	Jesse MacDonald, Knowledge and Technology Transfer Specialist
Oct 8	Wageningen, NL	Wageningen University, Startlife and East Netherlands Development Agency	Susan van Boxtel, Manager, Food, Health International, Oost; Loet Rammelsberg, Project Director, Startlife; Matthijs Montsma, Programme Manager, Postharvest Quality
Nov 28	Vancouver, BC	Academic Roundtable – various post-secondary institutions	Tammara Soma, David Hik & Eugene Fiume, Simon Fraser University; Rebecca Harbut, Wallapak Polasub & Kent Mullinix, Kwantlen Polytechnic University; Rickey Yada, University of British Columbia; Lucy Lee, University of the Fraser Valley; Rebecca Robertson, British Columbia Institute of Technology

## Political Entities

DATE	LOCATION	ORGANIZATION	REPRESENTATIVE
July 27	Victoria/Vancouver Island		BC Green Party Adam Olsen, MLA



## APPENDIX B: REFERENCE AND VIDEO LIBRARY

The following references provide context, examples and inspiration for the work of the Food Security Task Force.

### CANADA'S AGRICULTURE SECTOR:

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**TITLE:** Unleashing the Growth Potential of Key Sectors (the Barton Report), 2017

**SOURCE:** Advisory Council on Economic Growth

**LINK:** <https://www.budget.gc.ca/aceg-ccce/pdf/key-sectors-secteurs-cles-eng.pdf>

**TITLE:** Lets Seize This Historic Opportunity in Our Agriculture Sector, 2019

**SOURCE:** Policy Options, John Stackhouse

**LINK:** <https://policyoptions.irpp.org/magazines/september-2019/lets-seize-this-historic-opportunity-in-our-agriculture-sector/>

**TITLE:** Farmer 4.0 – How the coming skills revolution can transform agriculture, 2019

**SOURCE:** RBC Thought Leadership

**LINK:** [http://www.rbc.com/economics/economic-reports/pdf/other-reports/Farmer4\\_aug2019.pdf](http://www.rbc.com/economics/economic-reports/pdf/other-reports/Farmer4_aug2019.pdf)

### KEY THEME CONTENT:

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**TITLE:** UN General Assembly 2019: Speaker schedule and what to export, 2019

**SOURCE:** Aljazeera News

**LINK:** <https://www.aljazeera.com/news/2019/09/general-assembly-2019-speaker-schedule-expect-190922192946048.html>

**TITLE:** UN 2030 Agenda for Sustainable Development, 2015

Source: United Nations

**LINK:** <https://sustainabledevelopment.un.org/post2015/transformingourworld>

**TITLE:** UN Sustainable Development Goals, 2015

**SOURCE:** United Nations

**LINK:** <https://sustainabledevelopment.un.org/?menu=1300>

**TITLE:** The State of Food and Agriculture, 1996

**SOURCE:** Food and Agriculture Organization of the United Nations

**LINK:** <http://www.fao.org/3/w1358e/w1358e.pdf>

**TITLE:** World Agriculture Towards 2030/2050, 2012

**SOURCE:** Food and Agriculture Organization of the United Nations

**LINK:** <http://www.fao.org/3/a-ap106e.pdf>

**TITLE:** Report of the Country Life Commission, 1909

**SOURCE:** Washington Government Printing Office

**LINK:** <https://www.youtube.com/watch?v=VxRNoSSkLkE>

## AGRITECH / URBAN FARMING EXAMPLES

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**TITLE:** A WWII bunker under London's streets is now a vegetable farm, 2019

**SOURCE:** CBC News, Victoria Belton

**LINK:** <https://www.cbc.ca/news/technology/a-ww-ii-bunker-under-london-s-streets-is-now-a-vegetable-farm-1.5372047>

**TITLE:** What is vertical farming? What are the benefits? 2019

**SOURCE:** Pioneers for our Planet, Youtube

**LINK:** [https://www.youtube.com/watch?v=5\\_COI\\_L4yY](https://www.youtube.com/watch?v=5_COI_L4yY)

**TITLE:** Umami-driven farm-to-plane food has arrived on Singapore Airlines, 2019

**SOURCE:** CNN Travel, Shivani Vora and Stacey Lastoe

**LINK:** <https://www.cnn.com/travel/article/singapore-airlines-aerofarms/index.html>

**TITLE:** Gotham Greens opens large greenhouse in Chicago, 2019

**SOURCE:** The Packer, Tom Karst

**LINK:** <https://www.thepacker.com/article/gotham-greens-opens-large-greenhouse-chicago>

**TITLE:** Kimbal Musk's Farm of the Future, 2018

**SOURCE:** BEME News, Youtube

**LINK:** <https://www.youtube.com/watch?v=VxRNoSSkLkE>





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Canada won't stay at the  
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# in skills that harness the newest tools: technology and data.

PRINT ARTICLE

John Stackhouse

September 27, 2019



*(This article has been translated into [French](#).)*

**G**rowing Canada's agriculture sector must be a strategic priority for the next government. Our economic growth in the 2020s and our position in the world could depend on it.

More than two million people [earn their livelihood](#) from the agri-food sector, and close to 7 percent of our economic output stems from their efforts. As the fifth largest exporter of agricultural goods, Canadian producers help feed the world. This will become an even greater imperative in the decade ahead as the planet's population [approaches 9 billion people](#), with close to 1 billion more to feed than today.

Doing that in an environmentally sustainable and economically viable way won't be easy. But if we start to see the emergence of new technologies and data systems as a historic opportunity, we can transform and grow our agriculture sector, and add to Canada's relevance in a fast-growing and increasingly complex world.

To start with, few countries enjoy Canada's mix of abundant, arable lands and fresh waters, as well as access to markets as promised by trade agreements with Europe, Asia and the United States. Few countries can tap into as skilled a workforce, either.

But the skills needed to keep Canada at the forefront of global food production are in the early stages of profound change, and they will hold the key to the sector's transformation.

With the right skills and technologies, the agriculture sector could add

HEALTH

INDIGENOUS

LAW

MEDIA & CULTURE

POLICY-MAKING

POLITICS

SCIENCE & TECH

SOCIAL POLICY



**JOHN  
STACKHOUSE**

John Stackhouse is senior vice-president, office

of the CEO, at RBC. He advises the executive leadership on emerging trends in Canada's economy, providing insights grounded in his travels across the country and around the world.

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\$11 billion to Canada's GDP and be worth more than \$50 billion annually a decade from now. This is one of the findings in *Farmer 4.0*, a new report by RBC. That would make agriculture larger than the combined value of Canada's automobile assembly and aeronautics industries.

To get there, government, industry and academia must come together to ensure farmers and food producers have the right tools — from advanced technologies to financial capital to lifelong learning — to keep pace with other countries that are rapidly investing in agriculture.

Already, many aspects of Canadian farming and food production are at the forefront of innovation. Canadians are at the cutting edge of a new agricultural revolution. To research *Farmer 4.0*, my collaborators and I travelled across the country. We met with Saskatchewan canola farmers working with autonomous farm machines that measure soil conditions. We talked to a Greater Toronto Area builder who has started a vertical indoor farm to grow herbs. And we spoke to Ontario and Quebec dairy farmers, who are employing robotic milking machines to double their production and new data systems to track quality instantly.

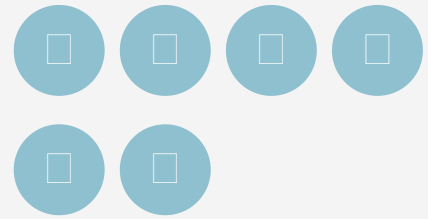
There is no shortage of ingenuity on Canadian farms.



Canola crops in Saskatchewan. By Kangas

Yet it is far easier for a young Canadian to raise capital to start a software company than to run a farm. Many producers I spoke with in

## CONNECT



the Prairies expressed frustration about that. They want Canadian leaders to create new financing options for people wanting to start farms, to invest in farming technology, to stimulate private-sector R&D in agriculture, and to attract more immigrant entrepreneurs and technologists to the agriculture sector.

Priority needs to be given to the human side of agriculture, to ensure Canada has enough people in the sector to avoid a demographic crisis and the right technology skills to avoid a digital crisis. That speaks to two challenges we must address.

First, over the next decade, nearly 40 percent of the agricultural workforce will be 65 or older. We don't have the pipeline to replace these workers, because every year, 600 fewer young people are entering the sector. To help reverse this trend, the industry needs to do a better job of drawing attention to the exciting and diverse career paths one can take in agriculture nowadays, including opportunities beyond the farm in office towers, data centres and engineering labs around the country.

Second, new skills are required to manage the farm of the future. The reality is innovative technologies aren't much of an advantage unless their operators have the skills and infrastructure to put them to use, and that includes leveraging data to help a farm boost productivity.

This is all the more challenging given that the capabilities required to operate an aquaculture farm will be different from those required to operate a vineyard or raise cattle. We need to rethink how we train youth, knowing that the challenges and opportunities vary greatly in each part of the country.

To better understand our challenges in this area, in Canada about 20 percent of farmers under 40 have a university degree. [Compare this with the situation in the Netherlands](#), where 75 percent of young farmers have a bachelor's degree or higher. A leading Dutch institute, Wageningen University, is helping the country sustain its global comparative advantage in greenhouse horticulture by developing the know-how in applying the [Internet of Things](#) to sustainable food systems.



Holstein cows grazing in a farm in Vaughan, Ontario. By Aerovista Luchtfotografie

Among its recent initiatives, Wageningen launched a [global competition](#) to create autonomous greenhouses to grow cucumbers in four months, drawing interest to Dutch agriculture from Microsoft, Intel and the Chinese technology giant Tencent. The results have been stunning. [Canada has 46 million hectares of agricultural land; the Netherlands has only 900,000 hectares.](#) Yet, per capita, the small European country exports three times the value of agricultural products that we produce.

To be sure, Canada is home to excellent agriculture schools; 6 of our universities rank in [the top 100 agriculture and forestry programs globally](#). What's more, the number of students enrolled in these programs is expanding rapidly, as Statistics Canada [shows](#). For example, enrolment has risen by 29 percent over the last 10 years. (Many graduates do, however, go on to work in value-added areas such as processing.) But training the next generation of producers will require innovation across our schools, including more interdisciplinary studies to blend the study of farming, food and land systems with non-agriculture courses such as computer science.

An enhanced focus on agriculture can't wait for post-secondary education, either. The earlier this integration of agricultural and non-agricultural learning can be done the better, starting in K-12. This is all the more important given the fact 26 percent of young farm operators

entered the industry directly from high school, according to [2016 census data](#) from Statistics Canada. Australia is already there, exposing children to agriculture and food issues in kindergarten and then expanding their awareness of opportunities in the field as they advance through school.

All those new skills will need new technology, too. Unfortunately, Canada lags behind its global competitors in the development of advanced agricultural technologies and processes, despite significant public dollars directed to research and development, according to [Agriculture and Agri-Food Canada](#). Even accounting for Canada's smaller size, private investment in R&D is a tiny fraction of what US firms spend. As a result, Canadian producers told us they often rely on second-generation technology that's been in use for a decade or longer in the market next door.

In our cross-country conversations with producers, public officials and academia, a number of recommendations emerged that will help producers take full advantage of an agricultural revolution.

Clearly the federal government needs to play a role. Many people we spoke to want to see Ottawa convene a national skills strategy for agriculture, together with farmers, food processors, educators and industry groups, to plan for future labour needs. That would include a re-examination of our immigration policies for the sector, [which relies heavily on foreign labour](#). One idea is to establish a dedicated referral channel for agriculture workers under the [Global Skills Strategy](#), which is a federal government initiative to reduce processing times for high-skilled labour in select industries. Currently no such channel exists for the agriculture sector.



Farms along the Amsterdam-Rhine Canal in The Netherlands. By Aerovista Luchtfotografie

At the same time, industry groups want a more coordinated effort, perhaps even a bold campaign, to attract more young people, women, Indigenous people and highly skilled immigrants to agriculture and to retain them.

Other recommendations in *Farmer 4.0* are focused on the need to prepare the next generation of producers for a more digitally enabled world of farming. From our consultations with producers, industry representatives and academia, there is a clear desire to incorporate agriculture into Canada's new [work-integrated learning strategy](#), a program that provides post-secondary students with real-world work experiences. This could be an effective way to increase exposure for non-agriculture students across the agri-food industry.

And there is a desire to see all major research and development initiatives link education and skills development. We see some early promising signs in this regard initiated by the [Protein Industries Supercluster](#), an industry-led, not-for-profit organization created to position Canada as a global source of high-quality plant-protein- and plant-based co-products.

In all of this, we have heard a chorus of voices declaring that agriculture must be treated as a strategic priority for Canada. Feed the

world, grow at home: that should be our clarion call.

Photo: Shutterstock, by Andriy Blokhin

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**John Stackhouse**

September 27, 2019



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- (514) 985-2461
- irpp@irpp.org
- 1470 Peel St. #200  
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Canada H3A 1T1



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