Plant the Seeds: Opportunities to Grow Southern Ontario's Fruit & Vegetable Sector

JRG Consulting Group

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Executive Summary

There is an opportunity to expand the $2.2 billion of fruits and vegetables grown in Ontario – a market where 43% is field grown and 57% produced in greenhouse operations. For most of the crops examined in this analysis, expanding production across the Greenbelt and southwestern Ontario would displace some of the $7.3 billion of annual imported fruits and vegetables. There are a number of factors to consider when looking at expanding any fruit or vegetable crop throughout the overall supply chain, including the operating environment and competitive factors. Certain perquisites need to be in place to realize the opportunities, and there is a role for growers, marketers, retailers, industry organizations, research and development institutions, and government to make it happen.

The Operating Environment

The operating environment for fruit or vegetable growers is much different than for grain and oilseed growers. Grain and oilseed growers have access to many market outlets near the farm with these buyers competing with each other, with pricing linked to the futures market in Chicago. Fruit and vegetable growers' market choices are more limited and success in the market is based on on-going relationships with buyers. For smaller growers, the market outlets are farmers' markets, niche markets and small volume accounts, or supplying produce to a wholesaler/marketer. Larger growers have options including directly supplying a food retail banner, merchandizing through the Ontario Food Terminal (OFT), and/or being part of a supply chain serving accounts in a larger trading region.

Ontario-based growers are also in competition with imported produce, and imports establish or influence the price of Ontario-grown fruits and vegetables. This means cost competitiveness is key. The profit margin for growers depends on many input factors:

- Cost and availability of labour
- Cost and availability of land
- Suitable genetics for Ontario growing conditions
- Access to crop protection materials
- Agronomic and management expertise required for fruit and vegetable production
- Weather and growing conditions in Ontario

For some crops, Ontario's current production meets buyer needs during the harvest season. Any additional volumes are considered surplus to market requirements and extra product would be shipped out of province with a lower net return, or the market would find an equilibrium at a lower price point. These scenarios would be a negative disruption to growers in existing supply chains and squeeze profit margins.

Conditions Supporting and Impeding Expansion

There are a number of competitive forces that impact whether there is an opportunity for expansion for some crops. A desire by food retailers for more of a specific Ontario-grown crop is critical to support expansion. It is helpful if the additional production is part of a well-established supply chain that already supplies some of that crop to major retailer buyers. A critical mass of the supply offering – and the ability to provide retailers and food service operators with a consistent year-round supply or be part of a supply chain with these attributes to buyers – is advantageous.

Any fruit crop expansion must occur outside the Niagara region as most, if not all, available land in the region is already in fruit production. There is also no room for more muck crop acreage in the Holland Marsh as expansion of one crop displaces an existing crop.

There are many constraints to overcome for crops with a growth opportunity:

- Ability of growers to obtain direct access to buyers and the resulting profit margins
- Availability of land suitable for fruit and vegetable production – and the high cost of land – can be a limiting factor for many growers
- Availability of labour, and the cost relative to competing jurisdictions, since most fruit and vegetable production is labour intensive

- Whether or not the crop can be machine harvested to significantly lower labour requirements and costs
- Availability of capital to finance the expansion
- Availability of cultivars suitable for Ontario growing conditions, with attributes required by retail buyers and consumers
- Availability of crop protection tools to successfully grow horticultural crops in Ontario
- Length of the growing season and harvest season, affecting the marketing window available for Ontario-grown produce that cannot be stored
- Cost of doing business in Ontario compared to competing US states

Fruit and Vegetable Field Crops with Expansion Possibilities

Fresh grapes, pears, strawberries, garlic, eggplant, sweet potatoes, snap beans, apples, and cabbage, and vertical farming, were identified as expansion opportunities based on the analysis. These crops (and vertical farming) were assessed to better understand the expansion opportunity, factors that facilitate expansion, and possible constraints that may affect expansion. This project only assessed these crops, although there are likely other crops with expansion opportunity.

The assessment determined that there is an opportunity to displace some imports without being disruptive (i.e., lower prices to growers). The expansion opportunity for at least one of the nine crops is limited, and any additional production would likely be disruptive unless retailer buyers committed to taking additional Ontario produce instead of imports.

Table i.i *Summary of Expansion Opportunities by Crop*

Crop	Current Production as a Share of Ontario Consumption	Expansion Opportunity (multiples increase)	Expanded Production as a Share of Ontario Consumption[1]	Farm Gate Expanded Revenue Potential (incremental millions)
Strawberries[2]	14.0%–16.0%	2.5 X	37.5%	$45.5
Apples (fresh)	62.0%–87.0%	1.11 X	83.0%	$20.0
Fresh Grapes	0.9%–1.6%	8 X	8.3%	$26.4
Garlic	6.0%–11.0%	2 X	20.0%	$10.0-$15.0
Pears	12.0%	2 X	25.0%	$10.8
Cabbage (regular)	65.0%–92.0%	1.15 X	90.0%	$6.8
Cabbage (Chinese)	40.0%–60.0%	1.36 X	68.0%	$5.8
Sweet Potatoes	51.0%	1.5 X	79.0%	$2.0
Snap Beans (fresh)	45.0%	1.09 X	49.0%	$1.8
Eggplant	16.0%	1.25 X	18.8%	$0.7

1 Note: The higher production, as a percent of consumption, for some crops is based on the mid-point of the current production to consumption ratio (as shown in the first row).

2 This expansion opportunity focused on field-grown strawberries, using mostly the day-neutral type of strawberry. Greenhouse-grown strawberries in the province can supply a portion of the market through October to mid-June. This indoor production complements field-grown strawberries. Year-round greenhouse strawberry production allows for an expansion that exceeds the 37.5 per cent of consumption to well over 50 per cent of all consumption.

For all nine crops:

- The expanded production must be part of an existing supply chain with a critical mass of supply offering
- Retailers need to support Ontario-grown product as part of their marketplace positioning
- Foodland Ontario must support retailers to market the product, and the product must be well signed and displayed at point of consumer purchase, whether in stores or foodservice operations
- A more competitive supply offering is needed with better access to crop protection materials that are used by US growers
- Cultivar selection programs and/or plant breeding program are needed for Ontario growing conditions and designed to deliver on specific product attributes

For vertical farms, the first three considerations listed above also apply. Vertical farms have very high initial capital costs. Any investment into vertical farming should only occur after a market need has been identified with a commitment by a customer to merchandize the produce.

The following actions can turn opportunities into reality and address identified constraints for a number of fruit and vegetable crops[3]. These actions are primarily focused on field-grown fruits and vegetables, despite opportunities that exist for Ontario-grown produce in enclosed structures such as greenhouses and vertical farms.

Actions by Food Retail and Food Service

There are actions that can be taken by Ontario's food retailers and food service companies that support expansion of Ontario's fruit and vegetable production base.

In-Store Signage and Promotion of Ontario-Grown Produce

At comparable price points, consumers prefer Ontario-grown produce. But display signage does not always let shoppers know there is an Ontario-grown choice. Ontario produce is not always stocked close to the Ontario-grown signage. And foodservice operations typically do not use their own or Foodland signage.

A fruit or vegetable in a package can use "Ontario-grown," "local," or "Foodland Ontario" for easy identification by shoppers. However, this is not the case for many bulk items where a product code sticker is not practical or easily falls off. These situations require signage that displays Ontario-grown or Foodland Ontario. A focus on in-store signage and promotion can help expand locally grown fruits and vegetables.

Action: *Collaboration between retailers and Foodland Ontario to enhance the display of Ontario-grown produce including in-store protocols that focus on placement of Ontario produce. Foodservice operations should also collaborate with Foodland Ontario to develop/enhance Ontario-grown signage.*

3 These perspectives are provided by JRG Consulting Group and do not necessarily reflect the view of the Greenbelt Foundation or any organization that provided advice to the Greenbelt Foundation during the conduct of this project

Demand Pull and Commitment from Retailers and Foodservice

Any additional fruit and vegetable production should be based on demand pull by a buyer willing to commit to merchandizing the additional production. Buyer commitment is critical since buyers typically have agreements with a few suppliers in each product category, and the buyer uses these supplier networks to source required supply. Buyers can only schedule in more Ontario production based on engaging in discussion with an established seller of Ontario produce – where they already have a relationship – and are willing to commit to more Ontario production. If this approach is not taken, any additional supply can be disruptive to established relationships and pricing.

Action: *There must be a commitment and demand from retailer and foodservice buyers, given the nature and structure of produce markets.*

Actions by Growers

Expansion of production can only occur based on investments made by Ontario fruit and vegetable growers. There are some actions growers can take to align with supply chains that sell produce to major buyers of fresh market fruits and vegetables.

Critical Mass of the Supply Offering is Critical

Retailers require a supply offering from a larger grower or marketer that provides sufficient volume to stock shelves on one of their store banners. Retailers typically do not want to be involved with a multitude of suppliers for one product line. That means any individual grower who is expanding production must have the scale to supply a banner with the necessary volume – or a set of growers collaborating as a common marketing organization to supply the marketplace.

Action: *A marketing approach with a critical mass to supply individual retail accounts is required. Smaller growers must aggregate with others to reach the necessary critical mass.*

Merchandizing Produce is Based on Relationships with Buyers

Fruits and vegetables are distinct crops compared to corn, soybeans, and wheat. A major difference is the storability, fungibility, and existence of active liquid markets for globally traded grain crops that have a futures market. It is common for these crops to be sold throughout the year to a local buyer with a network into global markets. The exchange of goods can be very transactional – not the case with fruits and vegetables where the interface with the market is through personal contact with a buyer and one-on-one networks. A grower cannot bring a truckload of produce to a retail distribution centre and expect to sell at a market price that is comparable to a load supplied by a preferred supplier or comparable to the price received at a competitor's distribution centre. The retail trade does not buy in this manner. The exchange of fruits and vegetables is based on a commitment made between the buyer and the seller through previously arranged terms and conditions.

The Ontario Food Terminal (OFT) is an important outlet where sellers merchandize products with prices affected by daily supply and demand at the terminal. Growing conditions may mean that a grower may have more production than required to fulfill direct contracts, so marketing through both the OFT and direct contracts with buyers is a wise strategy. The OFT also provides an opportunity to meet and build relationships with buyers.

Action: *Expansion should occur through supply chains where the seller – a grower or wholesaler – has a relationship with major buyers.*

Ensure that Expansion in a Specific Crop is Non-disruptive

On the surface, expansion of local production simply replaces imports. But this is not the case for most fruit and vegetable crops. In the harvest/marketing period of perishable produce – when local production fulfills most market requirements – any additional production is shipped out of the province at a lower net price, or the local price falls to move the additional supply. This type of expansion is disruptive to the existing supply base. For some fruits and vegetables, this situation does not apply because of storage options or where the Ontario-grown market share is low during the marketing season. Some of the crops investigated in this report illustrate that expansion is possible without being disruptive.

Action: *Individual growers should determine if they have a market for their additional production to ensure the added volume will not disrupt the local balance of supply and demand, and lower crop prices.*

Loyalty is a Two-Way Street

Ontario retailers support local production and some retailers use local Ontario produce as part of their differentiation strategy in the competitive food retail market. To deliver on this positioning, retailers must have relationships with local grower/marketers and be loyal even when events occur such as less than ideal growing conditions or when open market prices are well below agreed upon pricing terms in the pre-harvest season. Growers must also be loyal to retailers when there are short-term marketplace opportunities for growers to market some supplies into higher priced markets, such as the US northeast when currency fluctuations and/or regional shortages occur.

Action: *To successfully market more Ontario fruits and vegetables, business relationships in the supply chain must be based on loyalty and an expectation that commitments will be followed through on.*

Actions by Industry Associations

Industry associations, including grower organizations, can assist in the expansion of Ontario-grown fruits and vegetables through their activities and programs. Here are suggested actions for associations, based on our findings.

Facilitate Collaboration within the Production Sector

Critical mass of the supply offering is needed to support major expansion of fruit and vegetable crops that have a market-based opportunity for expansion. In many cases, individual growers will need to collaborate on marketing initiatives to ensure sufficient supply. Some commodities, such as tender fruit, have organizations that market produce on behalf of growers and/or grower members.

Action: *Select grower associations and/or the Ontario government could offer workshops to highlight the types of grower organizations and partnerships between growers that can be used to market produce in major market channels within Ontario.*

Recognize Diverse Pool of Next Generation Growers

One of the challenges to expansion is the declining number of fruit and vegetables growers. In addition to family farm members, there is a pool of knowledgeable other individuals who can successfully grow fruits and vegetables—consulting agronomists, field managers for large growing operations, and some crop supply input personnel. A program that highlights and connects this talent pool to businesses wanting to invest in the sector can help ensure its capacity to grow.

Action: *Grower organizations should continue to develop young grower programs so the industry can learn about the talent pool for continued field grown fruit and vegetable production in Ontario.*

Investment by Growing Operations within Established Supply Chains

Major produce buyers are served by organizations with access to supplies in a number of growing regions across North America, providing a continuous supply offering. Some of these supply chains are Ontario-owned and operated, while others are US-based operations. Expanding fruit and vegetable production within Ontario by these grower/marketer organizations automatically results in a market for the expanded Ontario production since these organizations plan operations to supply their various North American accounts out of their geographically diverse production base.
Action: *The Ontario government and/or selected grower organizations could provide information to multi-jurisdictional grower/marketer organizations on the benefits of expanding their continental supply with Ontario-based growing operations.*

Encourage Strategic Investments for Farmland Investors

Investors in farmland have the opportunity to acquire fruit and vegetable operations where the current owner/operator is retiring with no family member, other grower, or other qualified person interested in taking over the operation. A business model where farmland investors team up with individuals and organizations that have expertise in growing and marketing produce is a way to facilitate expansion. This model means the grower does not need to own the majority of the land they use for production but has planning certainty through long-term lease arrangements. Keeping productive farmland in fruit and vegetable production provides an opportunity for farmland investors to acquire farms and find qualified agronomists and professional managers to continue supplying fruits and vegetables.

Action: *Grower groups and municipalities could link growers looking to leave the business with farmland investors interesting in expanding fruit and vegetable production in Ontario.*

Actions by Research and Development Organizations

Ongoing research and development focused on fruit and vegetable production can support a competitive position in the marketplace.

Extending the Length of the Marketing Period

The local market can absorb more local production when the harvest season can be lengthened, and when storage technologies and programs can lengthen the storage season and offer high quality stored products. Focusing on cultivar selection and/or plant breeding programs will extend the harvest period and storability attributes for storable crops. Storage technologies can also be used to extend storage season of some crops.

Action: *Research and development in Ontario should include a focus on cultivar selection, plant breeding programs, and storage technologies to lengthen the marketing season for a number of Ontario-grown fruits and vegetables.*

Provide Varieties that Provide Beneficial Attributes for Growers and Consumers

Cultivar selection programs and/or breeding programs can result in varieties with disease tolerance for crops – where a specific disease is an issue – improving the competitive position of Ontario growers in the marketplace. Varieties that offer attributes that benefit consumers (or marketers/retailers) also improve the competitive position of Ontario growers. Some of the crops that were investigated in this report could benefit from more active cultivar selection activities and/or Ontario-based breeding programs.

Action: *Research and development in Ontario should focus on cultivar selection and plant breeding programs that deliver product attributes that growers, produce buyers, and consumers want.*

Actions by Government on the Policy and Information Fronts

Government programs and policies have an overarching effect on the fruit and vegetable production and marketing sector. This study identified a few areas where government action would be beneficial.

A More Even Playing Field on Crop Protection Materials

Ontario's fruit and vegetable growers are at a competitive disadvantage relative to import suppliers for crop protection tools that can be used in Canada. Certain crop protection products are available to US growers are not registered in Canada, resulting in a higher cost structure and/or lower yields in Ontario. This discrepancy can occur when the product manufacturer sees the market opportunity in Canada as too small to justify costs of registration in Canada. The PMRA's "Minor Use Program" is an approach to overcome disadvantages of using crop protection materials on relatively small crop acreages.

Action: *The Ontario government should continue to support of the Minor Use Pesticides Program (MUPP) with the presence of a Provincial Minor Use Coordinator position based in OMAFRA. The federal government should ensure sufficient resources are available within the Pest Management Regulatory Agency, Agriculture and Agri-Food Canada and other relevant departments to ensure a high capacity of the MUPP. Support is also needed for robust science-based regulatory decisions on crop protection products with a priority on access to crop protection materials used on individual crops in the US that are not available in Canada.*

Encourage Retailers to Merchandise Ontario-Grown Produce

Retailers are in the business to make a profit so may choose not to promote Ontario products in part due to the lower cost of imported versus local produce. Given the economic benefits of more local fruit and vegetable production, the Ontario government has an interest in ensuring retailers stock more Ontario-grown produce. The Province could consider creating incentives for achieving certain targets of Ontario-grown produce sales, such as a preferential provincial corporate tax rate associated with specific incremental increases in the sales volume (or value) of Ontario produce. A more intrusive alternative is a mandated minimal volume share by specific crop.

Action: *OMAFRA could investigate the use of incentives or regulations to increase the amount of Ontario produce sold in retail and food service outlets. This could include examining if the economic impact of additional Ontario-grown produce and the associated provincial tax revenues could offset possible tax allowances granted to Ontario-based food retail and food service operations.*

Provide Information to the Grower Community on Suitable Growing Regions

In the past, OMAFRA supplied a map highlighting where certain fruit crops could be grown in Ontario. This information could be revised to show areas of the province suitable for growing vegetable crops to assist with expanding vegetable production in different areas of the province.

Action: *OMAFRA could update the map showing where certain fruit crops can be grown throughout Ontario and develop a comparable map to show suitable growing areas for field-grown vegetable crops.*

Provide Information to the Grower Community on Cost of Production for all Crops

OMAFRA, with the support of grower organizations, develops and provides cost of production estimates/crop budgets for some tree fruits. This information assists growers wanting to expand or assists established growers diversifying into other fruit crops. OMAFRA should expand this activity to include all fruit crops and to many field-grown vegetable crops. This information would assist growers wanting to enter into fruit and vegetable production and provides guidelines for existing growers on their internal operations and where improvements could be made.

Action: *OMAFRA could develop cost of production estimates and/or crop budgets for a broader set of field-grown fruit and vegetable crops.*

Provide Information on Wholesale Prices for Fruit and Vegetable Crops

Infohort provides price information based on select wholesale markets, such as at the OFT. This price reporting service does not cover all fruits and vegetables merchandized through the Food Terminal and there are some coverage gaps within a crop. An expanded price reporting service for Ontario-grown produce would provide useful information to Ontario growers on wholesale prices throughout the harvest and storage season – information that could support a grower's decision to expand production or others deciding to start producing a specific crop.

Action: *Encourage OMAFRA to collaborate with Infohort to provide price information on an expanded list of fruit and vegetable crops grown in Ontario.*

Actions by Landowners

Land is essential for field-grown fruit and vegetables, and suitable farmland has an associated high capital cost. There are business models where growers do not need to own all of their production base, with landowners entering into long-term lease operations with fruit and vegetable growers.

Offsetting the High Capital Cost of Land through Lease Arrangements

For many growers, fruit and vegetable expansion requires access to more land. Land suitable for fruit and vegetable production can cost more than $20,000/acre. For a 100-acre farm, the land cost can be at least $2 million before any necessary land improvement or additional machinery required for expansion – an annual cost of $1,450/acre (based on 20 years of payback and 4% mortgage interest). An alternative is a long-term lease arrangement with a farmland investment company that leases farms to enable growers to free up capital for operating the farm. Assuming a 3% of market value lease rate, the annual cash flow on the $20,000/acre farmland becomes $600/year, versus $1,450 – a 55% reduction (an $80,000 annual cash savings on 100 acres).

Action: *Working with grower organizations, farmland investment companies could identify the benefits of long-term leases as a way for individual growers to consider expanding their operation with lower capital cost.*

Pickering Airport Lands can be Part of Fruit and Vegetable Production Expansion

The Federal government has approximately 6,500 acres of farmland in cash crop operations at the proposed Pickering Airport site, supervised by Transport Canada. This farmland can be a land base for expansion of certain fruits and vegetables suitable for the climatic and agronomic conditions to the northeast of Toronto. Long-term leases of at least 30 years are required for tree fruits. Lease arrangements of 10 to 20 years provide a planning horizon for vegetables and some fruit crops.

Action: *The federal government should consider providing 20 to 30-year leases on the proposed Pickering Airport lands. Select commodity organizations could identify the benefits of fruit and vegetable production on suitable acreage on these lands with established growers.*

Productive Idle Land can be Part of Fruit and Vegetable Production Expansion

Idle land on the north shore of Lake Ontario – that was once in fruit and vegetable production – is an expansion opportunity for crops suitable to be grown in the region. Bringing this land back into production requires a concerted effort by local municipalities to identify and incentivize landowners to return land to fruit and vegetable production, possibly through farmland investor groups (which in turn identify growers to produce applicable fruit and vegetable crops on these lands).

Action: *Selected municipalities could support expansion opportunities by identifying idle land and developing action plans that link current owners and farmland investors.*

1

Introduction

This report explores Ontario's opportunity to expand fruit and vegetable production. Ontario agriculture produces more than $2 billion in fruit and vegetable products on an acreage base of just under 200,000 acres. Table 1.1 shows the largest volume of production is field vegetables with more than $3.3 billion lb. of production in 2018, followed by 1.4 billion lb. of greenhouse vegetables and 0.9 billion lb. of fruit.

Table 1.1 *Ontario Fruit and Vegetable Production and Value, 2017 and 2018*

Crop	Acres	Production (million lb)	Farm Value ($ million)	Unit Value
Fruit – 2017	65,090	884.4	$475.0	$0.54
Fruit – 2018	64,876	863.0	$399.6	$0.46
Field Vegetables - 2017	122,268	2,872.8	$496.0	$0.17
Field Vegetables - 2018	132,306	3,373.1	$546.1	$0.16
Greenhouse Vegetables - 2017		1,339.6	$1,215.4	$0.91
Greenhouse Vegetables - 2018		1,402.0	$1,284.9	$0.92
Total of above – 2017	**187,358**	**5,096.8**	**$2,186.4**	**$0.43**
Total of above – 2018	**197,182**	**5,638.1**	**$2,230.7**	**$0.40**

Source: OMAFRA Horticulture Statistics

Part of the opportunity is to replace imports with fruits and vegetables that can be grown economically in Ontario. Table 1.2 shows that Ontario is a net importer of fruits and vegetables. Net imports of fruit are $4 billion and more than $1 billion of vegetables. The opportunity can also include expanding export volumes – nearly $2 billion in 2018 – including beyond the farm gate value added of marketing and processing.

Table 1.2 *Exports and Imports of Fruits and Vegetables, 2017 and 2018 ($ million)*

Crop	2017	2018
Fruit Exports	$236.0	$239.3
Fruit Imports	$4,245.8	$4,319.3
Net Trade	**-$4,009.8**	**-$4,080.0**
Vegetable Exports	$1,699.8	$1,803.9
Vegetable Imports	$3,128.4	$3,069.7
Net Trade	**-$1,428.6**	**-$1,265.9**
Total Fruits and Vegetables Exports	$1,935.9	$2,043.2
Total Fruits and Vegetables Imports	$7,374.2	$7,389.1
Net Trade	**-$5,438.4**	**-$5,345.9**

Source: OMAFRA Trade Statistics

Expanding Ontario-grown fruits and vegetables results in several benefits:

- More locally-grown fruits and vegetables available to Ontarians
- Higher levels of farm incomes and economic activity throughout the province
- More jobs in the Ontario economy
- A reduction in the trade deficit attributed to fruits, vegetables, and their products
- A reduction in the carbon footprint associated with long distance transportation of imports

The land base and geography of the Greenbelt and many parts of the Greater Golden Horseshoe (GGH) and other parts of southwestern Ontario along the northern shore of Lake Erie, are conducive to greater fruit and vegetable production. The GGH is the major Ontario supply region for tender tree fruits and is well positioned for expansion of most vegetable crops. The Greenbelt accounted for more than 50% of fruit acreage in 2016 and just over 10% of Ontario's field vegetable acreage, as shown in Table 1.3. There are opportunities that support expanding fruit and vegetable production in the GGH, and in other areas of southern Ontario, based on import replacement, and for some crops additional export volumes.

Table 1.3 *Greenbelt and Rest of Ontario Fruit and Field Vegetable Acreage*

Areas in production in 2016	Greenbelt		Rest of Ontario		Greenbelt Share
	Area in Production (acres)	Share of total Area (%)	Area in Production (acres)	Share of total Area (%)	
Fruits, berries, and nuts	26,912	3.6%	24,280	0.2%	52.6%
Vegetable crops	14,525	1.9%	120,895	1.0%	10.7%
Total area farmed	**748,712**	**100%**	**11,599,751**	**100%**	**6.1%**

Source: JRG Consulting Group, Agriculture Trends and Updates: Understanding the Greenbelt's Unique Advantages (2018).

There are also some constraints that can limit expansion – labour availability for most crops and length of harvest/marketing period for certain crops. Other constraints include the high capital requirements and time period after investing in expansion before any revenue is realized for perennial crops in vineyards and orchards. The volumes and institutional structures required within a sector to the economy of scale needed to provide a reliable supply base to large retailers/distributions poses another challenge. For processed fruit and vegetable products, the cost structure within Ontario compared to the landed cost of imported products is also a key consideration.

The Greenbelt Foundation wants to better understand the opportunities and constraints in expanding fruit and vegetable production in southern Ontario, and possible actions to address these constraints. The area considered for expansion includes the Greenbelt and the GGH. The JRG Consulting Group was commissioned by the Greenbelt Foundation to explore this issue and was guided by input from an Advisory Committee established by the Greenbelt Foundation.[4]

The methodology included interviews with participants in fruit and vegetable value chains to identify the nine fruits and vegetables that have marketplace opportunities and can be grown in southern Ontario. We gathered more detail to gain insights on any constraints to expansion, and then developed an action plan to address the identified constraints.

The findings of the report can be used by industry associations, supply chain participants, select government ministries and agencies and research institutions to consider opportunities for expansion and associated actions to realize the potential of the fruit and vegetable industry in Ontario.

This report is organized in 15 sections. Section 2 provides a situational analysis of the Ontario fruit and vegetable sector. Section 3 provides a discussion on issues that can affect expansion. The crops chosen for a more in-depth analysis are overviewed in Section 4, based on an initial assessment of the expansion opportunities. These crops are the focus of the next nine sections that cover the constraints that may hamper expansion, with the proposed actions to address the constraints. Section 14 covers expansion opportunity of vertical farming for leafy vegetables and microgreens. Section 15 outlines suggested actions to support expansion of field grown fruit and vegetable production in Ontario.

These findings, whether highlighted constraints or suggested actions, are offered by JRG Consulting Group, and may not necessarily be the views of the Greenbelt Foundation or of the organizations represented in the Advisory Committee.

4 The Advisory Committee included representatives from Agriculture and Agri-Food Canada (Erin Atchison), Golden Horseshoe Food and Farming Alliance (Janet Horner), Ontario Federation of Agriculture (Jason Bent), Ontario Fruit & Vegetable Growers Association (Alison Robertson), and Ontario Ministry of Agriculture, Food and Rural Affairs (Steve Duff).

2

Situational Analysis of Ontario's Fruit and Vegetable Sector

The $2.2 billion Ontario fruit and vegetable sector, valued at the farm gate as product leaves the farm, operates on a small land base of 200,000 acres, which suggests that expansion is possible given Ontario's agricultural land base of more than 12 million acres. Expansion has added benefits of reducing Ontario's $4.0 billion trade deficit in fruits and $1.3 billion deficit in vegetables.

A wide variety of fruits and vegetables are grown in Ontario and grouped in these categories with examples:

- Storable trees fruits (apples, pears)
- Tender tree fruits and vine crops (peaches, nectarines, grapes)
- Berries (strawberries, raspberries)
- Greenhouse crops (cucumbers, lettuce, strawberries)
- Muck vegetables (onions, carrots, celery)
- Root and tuber vegetables (parsnips, carrots, beets, onions, garlic, sweet potatoes)
- Cole crops (Brussels sprouts, broccoli, cabbage)[5]
- Gourds and squashes/vine vegetable crops (cucumbers, pumpkin, zucchini, squash)
- Nightshade crops/fruit vegetables (tomatoes, eggplant, peppers)
- Leafy vegetables/greens (spinach, chard, lettuce, kale, watercress)
- Stem crops (asparagus, celery, rhubarb)

This classification system is useful when looking at expanding fruits and vegetables production since crops in each category share similarities in growing region, production technology, capital and operating cost structure, length of growing season, machine harvestability, and perishability/storability of the harvested crop.

5 Cole crops, at a basic level, are plants that belong to the mustard (Brassica) family and are all descendants of wild cabbage (e.g., broccoli, Brussels sprouts, cabbage, cauliflower, and kohlrabi). As a group, these plants grow better in cool weather.

A situational analysis is provided of the fruit and vegetable sector with a focus on capturing insight on which fruit and vegetable crops can be expanded in the GGH and more generally across southern Ontario. These factors taken together guide the selection of crops that are assessed for expansion potential.

2.1 Trends in Per Capita Consumption

Changes in per capita consumption provides insight on the demand for specific fruits and vegetables. Figure 2.1 shows the trend in per capita consumption of fresh fruits at the national level[6] for those fresh fruits that have exhibited growth[7] over the last 10 years. Watermelons and cranberries have exhibited an ongoing annual increase in per capita consumption.

Other fruit crops show no change in per capita consumption (e.g., strawberries and cherries) or a decline in per capita consumption over the time period (e.g., apples, apricots, blueberries, fresh grapes, cantaloupes, nectarines, peaches, pears, and plums).

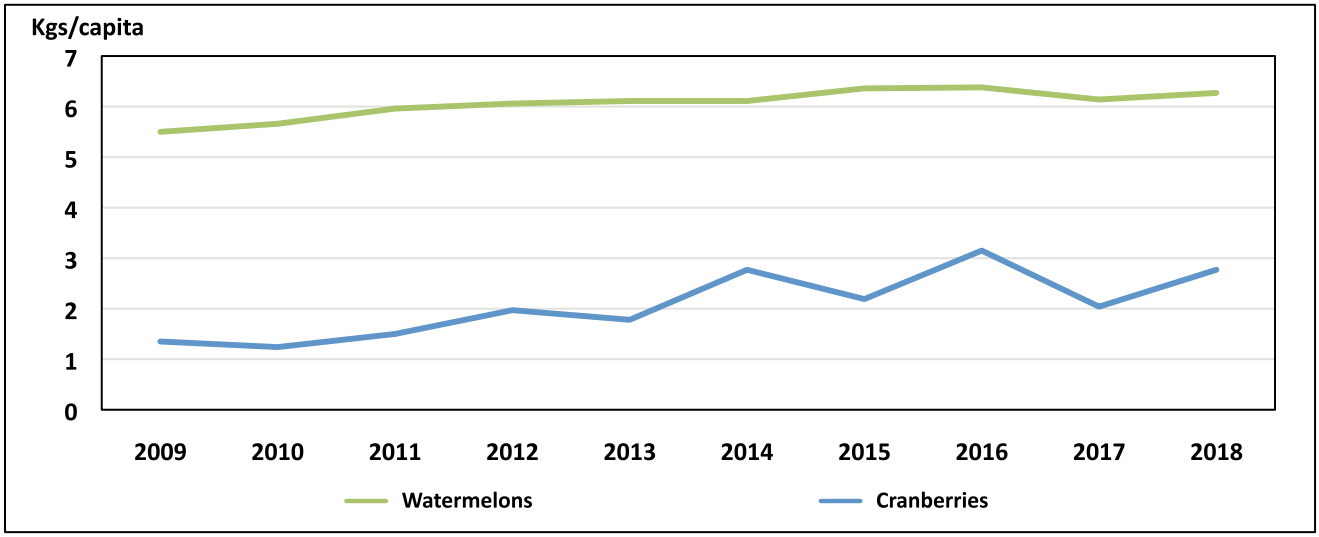

Figure 2.1 *Fruits Grown with Increasing Per Capita Consumption*

Source: Statistics Canada. Table 32-10-0054-01, Food available in Canada

In contrast to fresh fruits, per capita consumption of many fresh vegetables increased over the last decade. Figure 2.2 provides per capita consumption trends for fresh vegetables showing more than 1% annual growth including Brussel sprouts, beets, Chinese cabbage, eggplant, garlic, okra, parsley, parsnips, rappini, and spinach.

6 Statistics Canada does not provide per capita consumption of food at the provincial level.
7 Growth is based on average of last two years (of 2017 and 2018) compared to 2009 and 2010 values using a compound growth formula.

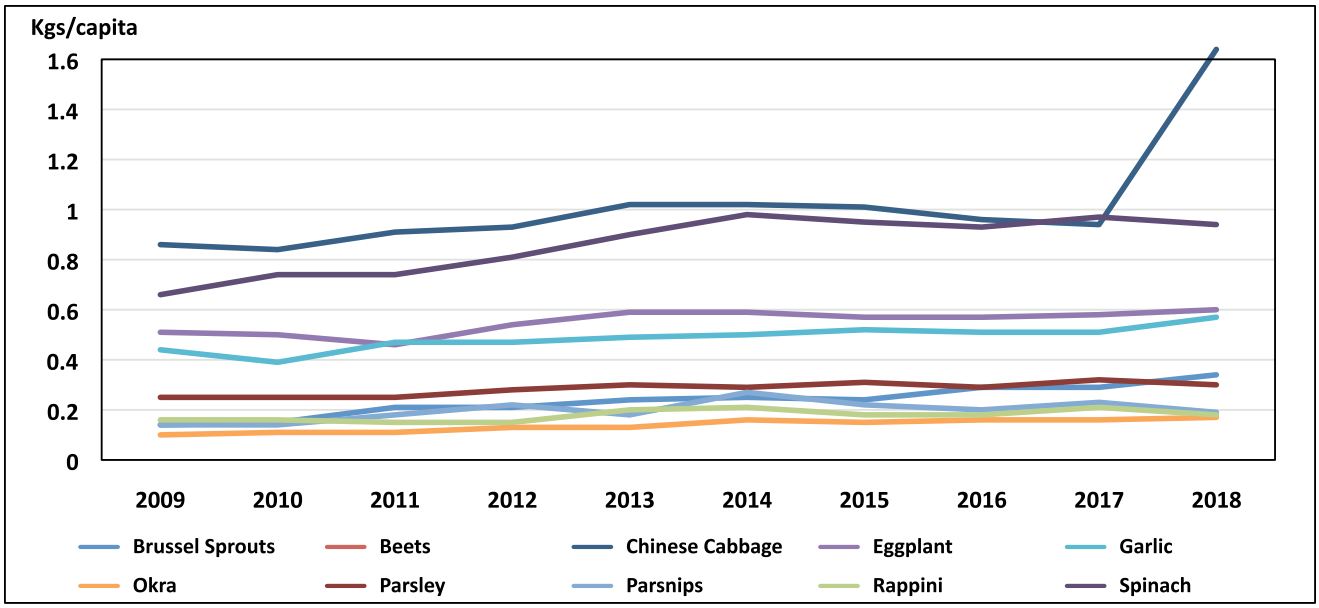

Figure 2.2 *Vegetables Grown in Ontario with Increasing Per Capita Consumption*

Source: Statistics Canada. Table 32-10-0054-01, Food available in Canada

Consumption of fresh vegetables that was relatively flat (up to 1% annual growth) on a per capita basis included asparagus, cabbage, cauliflower, cucumbers, leeks, onions/shallot, peas, peppers, potatoes, and tomatoes. Over the 10-year period, per capita consumption declined in beans, broccoli, carrots, celery, sweet corn, lettuce, sweet potatoes, radishes, and turnips/rutabagas.

Trends in consumption is one factor to consider for crops that could expand production in Ontario.

2.2 Trends in Production

Current production volumes and the change in production over time is another consideration for expanding fruit and vegetable production. Table 2.1 provides tonnage of individual fruit crops produced in the prior three crop years, and the associated annual change in production over the last 10 years. For example, there was 3.6% annual increase in apricot production in the province[8], and a 2.3% increase in apricot acres over the same time period.

In some cases, production has decreased (e.g., apples and peaches) corresponding to an acreage decrease. In peaches, acreage decreased by -1.9% with -0.3% lower production. In other crops, production increased while area in production decreased – strawberries show a 2.4% annual increase while acreage declined by -1.8% and pears had 1.2% more volume with -1.0% fewer acres. These statistics reflect greater yields on each acre in production, and for pears, the higher yields can occur with higher density plantings.

8 The annual change is estimated using a compound growth formula using the average over the two last years and the two years of 2009 and 2010.

Table 2.1 *Production of Fresh Fruit Crops and Annual Change (over 10 years)*

Crop	Production				
	2016 (tons)	2017 (tons)	2018 (tons)	10-year Annual Change in Production (%)	10-year Annual Change in Acreage (%)
Apples	175,218	134,737	165,155	-1.1%	-0.1%
Apricots	166	163	176	3.6%	2.3%
Blueberries		1,489	809	0.2%	5.5%
Sour cherries	6,445	4,827	5,688	2.3%	-2.0%
Sweet cherries	863	863	874	2.0%	-3.3%
Nectarines	3,328	3,933	3,120	7.5%	-0.8%
Peaches	17,190	19,551	20,359	-0.3%	-1.9%
Pears	3,022	3,302	3,449	1.2%	-1.0%
Plums/prune plums	1,402	2,550	1,372	0.4%	0.0%
Raspberries	1,060	716	848	1.6%	-1.6%
Strawberries	7,888	7,524	7,729	2.4%	-1.8%

Source: Statistics Canada. Table 32-10-0364-01, Estimates, production and farm gate value of fresh and processed fruits

Table 2.2 provides production volumes for vegetable crops grown in Ontario, including the 2016 to 2018 crops, the 10-year annual change in tonnage produced and the acreage used for production. Vegetable crops with the most tonnage include carrots, dry onions, sweet corn, cabbage, and tomatoes[9].

Most crops have shown an increase in production over the decade, with the exceptions being cabbage, carrots, cauliflower, leeks, lettuce, peas, sweet corn, and tomatoes. The volume reduction is typically associated with an acreage decline.

Some vegetable crops have been increasing output by 5% to 7% per year over the last 10 years, including garlic, parsnips, peppers, pumpkins, radishes, shallots/green onions, and squash/zucchini.

9 These are only field vegetables and do not include greenhouse vegetables, such as greenhouse tomatoes, peppers, and cucumber.

Table 2.2 *Production of Vegetable Crops and Annual Change (over 10 years)*

Crop	Production				
	2016 (tons)	2017 (tons)	2018 (tons)	10-year Annual Change in Production (%)	10-year Annual Change in Acreage (%)
Asparagus	8,212	7,564	7,528	2.2%	1.7%
Beans	32,536	30,314	31,321	1.7%	0.4%
Beets	12,550	11,114	11,933	2.1%	3.4%
Broccoli	16,218	18,426	15,942	2.8%	1.0%
Brussels sprouts	2,774	3,128	3,026	2.7%	0.6%
Cabbage	68,974	47,101	70,535	-0.8%	1.3%
Chinese cabbage	8,703	5,851	15,142		
Carrots	208,547	217,301	198,674	-0.6%	0.6%
Cauliflower	9,544	6,441	5,615	-7.8%	-2.7%
Celery	13,992	15,068	13,841	0.0%	2.8%
Cucumber/gherkin	46,361	44,978		0.3%	0.7%
Eggplant			1,490		
Garlic	661	900	799	10.3%	7.4%
Kale			2,500		
Leeks	151	148		-3.0%	
Lettuce	4,516	4,077	4,272	-2.7%	-7.6%
Dry onions	100,075	102,757	105,283	-0.8%	-1.2%
Parsley	1,167	1,263	1,213	4.0%	-0.6%
Parsnips	3,913	4,250	4,124	8.3%	5.3%
Peas	32,599	26,070	26,320	-2.0%	-1.7%
Peppers	46,750	52,948	47,760	6.2%	3.4%
Pumpkins	48,197	50,491	45,595	6.3%	0.8%
Radishes	2,982	2,369	3,377	5.2%	8.1%
Rutabagas and turnips	18,976	20,202	21,384	0.3%	-1.3%
Shallots and green onions		5,252	4,284	11.1%	0.9%
Spinach		2,710	2,415	1.8%	-1.8%
Squash and zucchini	32,847	28,400	32,882	6.6%	1.6%
Sweet corn	109,787	114,565	111,569	-1.4%	-2.3%
Sweet potatoes			13,959		
Tomatoes	536,638	529,500	535,058	-0.2%	-0.4%

Source: Statistics Canada. Table 32-10-0365-01 Area, production and farm gate value of vegetables. Note: Missing volume data occurs when this value is not supplied by Statistics Canada. Missing percentage change data occurs when there is no volume of acreage estimates earlier in the decade.

The trend in production volume of fruits and vegetables is another factor to consider with crop expansion. There are a few factors that can cause a decline in production – notably financial viability and returns associated with the crops, relative crop returns, and ability to profitably access the next level in the supply chain that serves the end-user market.

Overall acres in fruit production is on the decline as illustrated in Figure 2.3. Tree fruit acreage has steadily declined since 1951 – the 2016 acreage was 34% of the post-WWII value. Statistics Canada did not report grape and berry acreage until 1976 – the most acreage was in 1986, and in 2016 it was 76% of the peak acreage.

Acres in vegetable production steadily increased from just under 100,000 acres in 1951 to slightly more than 170,000 acres in 2001. By 2016, acreage has decreased by almost 35,000 acres to 135,420 acres.

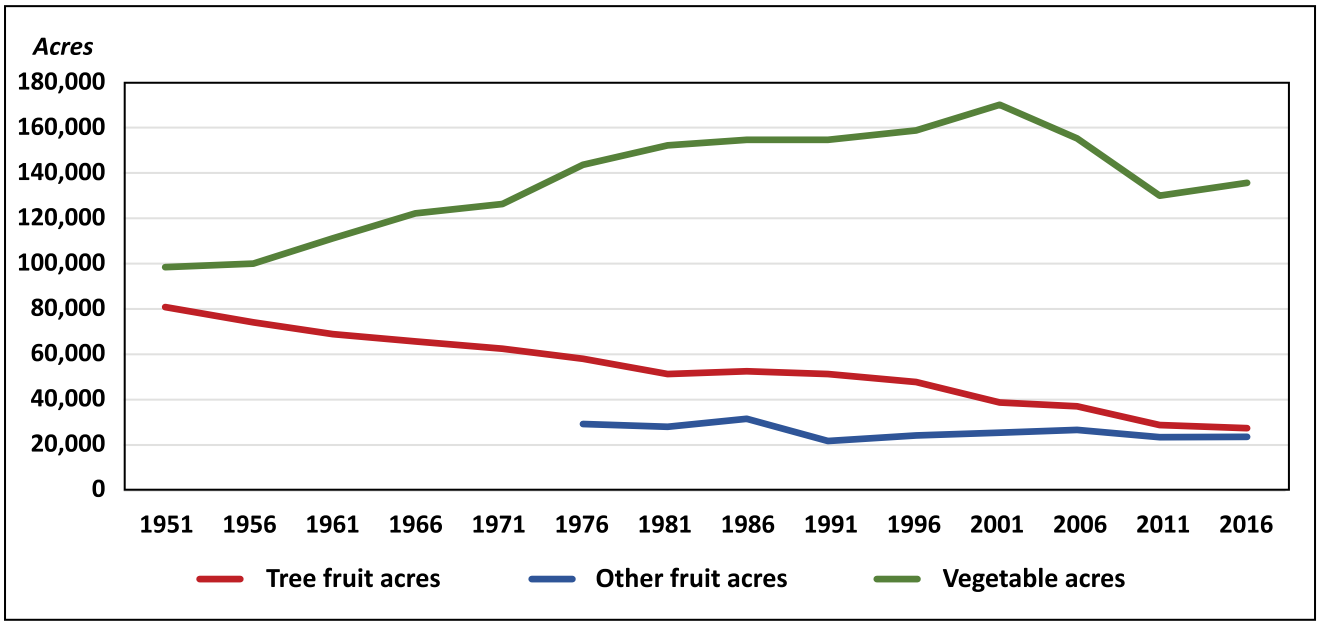

Figure 2.3 *Trend in Fruit and Vegetable Acreage, 1951 to 2016*

Source: Statistics Canada. Table 32-10-0154-01 Selected crops, historical data (via Census of Agriculture)

Over a 25-year period (1991-2016), total fruit and vegetable acreage decreased by -0.8% per year, with the largest change seen with tree fruit acreage falling by -2.5% per year, followed by vegetables at -0.5% per year. Other fruit acreage (mainly berries and grapes) increased by 0.4% per year.

In this same period, the number of farms in fruit and vegetable production decreased by -1.4% per year, with a loss of just over 3,000 farmers from 9,896 farm operations in 1991 to 6,892 in 2016. Along with the loss of acres devoted to fruit and vegetable production, the sector also lost production expertise.

2.3 National Supply and Disposition

Ontario has a trade deficit in fruits and vegetables despite the volumes grown in Ontario. Ontario is a net importer in most product categories except in greenhouse vegetables, field cucumbers and gherkins, and fresh carrots.

Supply and disposition tables for major fruits and vegetables provide another perspective on the production situation in Ontario. Canada-wide levels of production, imports, exports, and domestic disposition are provided in Table 2.3 for fruits where Statistics Canada calculates Canada-wide supply and disposition.

Table 2.3 *Canadian Supply and Disposition of Fruit and Ontario Share of Production*

Crop	Canadian Production (1,000 tonnes)	Canadian Imports (1,000 tonnes)	Canadian Exports (1,000 tonnes)	Total disposition (1,000 tonnes)	Import share (fresh) (%)	Import share (all) (%)	Ontario share of production (%)
Pears	8.6	64.6	0.2	73.2	95%	88%	34%
Plums	3.3	18.0		21.3	89%	84%	48%
Strawberries	27.3	109.9	0.9	137.2	89%	80%	26%
Peaches	23.3	19.6	0.1	42.8	50%	46%	74%
Nectarines	4.0	18.7		22.7	87%	82%	78%
Cherries	27.5	28.0	11.5	55.5	80%	50%	22%
Blueberries	149.0	39.1	33.7	188.1	87%	21%	1%
Apples	386.2	225.1	33.4	603.1	59%	37%	37%

Source: Statistics Canada. Table 32-10-0053-01 Supply and disposition of food in Canada. Note: Values are based on the crop years 2016 to 2018

There are market opportunities to expand production by replacing imports and increasing shipments to other provinces where Ontario has a high share of Canadian production and there are high levels of imports into the fresh market.

Table 2.4 provides similar data for vegetable crops. Ontario accounts for a major share of most Canadian vegetable production but import penetration for fresh market channels is high for most vegetable crops, except beets, parsnips, rutabagas, and turnips. These root crops can be stored for a period of time after the harvest season. The import share for fresh market sales is greater than 100% in some cases when a portion of the imports are also used in processing operations or after waste (as calculated by Statistics Canada).

Table 2.4 *Canadian Supply and Disposition of Vegetables and Ontario Share of Production*

Crop	Canadian Production (1,000 tonnes)	Canadian Imports (1,000 tonnes)	Canadian Exports (1,000 tonnes)	Total disposition (1,000 tonnes)	Import share (fresh) (%)	Import share (all) (%)	Ontario share of production (%)
Asparagus	8.9	21.0	1.5	29.9	82%	70%	82%
Beans	52.9	28.2	4.9	81.1	86%	35%	86%
Beets	38.3	6.0		44.2	17%	13%	17%
Broccoli	42.1	61.0		103.1	67%	59%	67%
Brussels sprouts	5.8	9.1	1.3	15.0	82%	61%	82%
Cabbage	166.4	85.5	72.7	251.0	56%	34%	56%
Chinese cabbage	27.3	37.5		46.6	87%	80%	87%
Kale	3.3	30.0		33.4	94%	90%	94%
Carrots	361.2	115.8	90.6	473.0	43%	24%	43%
Cauliflower	31.2	104.5	16.9	135.8	98%	77%	98%
Celery	35.1	87.5	4.8	122.6	84%	71%	84%
Corn	192.1	50.3		242.4	46%	21%	46%
Cucumbers	268.8	54.5	150.1	323.3	46%	17%	46%
Eggplant	1.7	25.1	1.9	25.7	117%	98%	100%
Garlic	1.4	19.5	0.3	19.9	101%	98%	100%
Leeks	5.7	5.7	0.7	11.3	58%	51%	58%
Lettuce	93.9	276.9	38.9	370.8	90%	75%	90%
Okra		6.8		6.8	114%	100%	
Onions	241.7	195.1	64.9	432.1	61%	45%	61%
Parsley	2.6	9.4		12.0	84%	78%	84%
Parsnips	7.3	0.5		7.8	7%	7%	7%
Peas	49.9	12.5	4.3	62.3	125%	20%	100%
Peppers	204.7	136.2	146.8	340.9	87%	40%	87%
Sweet potatoes	10.3	67.1	30.0	77.4	159%	87%	100%
Pumpkin and squash	132.2	55.6	28.9	187.8	46%	30%	46%
Radishes	15.3	15.0	15.4	30.3	104%	49%	100%
Rutabagas and turnips	45.6	1.9	1.2	48.5	5%	4%	5%
Spinach	5.4	36.1	2.1	41.5	104%	87%	100%
Tomatoes	767.7	218.7	195.4	986.4	73%	22%	73%

Source: Statistics Canada. Table 32-10-0053-01 Supply and disposition of food in Canada. Note: Values are based on the crop years 2016 to 2018

Table 2.4 also shows that Canada is a net exporter of peppers and cucumbers. There are some crops with considerable production that is exported compared to production (cabbage, carrots), and where exports are close to import volumes (radishes, sweet potatoes, carrots, cabbage). These crops could be candidates for expansion given the supply disposition balance.

2.4 Fresh Market Fruit and Vegetable Supply Chains

There are three general supply chains used in the Ontario fresh fruit and vegetable sector for Ontario-grown fruits and vegetables to move from the field to markets (Figure 2.4). One is for growers to sell product through an organization that markets the crop to retail and food service buyers. Produce marketers/wholesalers buy from several growers and in turn sell the product to the buyers of fruit and vegetables in the retail and food service channels (e.g., Koornneef Produce Ltd.). Much of Ontario's produce is sold this way, allowing the marketer to assemble a critical mass of product to ship product to a number of accounts. This supply chain is typically built on longer-term relationships between growers and produce marketers/wholesalers. Some marketers purchase the crop from growers at an agreed price, while others sell the crop based on a commission fee.

The produce marketers/wholesalers supply chain is also representative of grower organizations that market the crop on behalf of all growers such as the Ontario Tender Fruit Growers (OTFG), which use dealers/agents to market and ship the fruit to retail distribution centres on a commission basis. The dealer/marketer can be a cooperative involving grower member.

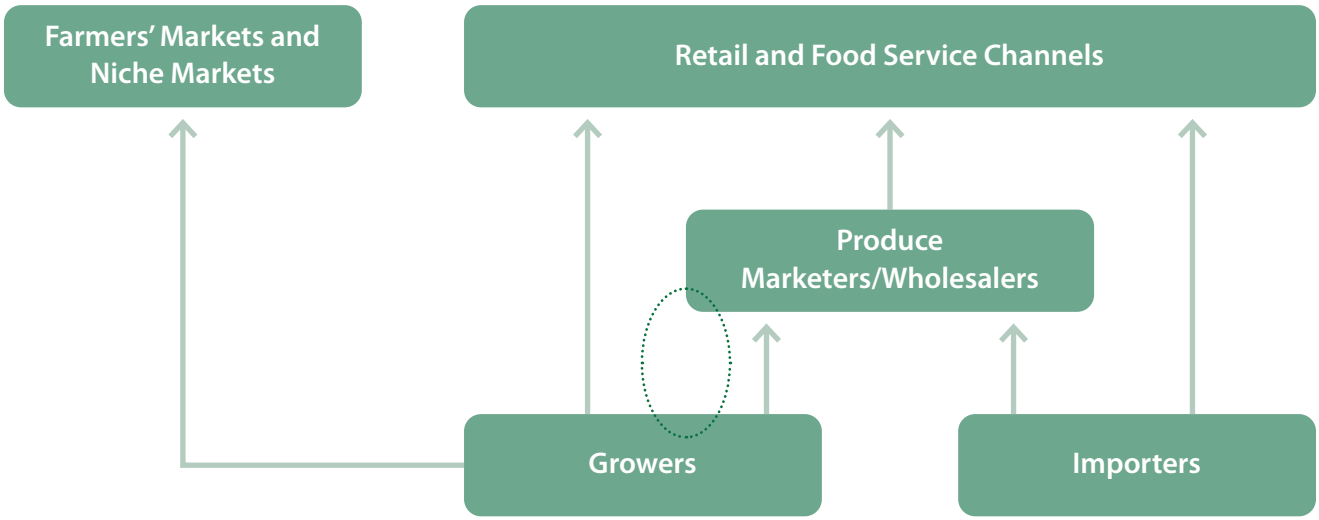

Figure 2.4 *Fresh Fruit and Vegetable Supply Chains*

Note: While not shown in figure above, some large growers and marketers/distributors also sell fresh product into US retail accounts. The diagram also does not represent shipments of fruits and vegetables into processing operations in Ontario or in nearby US locations.

Some growers also market their own crops by selling direct to retail and food service operators and shipping their produce direct to their distribution centres. These are typically large growers with a sizeable acreage base that can provide the volumes required by retailers (e.g., Nature's Finest). In addition to direct sales to retailers, some of these larger growers/marketers also use the Ontario Food Terminal (OFT) to supply smaller buyers in the retail and food service channels (e.g., Den Boer Family Farm Inc.). The dashed oval in Figure 2.4 shows that some larger growers also market their own crops into wholesale channels. For example, Ippolito contracts with Ontario growers and has its own vegetable farms in US locations to provide year-round supply into market channels.

The OFT facilitates 400 farmers to directly market their produce, and another 1,100 farmers who market products indirectly through sellers at the Food Terminal. Bringing farmers and wholesalers together in one facility gives produce buyers a one-stop shop for produce. The OFT is entirely self-funded through fees paid by its users.

Some fruit and vegetable growers also use other market channels including direct sales at farmers' markets, supplying into Community Supported Agriculture (CSA) channels, and sales into other niche markets. Smaller operations typically use these market outlets.

Aside from farmers' markets and growers supplying niche markets, Ontario fruit growers typically sell products through a supply chain where a marketer purchases from the grower or sells on commission on behalf of growers. For vegetables, growers either ship direct into retail and food service distribution centres (when they are large), act as their own marketer in the wholesale market, or have their produce sold through an established relationship with a marketer/wholesaler.

Imported produce use two main channels – either directly to food service and retail distribution centres, or through wholesale terminals such as the OFT. Some large Ontario-based vegetable growers also have their own production base in select US locations to offer a year-round supply of produce.

Marketers and large growers sell into a concentrated food retail sector with three major food retailers (Loblaws, Sobey's and Metro) and two large-scale general merchandizers (Costco and Walmart). The food service channel is more concentrated with two major distributors (Gordon's Food Service and Sysco), impacting the bargaining power of growers and the structure of the supply chain supplying these operations.

2.5 Pricing in the Supply Chain

The fruit and vegetable sector does not use the futures market (like grain and oilseeds) for pricing and minimizing price risk. Most fruits and vegetables cannot be stored, and there are not depots or delivery points where production can be dropped off and the producer can access the continental price as with corn, soybeans, and wheat. These factors impact how fruits and vegetables are marketed and priced, and the structure of the supply chain.

Fruits such as tender tree fruits and fresh grapes establish a price for all of the Ontario supply at the retail distribution level (subject to an adjustment for freight costs) and for processed product delivered to an Ontario-based processor. This pricing authority removes the pricing risk and gives all producers a guaranteed price for product delivered in a quality range.

Select processing vegetables (processing tomatoes, peppers, carrots) have the price established by negotiation through a grower organization (Ontario Processing Vegetable Growers/OPVG) and vegetable processors – the price is established before planting decisions are made. Vegetables that are processed and not under this pricing authority typically have individual growers enter into contracts with processors that cover term such as quantity, quality, delivery periods, and price.

Fresh market vegetables have different pricing models based on the supply chain. Large growers and large grower/marketers/wholesalers have contracts that specify volumes and price with larger retail accounts. To ensure supplies are available each week and throughout the year, these wholesalers have production facilities across North America to provide the weekly supply. If one area is late in harvesting, the supply from another region can be accessed for an uninterrupted supply of fresh produce.

Since produce is not as fungible as grains, and quality matters, the contract between a large supplier and a retailer is based on trust and past performance. These factors mean smaller growers are contract growers to the larger grower/wholesaler, they use other market channels such as the OFT, or they supply smaller retail accounts (and farmers' markets) to sell their crops.

Product sold through the OFT is price based on daily supply and demand conditions in the local market, with pricing shaped by imported supplies and the local supply/demand balance. An excess supply of local product will lower prices received by these growers and can persist through a growing season if the market is not in balance.

The structure of the fruit and vegetable supply chains are shaped by pricing regulatory authority for certain crops and the requirement that suppliers to retail and food service distribution have the scale and critical mass to supply produce year round.

2.6 Farm Gate Value of Fruits and Vegetables and Fresh Market Share

Farm gate values and the importance of the fresh market for fruits and vegetables is shown in Table 2.5 and Table 2.6. These tables show the farm gate value of most Ontario grown fruits and vegetables in crop year 2018, where for example apples has an estimated farm gate value of $95 million, which is 25% of the value of all fruit crops of $400 million (Table 2.5). The second column shows the value per acre of harvest crop, which ranges from $17,665/acre for strawberries for a fresh market crop to $4,063/acre for prunes and plums.

Table 2.5 *Farm Gate Value, Value per Acre and Fresh Market Sales Share*

Crop	Farm Gate Value ($ million)	Value Per Acre ($/acre)	Fresh Market Share of Sales (%)
Apples	$95.2	$6,531	73%
Apricots	$0.7	$10,169	100%
Blueberries (total)	$3.8	$5,981	100%
Watermelons	$11.0	$7,042	100%
Melons (other)	$3.1	$5,710	100%
Melons (total)	$14.1	$6,694	100%
Cherries (sour)	$5.4	$3,051	0%
Cherries (sweet)	$3.2	$8,912	99%
Grapes (labrusca)	$4.5	$6,668	59%
Grapes (vinifera)	$81.9	$5,029	0%
Grapes (total)	$86.4	$5,094	3%
Nectarines	$5.9	$10,978	100%
Peaches	$34.7	$7,894	96%
Pears	$5.6	$5,774	92%
Plums and prunes	$3.2	$4,063	100%
Raspberries	$5.7	$8,784	100%
Strawberries	$35.2	$17,665	99%

Source: OMAFRA, Area, Production, Value and Sales of Specified Commercial Fruit Crops, Ontario, 2018

The fresh market is the primary outlet for all fruit crops, aside from sour cherries and vinifera grapes destined for wineries.

The farm gate value of vegetables was $1.48 billion in 2018 (Table 2.6). Field vegetables makes up $536 million with the highest value fresh market crops including carrots, dry onions, and cabbage. The fresh market is the primary channel for most vegetable crops, except green beans, field cucumber and gherkins, green peas, field peppers, and field tomatoes that are processed (tomato paste, sauces, frozen peas, etc.).

Table 2.6 *Farm Gate Value, Value per Acre and Fresh Market Sales Share of Vegetables*

Crop	Farm Gate Value ($ million)	Value Per Acre ($/acre)	Fresh Market Share of Sales (%)
Asparagus	$28.5	$8,801	97%
Beans, Green and Wax	$17.4	$3,126	18%
Beets	$4.2	$3,735	84%
Broccoli	$31.9	$7,855	100%
Brussels Sprouts	$4.3	$6,730	100%
Cabbage (Chinese)	$10.4	$5,266	100%
Cabbage (regular)	$22.4	$6,453	80%
Cabbage (total)	$32.8	$6,024	85%
Carrots (baby)			100%
Carrots (regular)			80%
Carrots (total)	$43.3	$5,099	81%
Cauliflower	$4.1	$4,281	100%
Celery	$5.4	$9,101	100%
Sweet Corn	$36.7	$1,928	29%
Cucumbers and gherkins	$17.3	$4,635	14%
Cucumbers (greenhouse)	$302.8		100%
Garlic	$6.7	$8,916	100%
Leeks and other alliaceous veg.			100%
Lettuce (head)	$0.6	$9,367	100%
Lettuce (leaf)	$3.5	$8,827	100%
Lettuce (total)	$4.1	$8,898	100%
Lettuce (greenhouse)			100%
Onions (dry)	$34.8	$6,143	92%
Onions (green and shallots)	$8.2	$19,848	100%
Parsley	$2.5	$13,912	100%
Parsnips	$2.2	$6,232	100%
Green Peas	$10.4	$748	4%
Peppers	$39.8	$9,767	44%
Peppers (greenhouse)	$288.6		100%
Pumpkins	$14.1	$3,220	79%
Squash and zucchini	$15.1	$3,975	83%
Pumpkins, quash and zucchini	$29.2	$3,570	80%
Radishes	$2.3	$2,770	100%
Rhubarb			100%
Rutabagas and turnips	$10.6	$7,829	100%
Spinach	$4.4	$6,554	100%
Tomatoes (field)	$89.0	$6,445	8%
Tomatoes (greenhouse)	$355.2		100%

Source: OMAFRA, Area, Production, Value and Sales of Specified Commercial Vegetable Crops, Ontario, 2018

2.7 Size and Structure of Growers

There are a number of growers with small acreages of fruits and vegetables. For example, Census of Agriculture data indicates the average apple orchard is 15 acres – on the small side (Table 2.7,15,828 acres and 1,079 growers). Table 2.7 shows the number of growers and associated acreage by crop acreage, with 35 growers having more than 100 acres in apples – that is 7,008 acres in total or an average of 200 acres per grower.

Table 2.7 *Structure of Fruit Production, Distribution by Crop Acreage (2011)*

Crops	0.1-4.9 acres	5 - 9.9 acres	10 - 29.9 acres	30 - 49.9 acres	50 - 99.9 acres	100 acres & over	Total	Farms with 90 % of acreage		Average acres for farms with 90% of acres
Apple										
Farms	689	112	149	48	46	35	**1,079**	26%	278	51
Acreage	761	743	2,411	1,773	3,133	7,008	**15,829**			
Apricots										
Farms	96	3	1				**100**	45%	45	2
Acreage	77	16	x				**102**			
Peaches										
Farms	155	42	55	15	21	14	**302**	35%	105	55
Acreage	248	286	972	566	1,532	2,850	**6,454**			
Pears										
Farms	393	41	30	7	2		**473**	32%	152	8
Acreage	350	259	418	227	x		**1,383**			
Plums and prunes										
Farms	293	31	22	2	3		**351**	35%	123	10
Acreage	311	191	333	x	180		**1,383**			
Sweet cherry										
Farms	230	27	8		1		**266**	39%	103	5
Acreage	247	171	96		x		**576**			
Sour cherry										
Farms	96	6	11	5	6	7	**131**	22%	29	73
Acreage	67	36	194	195	457	1,393	**2,342**			
Strawberry										
Farms	469	97	84	9	4		**663**	49%	324	9
Acreage	539	621	1,429	326	x		**3,283**			

Source: OMAFRA, Area and Number of Farms by Size of Crop Area, Ontario, (based on 2011 Agricultural Census)

Table 2.8 provides similar information for vegetable crops. Acres devoted to each crop is generally larger than with fruit crops for growers responsible for 90% of the acreage base.

Table 2.8 *Structure of Vegetable Production, Distribution by Crop Acreage (2011)*

Crops	0.1-4.9 acres	5 - 9.9 acres	10 - 29.9 acres	30 - 49.9 acres	50 - 99.9 acres	100 acres & over	Total	Farms with 90 % of acreage		Average acres for farms with 90% of acres
Asparagus										
Farms	319	15	25	11	16	3	**389**	14%	55	45
Acres	205	99	428	398	1,014	600	**2,744**			
Beans										
Farms	806	33	12	21	39	24	**935**	9%	84	98
Acres	372	196	220	771	2,571	5,057	**9,186**			
Beets										
Farms	725	12	22	7	6	1	**773**	12%	90	13
Acres	260	66	346	233	355	X	**1,259**			
Broccoli										
Farms	354	15	12	5	2	12	**400**	5%	19	207
Acres	186	92	174	188	X	3,727	**4,367**			
Cabbage										
Farms	441	19	15	3	8	10	**496**	7%	36	84
Acres	250	115	222	120	532	2,117	**3,354**			
Carrots										
Farms	623	15	22	14	27	23	**724**	9%	64	139
Acres	245	95	352	519	1,887	6,758	**9,855**			
Cauliflower										
Farms	288	13	11	3	12	2	**329**	12%	41	30
Acres	170	82	177	110	811	X	**1,350**			
Cucumber										
Farms	765	52	75	20	4	5	**921**	17%	156	20
Acres	380	325	1,188	720	248	624	**3,484**			
Onions (dry)										
Farms	585	11	28	25	19	19	**687**	13%	91	64
Acres	259	68	506	943	1,271	3,408	**6,456**			
Peas (green)										
Farms	573	13	18	36	83	49	**772**	22%	186	73
Acres	248	78	295	1,482	5,598	7,419	**15,121**			

CONTINUED OPPOSITE

Crops	0.1-4.9 acres	5 - 9.9 acres	10 - 29.9 acres	30 - 49.9 acres	50 - 99.9 acres	100 acres & over	Total	Farms with 90 % of acreage		Average acres for farms with 90% of acres
Peppers										
Farms	661	29	53	21	10	6	**780**	15%	119	29
Acres	396	173	821	728	615	1,159	**3,892**			
Pumpkins										
Farms	843	83	71	8	6	5	**1,016**	35%	358	12
Acres	804	492	956	294	342	1,770	**4,658**			
Squash										
Farms	961	60	35	9	10	7	**1,082**	25%	274	12
Acres	762	358	542	314	650	964	**3,590**			
Sweet corn										
Farms	670	106	143	77	88	62	**1,146**	32%	370	62
Acres	767	660	2,352	2,954	5,778	13,030	**25,540**			
Tomatoes										
Farms	1,163	69	47	30	47	66	**1,422**	10%	143	104
Acres	781	416	746	1,092	3,340	10,185	**16,558**			

Source: OMAFRA, Area and Number of Farms by Size of Crop Area, Ontario, (based on 2011 Agricultural Census)

Using carrots as an example, 64 farms represented 90% of the carrot production acres, with an average of 139 acres. These growers account for only 9% of all farms with carrot production. For broccoli, only 5% of the broccoli growers with an average of 207 acres of broccoli per grower accounted for 90% of the crop acres. In contrast, 90 beet growers accounted for 90% of beet acres with an average of 13 acres of beets.

Table 2.9 provides information of fruit and vegetable growers by size of operation, using gross cash receipts (revenues) based on the 2016 Census of Agriculture (includes 2015 revenues and expenses). Farms with more than 50% of their revenues in fruit of vegetable production in 2015 are represented in Table 2.9.

Table 2.9 *Distribution of Growers, Revenues and Profit Margin by Size, 2015*

Item	Under $24,999	$25,000 - $99,999	$100,000 - $249,999	$250,000 - $499,999	$500,000 - $999,999	$1,000,000 and over	All farms
Vegetable Growers							
Number of growers	906	316	188	127	127	192	1,856
Revenue per grower	$7,482	$53,336	$168,074	$360,342	$718,989	$2,672,615	$380,091
Profit margin (before CCA) per grower	-$2,936	$9,956	$26,691	$67,277	$112,771	$439,081	$60,708
Profit margin (before CCA) - % of sales	-39%	19%	16%	19%	16%	16%	16%
Distribution of growers	49%	17%	10%	7%	7%	10%	100%
Distribution of revenues	1%	2%	4%	6%	13%	73%	100%
Fruit Growers							
Number of growers	578	305	198	111	103	67	1,362
Revenue per grower	$7,984	$51,987	$154,566	$341,623	$679,079	$1,953,714	$212,804
Profit margin (before CCA) per grower	-$4,097	$3,377	$16,920	$36,173	$71,493	$282,365	$23,723
Profit margin (before CCA) - % of sales	-51%	6%	11%	11%	11%	14%	11%
Distribution of growers	42%	22%	15%	8%	8%	5%	100%
Distribution of revenues	2%	5%	11%	13%	24%	45%	100%

Source: 2016, Census of Agriculture, Statistics Canada (provided by OMAFRA)

In 2016, 906 or close to 50 percent of growers had under $25,000 in overall gross revenues. Table 2.9 shows that 10% of the growers account for 73% of the revenues, and these growers had more than $1 million in sales (average sales value for these growers was $2.67 million).

The average fruit grower has less gross revenue at $212,804 compared to the average vegetable grower at $380,091 (Table 2.9). Compared to vegetable growers, only 5% of fruit growers had annual sales over $1 million in 2015, with sales volume accounting for 45% of all fruit grower revenues. The number of fruit growers with sales over $1 million grew from the 49 in 2006 Census of Agriculture to 67 in 2016 (Table 2.9).

The profit margin in fruit operations is lower (11%) compared to vegetables (16%), with smaller sized fruit operations having a lower profit margin (6% at sales between $25,000 and $100,000) than vegetable growers (profit margin of 19%).

2.8 Land Base

Ontario has a land base suitable for fruit and vegetable crop production, with some areas more favourable than others. The Greenbelt, for example, accounts for more than 50% of the province's fruit production and 10% of the vegetables.

Within the Greenbelt there are unique production regions such as the Holland/Bradford Marsh where muck crops are grown. The Marsh was drained in the 1920s and there are no opportunities to expand the land base for vegetable production.

The Niagara region within the Greenbelt accounts for a large share of tender tree fruit and fresh grape production. Expansion of high value fruit crops is limited based on the availability of land, although replanting trees at higher densities can expand production. The Greenbelt Plan policy of retaining agricultural zoned land for agricultural uses only provides certainty to invest in expansion, but expansion in this geography often leads to a substitution between crops based on marketplace opportunities and operating margins.

Most of the fruit production occurs within the Greenbelt (Table 1.3), with Ontario fruit grown in several regions across the province including the north shore of Lake Erie and Lake Ontario. Figure 2.5 shows where fruit production occurs in Ontario based on the type of fruit crops grown in each suitable growing region. Pears, for example, can be grown in the Niagara area, along the north shore of Lake Erie and in a band between Lake Erie and Lake Huron. The Great Lakes moderate winter temperatures that supports pear production given the level of winter hardiness of pear trees. Peaches – like other stone fruits – are less tolerant of cold winters and production is mostly confined to the Niagara region and areas adjacent to the lakes in the extreme southwest part of Ontario.

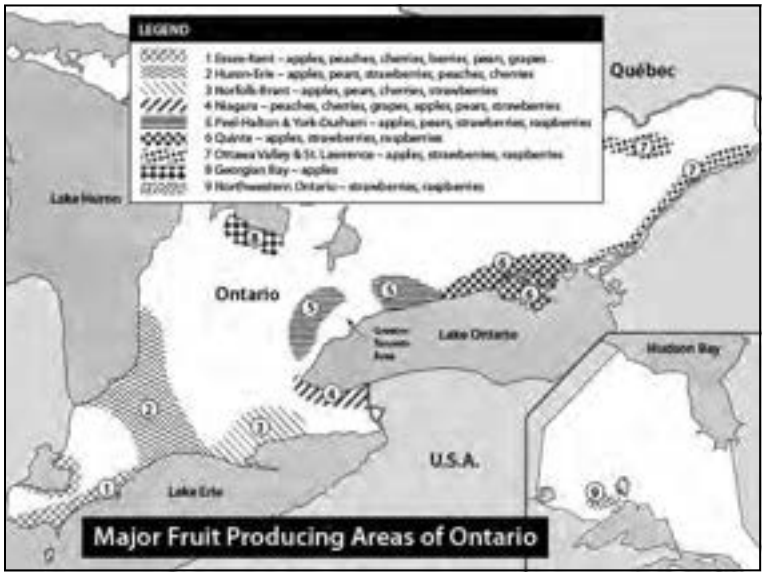

Figure 2.5 *Fruit Growing Areas in Ontario*

Source: OMAFRA Factsheet – "What You Should Know About Fruit Production in Ontario"[10]

10 OMAFRA Factsheet, "What You Should Know About Fruit Production in Ontario" Agdex # 206/11, (ISSN 1198-712X) prepared by John Gardner - Apple Specialist (OMAFRA); Ken Slingerland - Tender Fruit and Grape Specialist (OMAFRA); Pam Fisher- Berry Specialist (OMAFRA).

Land along the north shore of Lake Erie includes a large share of Ontario's fruit and vegetable production. Fruit crops such as apples, pears, cherries, peaches, and fresh grapes are grown in this region given the soils and proximity to Lake Erie that moderates winter temperature extremes. Figure 2.5 shows the regions in Ontario suitable for various fruit crops.

The type of fruit crops that can be grown in regions of Ontario depend on the winter hardiness of the plant and the plant hardiness zones across southern Ontario (Figure 2.4). For example, much of Essex County and parts of Niagara are in zone 7a where crops such as fresh grapes can be grown based on their winter hardiness tolerance.

Table 2.10 indicates where the bulk of fruit production occurs in southern Ontario. This distribution is based on cash receipts for fruit growers – Statistics Canada classifies fruit growers as farm operations where more than 50% of output is a fruit crop. Fruit production occurs primarily in the Niagara region (48%), along the north shore of Lake Erie for tender fruits, and for apples includes Grey County, Durham, Simcoe County and Northumberland.

Table 2.10 *Location of Fruit Production Using Revenue for Fruit Farms (2015)*

County/Region	Cash Receipts	Ontario Share	Cumulative Share
Niagara	$140.0	48%	48%
Norfolk	$29.8	10%	59%
Grey	$20.3	7%	66%
Essex	$12.9	4%	70%
Durham	$9.6	3%	73%
Elgin	$8.3	3%	76%
Middlesex	$7.1	2%	79%
Hamilton	$5.9	2%	81%
Simcoe	$5.1	2%	82%
Chatham Kent	$4.7	2%	84%
Northumberland	x		
Ontario	**$290.0**	**100%**	**100%**

Source: 2016, Census of Agriculture, Statistics Canada (provided by OMAFRA).
Note: Cash receipts are for farms where the majority of revenue is due to fruit production and includes regions representing more than 1% of crop value.

Expanding fruit production requires available suitable land, which excludes the Niagara region. The Niagara region is the most favourable area for growing tender tree fruits such as peaches, nectarines, and apricots (the stone fruits) due to the milder winters. Expanding one fruit crop often replaces an existing fruit crop in Niagara. Expanding production in other regions depends on the plant hardiness zones and winter hardiness of each specific fruit crop.

Figures 2.5 and 2.6, and Table 2.10 show where fruit crop expansion could occur in Ontario based on climate and geography.

Some tree fruit crops including pears can be grown on heavier soils. Fresh grapes can also grow in heavier soils that are well drained to avoid excess moisture near the roots.

Many vegetable crops are grown in several areas across southwestern Ontario – the location depends on soil type, geography, and climate. The largest field vegetable growing region in 2015 was the Norfolk region (18% of the value of Ontario production) followed by Chatham-Kent (17%) – see Table 2.11. The Simcoe and York region includes muck crops in the Bradford Marsh and account for 24% of the value of Ontario production.

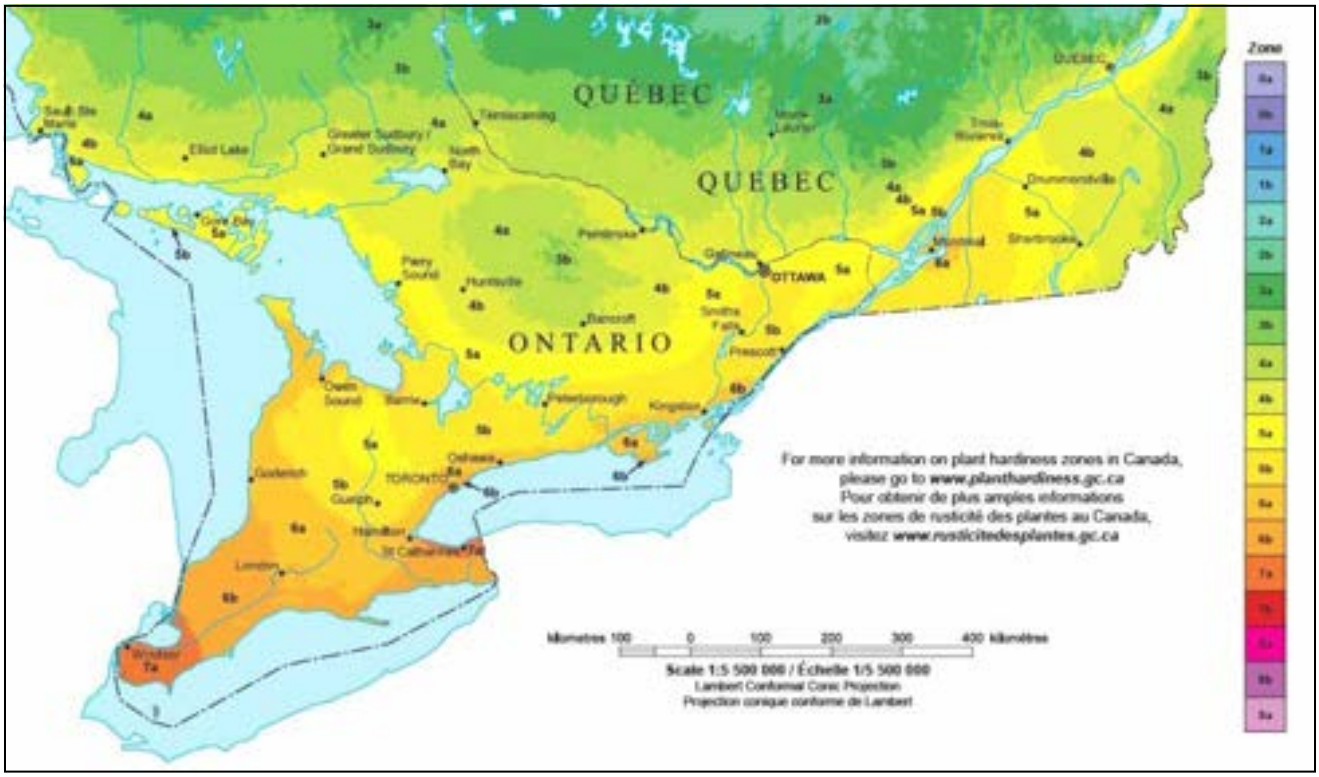

Figure 2.6 *Plant hardiness Zones in Southern Ontario*

Source: Natural Resources Canada

Table 2.11 *Location of Vegetable Production Using Revenue for Vegetable Farms (2015)*

County/Region	Cash Receipts	Ontario Share	Cumulative Share
Norfolk	$126.1	18%	
Chatham Kent	$116.6	17%	34%
Simcoe	$97.4	14%	48%
York	$67.3	10%	58%
Elgin	$43.7	6%	64%
Essex	$39.4	6%	70%
Brant	$33.1	5%	74%
Oxford	$23.6	3%	78%
Huron	$20.5	3%	81%
Hamilton	$16.5	2%	83%
Middlesex	$14.7	2%	85%
Lambton	$14.6	2%	87%
Ontario	**$705.0**	**100%**	**100%**

Source: 2016, Census of Agriculture, Statistics Canada (provided by OMAFRA). Note: Cash receipts are for farms where the majority of revenue is due to vegetable production and includes regions representing more than 1% of crop value.

Soil type is important for many vegetable crops, where daily harvesting is required to provide a fresh supply. Light soils, such as sandy and loamy soils, allow for harvesting even after a rain, but heavier clay soils do not. Soil type helps shape the location of production for many fresh market crops, and many are either muck crops (grown in the Marsh) or grown in areas with lighter soils. Figure 2.7 shows the lighter soil areas in southern Ontario including Region 22 (Norfolk Sand Plain), parts of Brant County, the Hamilton region, and Region 18 (Bothwell Sand Plain) that includes parts of Elgin County and Chatham-Kent.

Perishable fresh market vegetables, such as cauliflower and eggplant, are harvested daily to supply a fresh high-quality product to the market. These crops depend on a light soil to allow equipment to harvest the crop shortly after any rainfall. A heavier clay soil can take days to dry before it is advisable to enter the field with heavy equipment. Suitable land is available in a number of regions in the province for expansion of vegetable crops. For muck crops, more marshland could be used for production, but environmental policies prevent draining of such land.

Vegetable crops are annual crops and planting can begin once conditions are optimal. Lighter soil areas in the southern parts of the province allow for early planting. Spacing out the planting season allows for a longer harvest season. Table 2.11 shows the top six vegetable growing regions in Ontario that accounted for 70% of the value of vegetable production in 2015: Norfolk, Chatham-Kent, Simcoe, York, Elgin, and Essex.

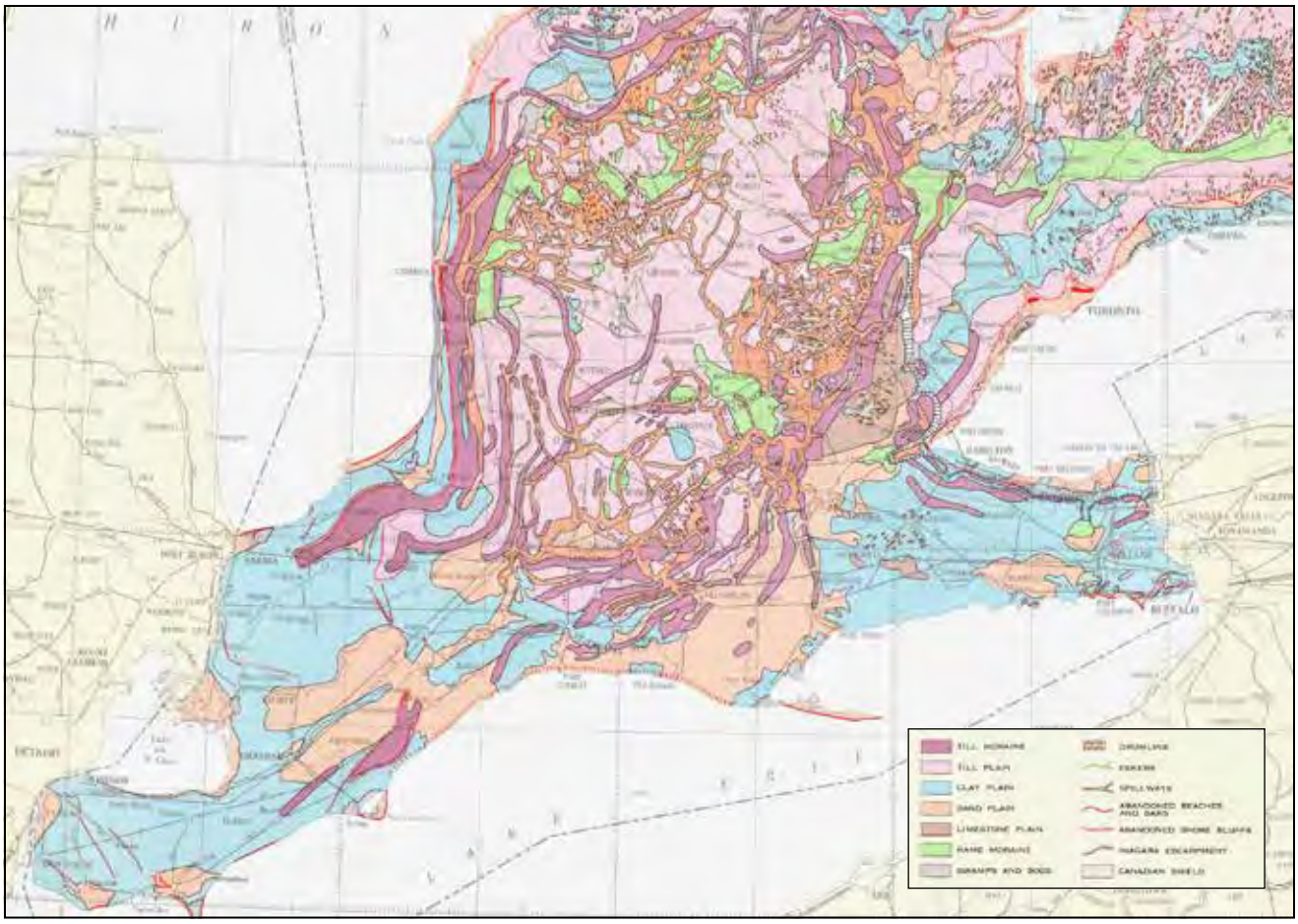

Figure 2.7 *Physiographic Regions of Southern Ontario*

Ontario has approximately 10,000 acres of muck crop acreage (Holland and Bradford marshes). Quebec has a much larger area in muck crop (about 20,000 acres) that supplies leafy vegetables (lettuce) and other fresh vegetables into the Ontario market.

Over the last 20 years, the land base in Ontario in fruit and vegetable production has been declining with 43,000 fewer acres producing fruits and vegetables in 2016 compared to 1996 (Table 2.12). This represents a -1.6% annual decline in fruit crops and a -0.8% annual decline in vegetable crops. It is important to understand why that has happened in order to assess opportunities and identify barriers for expansion.

Table 2.12 *Trend in Ontario Fruit and Vegetable Crop Acreage, 1996 to 2016*

Crop	1996	2001	2006	2011	2016	Annual Change
Fruit	70,664	65,076	63,704	52,740	51,192	-1.6%
Vegetables	158,471	170,147	155,594	129,595	135,420	-0.8%
Total	**229,135**	**235,223**	**219,298**	**182,335**	**186,612**	**-1.0%**

Source: Census of Agriculture, Ontario Farm Data, 1996, 2001, 2006, 2011 and 2016

3

Factors Affecting Production Expansion

This section focuses on identified factors that can affect expansion of fruit and vegetable production.

3.1 Competitive Factors

Figure 3.1 shows the competitive factors affecting fruit and vegetable production in Ontario along the supply chain at six levels:

1. Market level where the intersection of supply and demand occurs for each crop
2. Grower level
3. Produce marketer level
4. Retail and food service level
5. Supporting infrastructure level
6. Government policy and regulation

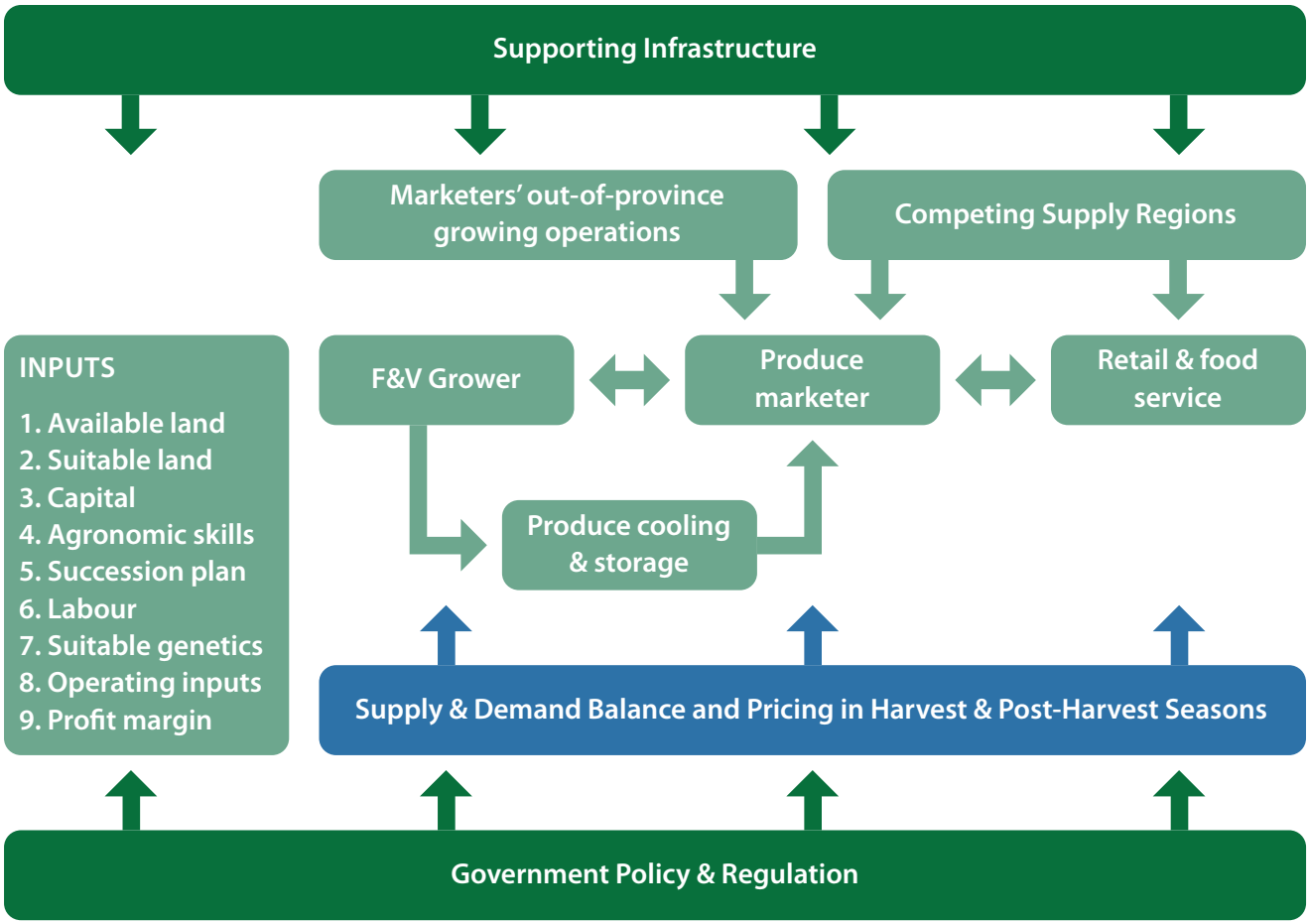

Figure 3.1 *Competitive Factors Affecting Fruit and Vegetable Production*

The Ontario industry operates within a ***supply and demand context*** in the harvest period and post-harvest seasons. Large established businesses – large growers or growers that are also marketers with contract production – are part of a continental market. Once the Ontario harvest period is completed, these marketers access produce from other supply regions, which results in the following situations:

- The market is in equilibrium during the harvest season for some crops, limiting expansion for non-storable crops – and with expansion any over-supply can have a negative effect on prices received. This situation limits expansion for crops where the market is in equilibrium for local product.
- For some perishable crops, there is an opportunity to expand without having a negative impact on grower returns since the market is undersupplied with local product during the harvest period.
- For storable crops, investment in storage facilities is required to provide quality produce in the post-harvest season, and post-harvest prices are determined on imported supplies.

There are several factors that can ***impede expansion*** of fruit and vegetable production at the ***grower level***:

- Availability of varieties and genetic material designed for Ontario growing conditions for certain crop kinds (e.g., winter hardiness and specific diseases)
- Development of varieties for certain crops that provide attributes consumers want (e.g., seedless grapes)
- Replacement by cash crops such as grains and oilseeds given the risks of fruit and vegetable production and the higher associated capital costs
- Familiarity and experience needed to grow fruit and vegetable crops for farmers currently in cash crops (e.g., corn and soybeans)
- Whether the next generation of a family farm operation wants to continue fruit and/or vegetable production and the permanent loss of the expertise
- Older growers with no incentive to expand operations
- Loss of productive capacity when growers exit the business and another fruit or vegetable grower does not acquire the land base
- Suitable available land (e.g., soil type, winter hardiness) near existing fruit and vegetable operations or near supporting infrastructure
- Deployment of capital and use of technology that can substitute for labour at harvest and technology that can extend growing seasons (e.g., high tunnels)
- Profit margins and incentives for existing fruit and vegetable growers to expand
- Grower relationships with marketers and the marketing approach taken by smaller growers
- Availability of labour at wage rates that deliver an acceptable profit margin with an expansion plan

Wholesalers and marketers are an important link between growers and the retail and food service buyers for produce. At the ***marketer level***, there are factors that can ***limit the amount of Ontario produce*** that they handle:

- Large marketers have growing operations outside of the province and contracted supply in Ontario. This can impact the amount of Ontario grown produce in their supply regions (based on per acre profit margin), despite the request by retailers for local produce
- Marketers have access to imports and the associated landed cost affects their margins and choice of product supply from various supply regions. This situation puts a limit on the price received by Ontario growers and the volume they will contract for the growing season

The ***concentrated food retail and food service distribution*** sector in Ontario and their ***bargaining power*** in relation to suppliers of fruit and vegetables can:

- Lead to lower terms of trade for fruit and vegetable suppliers
- Cause suppliers to become large enough to supply year-round with enough volume to be a preferred and reliable supplier
- Have independent growers align with a marketer and/or become a contract grower for a large supplier

The ***retail and food service*** sector reflect consumer demand for produce and the ***demand pull for locally grown produce*** has an impact on the amount of Ontario produce purchased. This can happen where:

- More retailers promote "Ontario-Grown" to increase the overall requirement for Ontario-grown fruits and vegetables, and that promotion is enhanced resulting in more demand pull for local product
- Retailers commit to purchase additional local produce, despite relationships with suppliers that provide the product from various North American locations for 12 months of the year

Research organizations and educational facilities are examples of ***supporting infrastructure*** for the fruit and vegetable supply chain. The University of Guelph (in Plant Agriculture and the Muck Crop and Simcoe Stations) and the Vineland Research and Innovation Centre provide technical expertise, new varieties, and other supporting services to the industry. But there are examples of ***additional capacity*** to support the supply chain:

- Varietal development that provides genetics most suitable to Ontario growing conditions
- Increased scouting and cultivar selection conducted by supporting organizations

Government policy and regulation can ***influence*** overall ***demand*** for Ontario-grown fruits and vegetables, and the ***supply offering*** in various ways:

- Programs like Foodland Ontario provide overall support for the labeling and promotion of Ontario produce
- Government supported research and extension programs that provide information, technical expertise, and genetic material to assist with industry competitiveness
- Reduction of some regulatory barriers that directly impact production

3.2 Forces Contracting Production

There are a few issues and forces that reduce Ontario fruit and vegetable production. Over the last number of years, total acreage in fruits and vegetables has declined (Table 2.12 and Figure 2.3). There are several forces that can impede expansion, including:[11]

- ***No business succession***. A number of family farm operations do not have a next generation willing to take over the operation, resulting in reduced productive capacity (and acreage) focused on fruit and vegetable production.
- ***High cost of labour***. The increase in labour costs due to higher minimum wage has resulted in negative margins for some operations, signaling the need to exit the business.
- ***Scale of operation and operating margins***. Mid-size operations may not be large enough to make investments in technologies and equipment required to compete against imported supplies and associated landed values. The resulting low margins lead some operations to exit fruit and vegetable production.
- ***Weather risks***. Variability in weather – compared to more predictable weather in some US locations and production in covered farming – and the resulting variability in product volumes and quality has caused some growers to exit the business based on financial pressure.
- ***Price takers and margins***. Fruit and vegetable growers are price takers, that is, the market price is established based on supply/demand conditions, and imported supplies often establish the reference price. Without the necessary scale of operations for cost efficiency, the margins in some crops force growers to decrease production or exit the business.
- ***Food safety requirements***. Compliance with food safety regulations and standards can be a burden for some smaller to mid-size operations, limiting their ability to access the major market channels. For growers not wanting to supply niche markets, such as farm gate or farmers' markets, exiting the business is a viable option.

3.3 Constraints to Expanding Production

There are several constraints that can impede production expansion including:

- ***No room for expansion in Niagara***. The Niagara region is very suitable for fruit production, but most available acres are already used, prohibiting expansion in the region. Fresh market production has actually declined in the region as some growers have increased vinifera grapes that can be machine harvested to save on labour costs.
- ***No room for expansion of muck crops***. The area available for muck crop production is limited and fully utilized. Expanding one crop would simply reduce another crop – this type of switching would be based on economic and marketplace considerations. Environmental policies prohibit further draining of marsh areas for expansion of muck crops.

11 See also Annex 1 which provides a SWOT analysis, which highlights the strengths and opportunities that can be leveraged for expansion, as well as the barriers to expansion, such as whether internal weakness can be addressed and threats from out of province forces can be minimized or mitigated.

- ***Availability of suitable land***. Expanding production requires land that is suitable for fruit and vegetable production, based on soil type and climate. Most field vegetables require lighter soils and depend on areas with a long growing season. Tree fruit crops require suitable climatic regions, which outside Niagara means largely along the shores of Lake Erie.
- ***High cost of land***. Land can cost up to $20,000/acre in the parts of the province conducive to fruit and vegetable production, including areas just north of the Lake Erie shoreline. With interest at 3%, the cost for land is $600/acre. For many fruit and vegetable crops, the per acre margin is not economically feasible for expansion – unless the business has a long-term view and subsidizes the expansion based on existing acre returns.
- ***Availability and cost of labour***. Fruit and vegetable growers require seasonal labour that is becoming scarcer and more expensive. The higher minimum wage has increased the labour share of operating expenses and growers are finding ways to reduce their labour needs, including no expansion plans.
- ***Availability of machine harvesting***. Machine harvesting allows for expansion of some crops without the need for seasonal labour. Fresh market fruits are hand harvested and machine harvesting is not an option at this point. Robotics are being developed for machine harvesting in some greenhouse operations. Harvesting equipment is not readily available for some crops and growers using them are early adopters, such as with broccoli growers. Only growers with large operations can justify the capital expenditure associated with some harvesting equipment.
- ***Availability of capital***. Fruit and vegetable production requires significant amounts of capital – orchards can incur up to $40,000/acre in costs with a four to six year wait before any revenue is received from the investment. Growers must be well financed to consider expansion or replacement of an orchard. Vegetable operations looking to expand their acres must take incremental steps to align with equipment capability. Growers operate their farm at optimal sizes given their equipment configuration, considering individual pieces of equipment can cost well over $200,000. Expansion requires investments in additional equipment and acres, which may be in 250-acre increments and can add up to a $5 million dollar investment. Only growers will strong balance sheets will be able to expand production.
- ***Availability of suitable cultivars for Ontario growing conditions***. The limited options of varieties suitable for Ontario growing conditions can restrict production expansion opportunities. Short season varieties, those with relevant disease resistance, and varieties with desirable appearance, taste, and texture attributes can help drive production expansion. These cultivars can be based on plant breeding programs within Ontario, and by evaluating programs of cultivars grown in other regions of the world.
- ***Length of growing and harvest season***. The number of growing days in Ontario can limit the timing of planting and harvesting of crops – limiting the number of months non-storable Ontario fresh produce can be supplied into the market. For some crops, the market window is four months (e.g., eggplant and peppers), and others can be as little as two months (e.g., asparagus). Plant breeding and cultivar selection can address these limitations in some situations.
- ***Ontario-based marketers with US and Mexican growing operations***. There are marketers/wholesalers in Ontario that have their own farms in Ontario or contract with Ontario growers and operate farms in the US and Mexico. These operations typically expand their business to supply accounts in Ontario with out of country operations instead of within Ontario supplies. These decisions are made for a variety of reasons, including more consistent and reliable supplies from their US locations and lower operating costs (higher margins) from out of province supply sources.

- ***Incentives provided by neighbouring US states***. Large Ontario-based greenhouse operators are expanding in neighbouring US states because of lower cost labour, lower cost of doing business, and incentives provided by local and state governments. These incentives limit expansion of Ontario greenhouse operators. The same factors can affect large scale field vegetable operations, also limiting expansion by some large Ontario growers.
- ***Obtaining direct access to buyers and resulting profit margins***. Large growers can deal directly with food service and retail buyers. But smaller growers typically work with a marketer as a contract grower who pays a commission to the marketer or the marketer directly purchases the product before reselling it. For smaller growers, there is a lower profit margin that can limit potential expansion due to the resulting financial outcome. Tender tree fruit and fresh grape growers have direct access to buyers through the collective marketing action through their marketing boards and associated dealer/agents.
- ***Retailer and food service demand for year-round consistent supply and quality***. Buyers for retailers and food service operations want consistent supply and quality throughout the year. Suppliers must deliver on these attributes to keep the business, leading suppliers (i.e., marketers) to use supply chains with these attributes. Given the weather variability in Ontario, there is a limit on the percentage of the annual supply there is from Ontario growers (or their own Ontario operations). As an example, a two-week delay in planting in the spring can affect supply if redundancies are not built into their supply source schedule. Protected agriculture – greenhouses, high tunnel (hoop houses), or vertical farming – provide a more consistent supply by minimizing weather risks.

4

Crops Selected for Further Analysis

In this section, the analysis of crops with the potential for expansion is summarized in more detail in later sections. As outlined above, crops selected can be grown outside of the Niagara region with minimal production risk and muck crops are excluded since production acres are limited.

4.1 Criteria Used to Select Crops

Many crops can be considered based on factors highlighted in previous sections. The criteria used to select from the possible crops include:

- More local product during harvest season that does not disrupt existing local supply/demand balance and grower returns
- New product offerings that have attributes preferred by consumers
- Provides for a year-round supply offering of local Ontario-grown products
- Can extend the harvest season
- Availability of extended or improved storage for storable crops
- Additional production that can be readily shipped into export markets
- Trend of production (or acreage) increase
- Ability to machine harvest the crop

The first criterion ensures any additional local production does not disrupt the existing supply demand balance during the Ontario harvest season. When the local market is still reliant on imports during the Ontario harvest season, an expansion will not cause returns to be lowered when pricing is based on import replacement prices. When Ontario production is ~2% of supply, more local production should not be disruptive, with garlic as an example. Additional production of crops that currently move into export markets should not be disruptive if the additional supply is directed into established export markets.

New product offerings with attributes preferred by consumers is another criterion. A product line expansion such as a new variety with different attributes can deliver incremental growth. This can include product attributes associated with imported product – but not yet part of the local supply offering – like Ontario-grown seedless fresh grapes.

The potential of a year-round supply offering of local Ontario grown products can be achieved through crops that can be stored, and those that can be grown in a controlled environment such as greenhouses and vertical farms. This feature reduces reliance on imports and satisfies buyers that desire local product 365 days of the year.

A longer harvest season provides a longer time frame to market non-storable fresh fruits and vegetables. Extending the season can be achieved through cultivar selection, plant breeding programs, and other technologies/management practices. The expanded strawberry harvest period is one example.

Crops that can be machine harvested usually have a cost advantage over hand harvested crops, as labour costs can approach 50% of the cost of goods (or final sales value). Assuming all other production factors are constant, machine harvesting is conducive to crop production expansion.

Crops that can be stored extend the time when Ontario production can supply the local market. Storage technologies and cultivar selection for varieties that allow for a longer storage life are two approaches to extend the storage season. Pears are a good example of a crop that offers this opportunity.

Any crop considered for expansion does not need to meet all the criteria listed but should meet many of them. The only exception is that any crop selected should ensure that expansion does not disrupt the harvest period, the supply/demand balance and lower grower returns. The crops selected and how the criteria apply to each of the selected crops is covered in Table 4.1.

Table 4.1 *Criteria and Crops Selected*

Crop	Non-disruptive expansion	New attribute offering	Year-round supply	Harvest period expansion	Machine harvest	Post-harvest storage	Production trend
Fresh grapes	Y	Y		Y			Y
Pears	Y	Y		Y		Y	Y
Strawberries	Y			Y			Y
Apples	Y	Y	Y		*y*	Y	
Garlic	Y		Y		Y	Y	Y
Eggplant	Y	Y					Y
Sweet potatoes	*y*		Y	Y	Y	Y	
Snap beans	Y				*y*		Y
Cabbage	*y*	Y	Y		*y*	Y	
Vertical farm	Y	Y	Y	Y	*y*		Y

A brief overview of these crops and vertical farm operations are provided, with a separate analysis in following sections of this report.

4.2 Fruit Crops Selected

Pears, fresh grapes, strawberries, and apples are the fruit crops selected for further examination, and all have the following opportunities:

- Replacing imports during the harvest season without disrupting the local market
- Their production and/or acreage is growing
- The harvest period has the opportunity for expansion
- Different product attributes can be provided
- Pears and apples can be stored and marketed in the post-harvest season
- These field crops can be grown outside of the Niagara region

Ontario imports more than 60 million lb. of ***pears*** in a year and produces just under 7 million lb., indicating there is a significant opportunity to replace some imports since pears can be stored for a number of months. Pears can be grown along the north shore of Lake Erie and in a band between Lake Erie and Lake Huron (Figure 2.3). Farmland is available in these regions that will not displace other fruit crops, and soil types suitable to pear production are also available. There are production constraints to be resolved such as the fire blight bacterial infection that can kill off an orchard, but varieties can be adapted to Ontario conditions that are fire blight resistant. Supporting infrastructure such as adequate post-harvest storage and links to marketers are constraints outside of Niagara that can be addressed.

Fresh grape production in Ontario is around 4 million lb., which is less than 3% of estimated consumption in the province and suggests a significant opportunity. The predominant variety in Ontario is Sovereign Coronation, which has a blue skin and is not seedless. The challenge is to scout for and/or develop a seedless variety that has the colour, taste, and texture desired by the average consumer, and can be grown in Ontario. Fresh grapes can be grown outside of the Niagara region along the North Shore of Lake Erie in the Kent, Essex region (Figure 3.2). Supporting infrastructure and access to the market is also required for growers outside of the traditional fresh grape growing region.

Strawberry production is increasing for field grown and greenhouse grown. New varieties and ever bearing varieties provide a much longer harvest period for field grown strawberries, and year-round production can occur in greenhouse operations. High quality, locally grown strawberries have the opportunity to supply a much larger portion of the market.

Apples are a storable crop and currently Ontario's apple production base supplies just over 50% of consumption of apples and apple products in the province. The expansion opportunity is to supply a larger portion of the fresh apple market requirement in Ontario as well as in neighbouring provinces and in select export markets.

4.3 Vegetable Crops Selected

Garlic, eggplant, sweet potatoes, snap beans, and cabbage are the vegetables selected for further examination.

Ontario is the only producer of ***garlic*** in Canada with 800 acres and 800 to 1,000 tons of product (Table 2.2). Most of the imported supply is from China, Spain, or France. Garlic acres could significantly increase over the current acreage base, and the crop can be grown in a number of soil types ranging from sandy soils to clay-loam soils. Expansion can occur in regions across southern Ontario with these soil types. Expansion requires grower education and experience with a crop that is planted in the early fall (like winter wheat), disease-free seed cloves, use of labour saving technologies such as machine harvesting, and proper processing and storage to supply garlic from the July harvest period through to the following spring.

Eggplant is a relatively new crop in the province, with Statistics Canada first reporting acres in 2019. Eggplant is grown on just over 200 acres, producing around 1,500 tons of product. It is currently only field-grown in Ontario and around 98% of supply comes from imports. The expansion potential is significant in the province. As a nightshade plant, like tomatoes, production is required in the warmer growing regions of the province. Seedlings are planted in the spring once the risk of frost is minimal, and harvest occurs between August and October. Eggplant production does require hand harvesting that brings an associated labour requirement. Expansion can occur through varietal development for Ontario growing conditions, as well as grower education and experience. Developing links between some growers and marketers to access certain market channels will help with expansion.

Ontario is the largest producer of ***sweet potatoes*** in Canada with 1,800 acres and 10,000 tons of production. In the last few years, Ontario has exported 2,200 tonnes of sweet potatoes and imported 44,000 tonnes. Since 2013, Ontario's net imports of sweet potatoes increased from 38,500 tonnes to 42,000 tonnes in 2018. Canada-wide exports increased from virtually no exports in 2013 to 37,000 tonnes in 2018, while imports were 72,000 tonnes. Net Canadian imports decreased from 50,000 tonnes in 2013 to 35,000 tonnes in 2018 suggesting that sweet potatoes are re-exported through Canada. Sweet potatoes are a warm climate crop, and seedlings must start in a greenhouse/hothouse prior to planting in a sand-loam field near Lake Erie, such as in parts of Brant and Norfolk regions. Seedlings are currently imported from southern US states. There is an opportunity to supply these by Ontario-based propagators. Cultivar selection, agronomic services, and storage/marketing are needed to displace imported supplies.

Ontario farmers grow ***snap beans*** for the fresh market and for the processing market. Production of snap beans has been increasing as well as consumption. For fresh market snap beans, production has been increasing and there is an opportunity to replace imports that occur during the summer growing season. Expansion of processed snap bean production depends on vegetable processors investing in processing plant expansion.

Cabbage is a cole crop that is well suited to Ontario's growing regions with over $33 million in farm value in a crop year. Regular cabbage has a long storage season, which allows the local crop to supply market requirements for most of the year. In addition to replacing imports, both regular cabbage and Chinese cabbage currently supply export markets and have an opportunity to expand sales into these markets.

4.4 Vertical Farming and Produce Expansion

Vertical farming has only recently begun in the province, with current operations providing microgreens and leafy vegetables. Vertical farms offer the promise of year-round production and supplying non-storable fruits such as strawberries, and non-root crop vegetables such as tomatoes, cucumbers, and eggplant. The vertical farm concept can be located in urban areas or the fringe of the urban area to limit transportation requirements. Vertical farm production can be located in the Greenbelt and help to expand fruit and vegetable production within Ontario without disrupting the local market.

Photo courtesy of Sarah Marshall, Ontario Tender Fruit

5

Fresh Grapes

There is opportunity for expansion of fresh grapes production in Ontario. Cultivars from other cold growing regions – or development of new cultivars – are needed to support a significant expansion of fresh grape production in the province.

5.1 Supply and Disposition Overview

Ontario fresh grape production has ranged between 1,360 tonnes to 1,859 tonnes (4.1 million lb.) over the last few years (Table 5.1). This volume is overshadowed by the imports of more than 100,000 tonnes (220 million lb.) of fresh grapes, with imports at Ontario border points in the 2018 crop year being 123,046 tonnes. Ontario production plus imports supplied Ontario with 124,586 tonnes in the period from July 2018 to June 2019 (Table 5.1) –Ontario's crop was 2.3% of this supply volume. A good portion of the imports is shipped to other provinces.

Table 5.1 *Supply and Disposition of Fresh Grapes, Ontario Crop Year 2014 to 2018*

Item	2014 Crop	2015 Crop	2016 Crop	2017 Crop	2018 Crop
Ontario production (tonnes)	1,761	1,763	1,360	1,859	1,540
Imports at Ontario border points (tonnes)	109,270	106,301	118,158	117,107	123,046
Ontario supply (tonnes)	111,031	108,063	119,518	118,966	124,586
Ontario consumption (using national average) (tonnes)	60,734	63,327	59,803	61,774	65,598
Ontario grapes shipped to other provinces (tonnes)	1,074	1,075	734	855	955
Exports from Ontario border points (tonnes)	1,737	1,595	1,173	2,960	1,619
Additional Ontario consumption and inter-provincial shipments (tonnes)	48,560	43,142	58,542	54,232	57,369
Production to consumption ratio (%)	2.9%	2.8%	2.3%	3.0%	2.3%
Net Ontario grape consumption share (%)	1.1%	1.1%	1.0%	1.6%	0.9%

Source: OTFG for production, Statistics Canada Table: 32-10-0054-01 (food available in Canada), and Statistics Canada, CATSNET Analytics, Ontario imports and exports of selected fruit by July/June crop year

Statistics Canada reports the per capita consumption of fresh grapes across Canada was 4.58 kg/person (10.1 lb./person) in 2018. Using this national value to represent consumption by the average Ontarian, province wide consumption of fresh grapes is estimated at 65,598 tonnes in the 2018 crop year. This consumption is larger than the Ontario supply of 124,586 tonnes, indicating that wholesalers and importers use an Ontario border crossing to import grapes and ship them to other provinces. The Ontario grower share of Ontario consumption ranged between 2.3% to 3.0%, on an annual basis.

The Ontario Fresh Grape Growers' Marketing Board (OFGGMB) reports that in an average year just over 50% of Ontario's fresh grape production is shipped to other provinces, mostly Quebec. This results in Ontario-produced fresh grapes accounting for between 0.9% and 1.6% of Ontario annual grape consumption. For the approximately two months of Ontario fresh grape sales, there is a 5% to 10% share of Ontario grape consumption.

5.2 Production Expansion Opportunity

There is an opportunity to increase Ontario market share of fresh grapes – 16.7% of the market – during the August and September harvest period. If Ontario fresh grapes can achieve a 50% market share during the two harvest months, this would represent an 8.3% share compared to the current 2.3% to 3.0% share (and the 0.9% to 1.6% share after accounting for Ontario fresh grapes shipped to other provinces).

The opportunity is an eight-fold increase in production, assuming Ontario fresh grapes can have a 50% market share during the harvest period. For the current base of 91 growers, with 465 acres in production, this is an opportunity to plant another 3,720 acres in fresh grapes in southwestern Ontario. At $7,000 in gross revenue per acre, this represents $26.4 million in farm gate value.

Expansion can be based on various attributes including a longer harvest period, different colour (red or green), a larger berry, and a crisper berry with longer shelf life.

5.3 Expansion Constraints and Impediments

A Fresh Grape that Responds to Market Requirement

More than 90% of fresh grapes grown in Ontario are the Coronation variety with a dark blue, soft skin. There are not expansion opportunities for this variety, other than extending the harvest window. There are opportunities to produce fresh seedless grapes – red or green in colour – with a larger berry size and a crisper berry skin.

The crisper berry skin, which contrasts with the soft skin of the Coronation variety, allows for a longer shelf life and short-term storage. A longer shelf life, on its own, provides opportunity for expansion.

A larger seedless berry would compete directly with the imported fresh grapes and allow for replacement of imports during the harvest season.

Research and Cultivar Selection for Fresh Grape Production

Providing fresh grapes with desired attributes requires resources dedicated to cultivar selection and/or development for Ontario growing conditions.

Cultivar selection involves scouting similar growing areas around the world for grape varieties that offer attributes wanted for Ontario. These attributes include those in demand by the marketplace and those needed to produce fresh grapes, such as winter hardiness, disease tolerance/resistance and yield. Vineland Research and Innovation Centre (VRIC) has a technology scout that can identify cultivars for possible use in Ontario. Expansion of fresh grapes requires dedication of resources to cultivar identification and resulting trials for possible use in Ontario.

A fresh grape breeding program would also benefit the fresh grape industry. This type of program would focus on variety development for fresh grapes to be grown in specific regions and with the desired attributes – winter hardiness, disease tolerance, large berry, colour, skin texture, taste, etc. A breeding program at the University of Guelph or at VRIC should complement a cultivar selection program focused on expanding Ontario fresh grape production.

Location of Production

Fresh grapes are mostly grown in the Niagara region where there is minimal opportunity for expanding fruit production acres. Production expansion could occur along the north shore of Lake Erie in southwestern Ontario. Grapes for wine production are grown in this southwestern region, and fresh table grapes can also be grown there.

Figure 5.1 shows where table and vinifera grapes are currently grown in southwestern Ontario, suggesting expansion is possible close to the Lake Erie shore in Essex County.

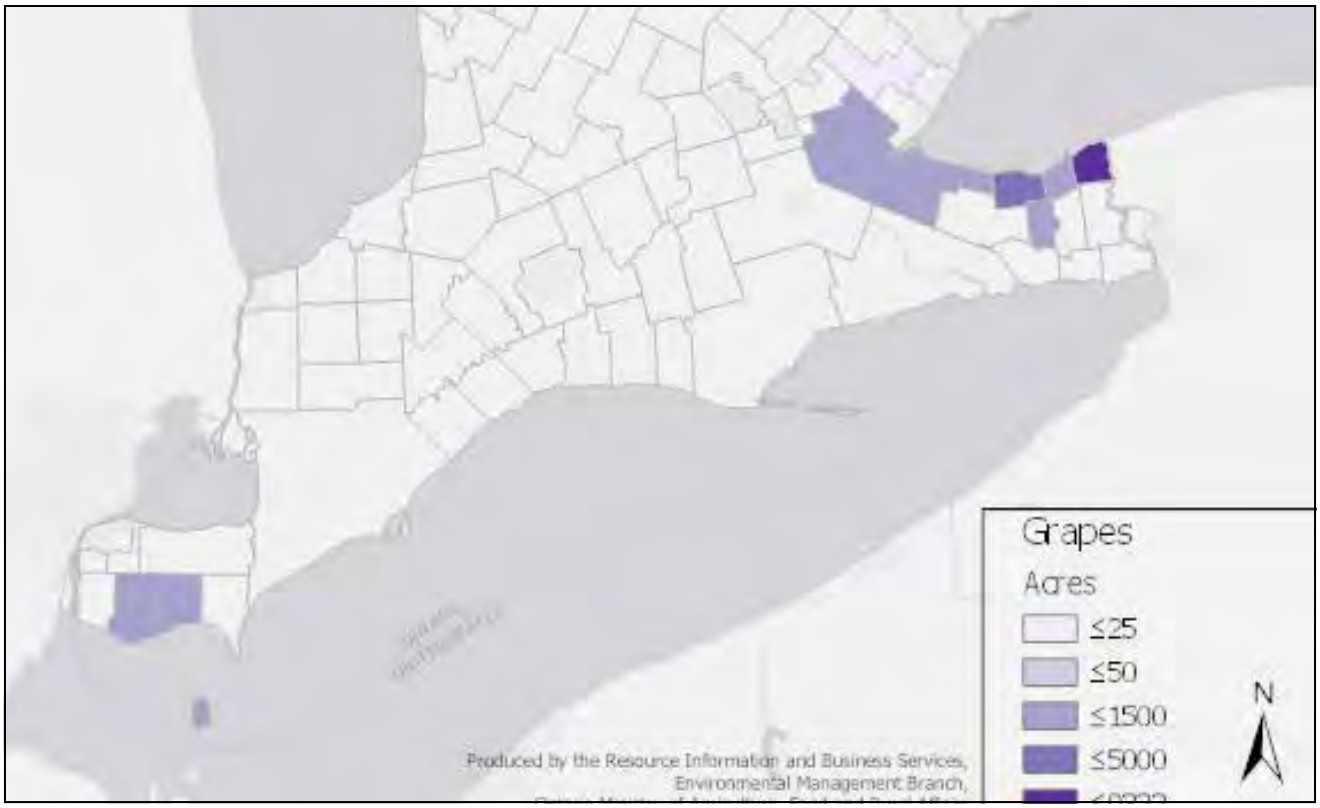

Figure 5.1 *Location of All Grape Production in Ontario*

Source: Statistics Canada – 2016 Census of Agriculture with maps provided by the OMAFRA

Winter hardiness is a critical issue that affects the location of grape production. One measure is the temperature when 10% of the primary buds are killed by the cold temperature, and another measure is when 50% of buds are damaged by winterkill. These measures can vary by grape variety, ranging between -150C to -200C for the 10% winterkill measure, and each variety having a different critical winterkill point.

With cultivar selection and variety development focused on winter hardiness, table grapes can be grown in the extreme southwestern part of Ontario. There is also the opportunity to grow varieties on the Lake Erie shore in the regions of Chatham-Kent, Elgin, and Norfolk.

Expansion will likely be by existing growers outside of the Niagara region, and by Niagara-based growers willing to expand their operation in other parts of the province.

Fresh Grape Grower Returns

Grower returns were $0.88/lb. for the 2017 and 2018 fresh grape crops, not including packaging and marketing costs. With a yield of 10,000 lb./acre, total grower costs are estimated to be under $0.70/lb., suggesting a profit margin that is favourable to acreage expansion.

The OFGGMB establishes grower returns, in consultation with the licensed dealers, to determine a wholesale value that accounts for import competition. The OFGGMB has the regulatory authority to establish a wholesale price (fresh grapes packaged and ready for shipment by licensed dealers), and the established price applies to all fresh grapes that meet the quality standard. Grower returns equal the

established wholesale value minus applicable package and marketing costs. In the 2017 and 2018 crop year, the wholesale value of Ontario fresh grapes in the Niagara region for delivery into distribution centres was $1.29/lb. to $1.30/lb., effective the middle of August when grape harvest begins. After average freight costs to distribution centres, the product value was $1.35/lb. to $1.36/lb. [12].

Fresh Grape Market Returns

Crop year average prices of fresh grapes imported from the US into Ontario are provided in Table 5.2, with the 2017 crop year average at $1.35/lb. and the 2018 crop year average at $1.27/lb.

Table 5.2 *Border Prices for Fresh Grape Imports into Ontario, Crop year 2014/15 to 2018/19*

Units	2014-2015	2015-2016	2016-2017	2017-2018	2018-2019
$/kg	$2.61	$3.06	$3.03	$2.97	$2.81
$/lb.	$1.18	$1.39	$1.37	$1.35	$1.27

Source: Statistics Canada, CATSNET Analytics, Ontario imports of selected fruit by July/June crop year

12 JRG Consulting Group, "Economic Impact of the Ontario Tree Fruits and Fresh Grapes" prepared for OAG, OTFG, and OFGGMB, October 2019.

In the pre-harvest season, fresh grape prices are much higher. Figure 5.2 shows the value of US fresh grapes at the Canadian border on a monthly basis, with the value shown in Canadian dollars. In 2019 the average monthly import value was $1.52 in June, which decreased to $1.29 in July and was valued at $1.08/lb. in August, the low price of the year.

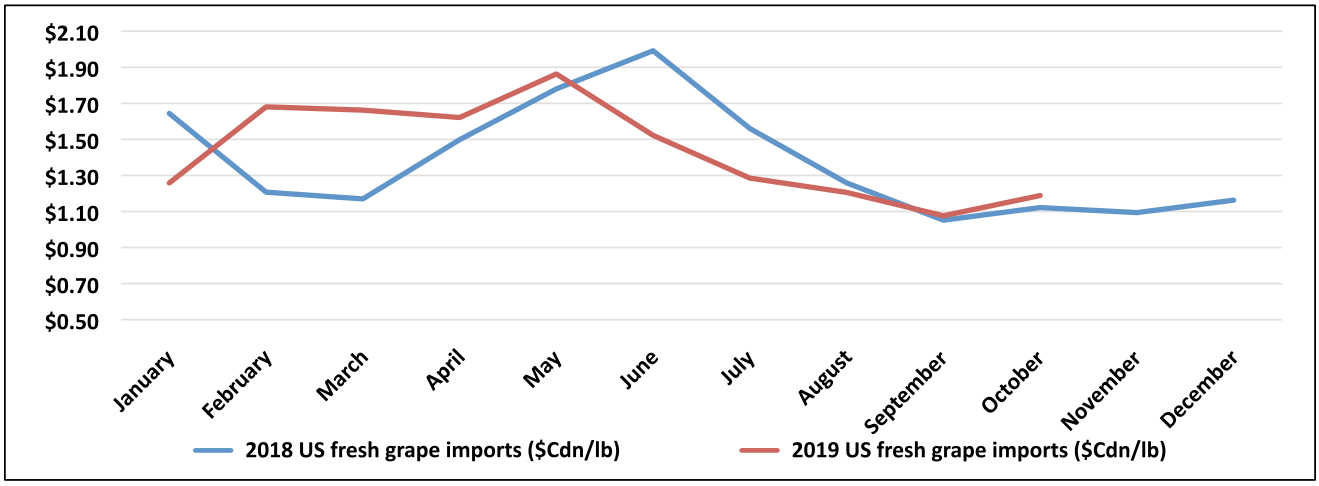

Figure 5.2 *US Fresh Grape Prices at the Canadian Border ($/lb.)*

Source: USDA GATS

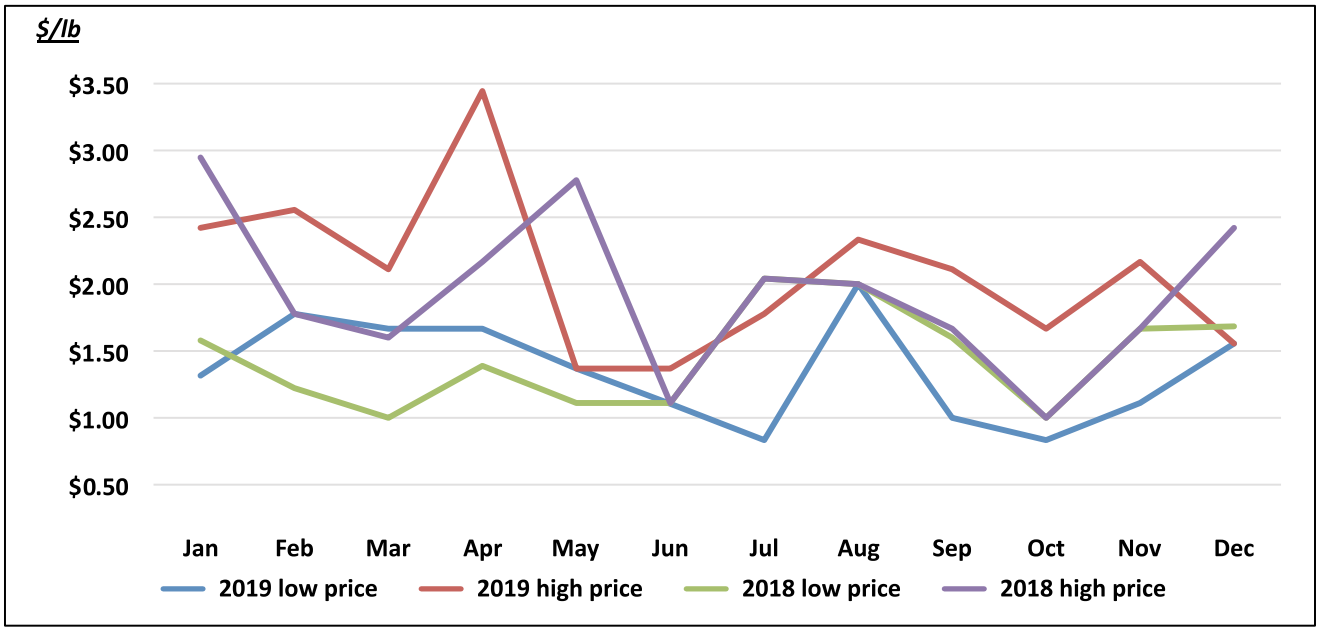

Figure 5.3 *Monthly Fresh Grape Prices at the Ontario Food Terminal, 2018 and 2019*

Source: InfoHort

The average low price for red grapes were $1.80/lb. in 2018 and $1.50/ lb. in 2019 for the August and September period at the Ontario Food Terminal, with the average high price in the same periods at $1.33/ lb. and $1.89/lb. Figure 5.3 illustrates the monthly high and low prices for red grapes at the Ontario Food Terminal. These average prices during the Ontario fresh grape harvest support the expansion of Ontario fresh grape production.

Marketing of Fresh Grapes

Ontario fresh grapes are almost exclusively marketed by dealers licensed by the OFGGMB – there are 10 dealers and less than five are the major marketers of Ontario fresh grapes. With a pre-determined price for retail sales, these dealers do not compete against each other on price, but on other attributes including customer relationships with retailers. The major competition for these marketers is imported fresh grapes.

Retail Level

Ontario retailers support the promotion of Ontario fresh grapes. Given the supply volumes, this is not a constraint to expansion. Retailers would like to see Ontario fresh grapes supplied over a longer time frame.

5.4 Factors That Will Enable Expansion

The following factors will support the expansion of fresh grape production in Ontario:

- Cultivar selection and/or a plant breeding program focused on attributes such as a longer harvest period, larger berries, red and green in colour, and crisper skin
- Ongoing promotion by Foodland Ontario of Ontario-grown fresh grapes and the product offerings (based on the new varieties)
- Access to crop protection materials used by US counterparts
- Expansion of fresh grape acreage outside of the Niagara region

6

Pears

Expanding pear production requires an investment by growers into high density pear production and pear varieties tolerant to fireblight that affects the two popular varieties grown in the province today. A focus on product appearance can also assist sales at retail.

6.1 Supply and Disposition Overview

As a storable tree fruit, Ontario's pear production was 12% of estimated provincial consumption volumes (Table 6.1) for the last two crop years, using Canada-wide per capita consumption values for Ontario's consumption. Imported pears are the major supply source. Based on using these national per capita consumption values, with about 26,500 tonnes of pear consumption in a year, the supply data suggests that around 25% of the provincial supply (based mostly on imports) is shipped into other provinces. The import data is based on the border of clearance, which can result in some imports being shipped inter-provincially, such as into Quebec. Ontario could be consuming a portion of this volume due to a higher per capita consumption than the national average.

Table 6.1 *Supply and Disposition of Pears, Ontario Crop Year 2014 to 2018*

Item	2014 Crop	2015 Crop	2016 Crop	2017 Crop	2018 Crop
Ontario production (tonnes)	2,274	3,231	2,747	3,002	3,135
Imports at Ontario border points (tonnes)	36,471	32,379	33,633	31,248	32,341
Ontario supply (tonnes)	38,745	35,610	36,380	34,250	35,476
Ontario consumption (using national average) (tonnes)	30,095	29,196	26,918	25,469	26,497
Exports from Ontario border points (tonnes)	55	0	0	24	0
Additional Ontario consumption and inter-provincial shipments (tonnes)	8,595	6,413	9,462	8,757	8,979
Production to consumption ratio (%)	8%	11%	10%	12%	12%

Source: Statistics Canada Table 32-10-0365-01 for production, Statistics Canada Table: 32-10-0054-01 (food available in Canada), and Statistics Canada, CATSNET Analytics, Ontario imports and exports of selected fruit by July/June crop year

6.2 Production Expansion Opportunity

Pears can be stored for four to six months, depending on the variety, which suggests the potential for Ontario production to expand and supply more than 75% of consumption requirements for one-third of the year, or more. The pear harvest begins in August and quality pears coming out of storage can be available into December. Assuming minimal seasonality in pear consumption, this represents a 6,500 tonne opportunity[13]. At this volume, Ontario growers would be supplying just under 25% of the Ontario market, a doubling of the current 12% share.

From a production base of just over 3,000 tonnes, pear production has the potential to expand by 100% over current volumes (based on the 6,500 tonne opportunity). If there is distinct seasonality to pear consumption –with higher levels in the North American harvest periods – the opportunity could exceed this doubling of production. During the harvest and post-harvest storage season, a larger production base has the opportunity to displace most imports.

Another 3,000 tonnes of pear production provides an additional $5.0 million in farm gate revenues for growers of pears.

6.3 Expansion Constraints and Impediments

Planting of Disease Tolerant Varieties

The main constraint to expanded pear production is growers having access to varieties that are tolerant to fireblight bacteria. The two major varieties currently in production, Bartlett and Bosc, can be affected by fireblight. Expansion could occur with cultivars that are more tolerant of the fireblight disease. There are varieties available in Ontario with fireblight tolerance including Harrow Gold, Harrow Crisp, Cold Snap, and Harrow Sweet.

Vineland Research and Innovation Centre is working with the Ontario pear industry to develop varieties that are fireblight tolerant and conducive to high-density production. Sufficient resources are required to result in the innovation needed for pear expansion.

Growers Investing in High-Density Pear Production

High-density pear production results in a higher profit margin over the more traditional standard tree density, suggesting any expansion must be on this high-density trellis type production. The capital costs over four years can exceed $47,000/acre while the orchard comes into production, and after seven years' overall revenues begin to exceed accumulated costs. After this start-up period, annual EBITDA (earnings before interest, taxes, depreciation, and amortization) can be $24,000/acre[14].

This profitability level is based on a grower achieving gross revenues of $37,900/acre based on a yield of 25 tons/acre (22.7 tonnes/acre) and a farm price of $0.75/lb. ($1.65/kg).

13 Four months of 26,500 tonnes of annual consumption is 8,745 tones and a 75% market share in this period represents 6,559 tonnes.

14 Source is the OMAFRA "Ontario Tender Fruit Establishment and Production Costs – 2018 Economic Report". The breakeven analysis used in the report is based on a yield of 25 tons/acre and a farm price of $0.75/lb. ($1.65/kg).

Investments in new high-density orchards should be with varieties that perform well in high-density production, are fireblight tolerant varieties, and present well when on retail shelves. New plantings can also be with varieties that offer some differentiable attributes over the more traditional varieties of Bartlett and Bosc pears including a longer harvest window, pear taste and texture, and performance using the cold storage or controlled atmospheric storage.

Organic pears are also an opportunity, given the absence of organic pears in Eastern Canada. Organic pears are imported into the province from either British Columbia or the US.

A challenge for growers is that a pear tree has a productive life of around 50 years. This life span impacts whether to replace an existing orchard or invest in high-density pear production, despite the higher returns of high-density production once the tree bears fruit. For growers with the land base to expand, investing in additional high-density acreage and retaining the existing orchard is an option.

Location of Pear Production

There are a number of areas in Ontario where pears can be grown, generally in the same areas where apples are grown. Figure 2.3 indicates that pears can be grown along the north shore of Lake Erie and in band from Elgin County to the southern part of Lake Huron. Existing pear acreage as reported by the 2016 Census of Agriculture in Figure 6.1 shows the location of pear production in southern Ontario and suggests that where pears can be grown should not be a limiting factor. The Norfolk area – where growers have expertise in apple production – is one area with potential for expansion of pear production.

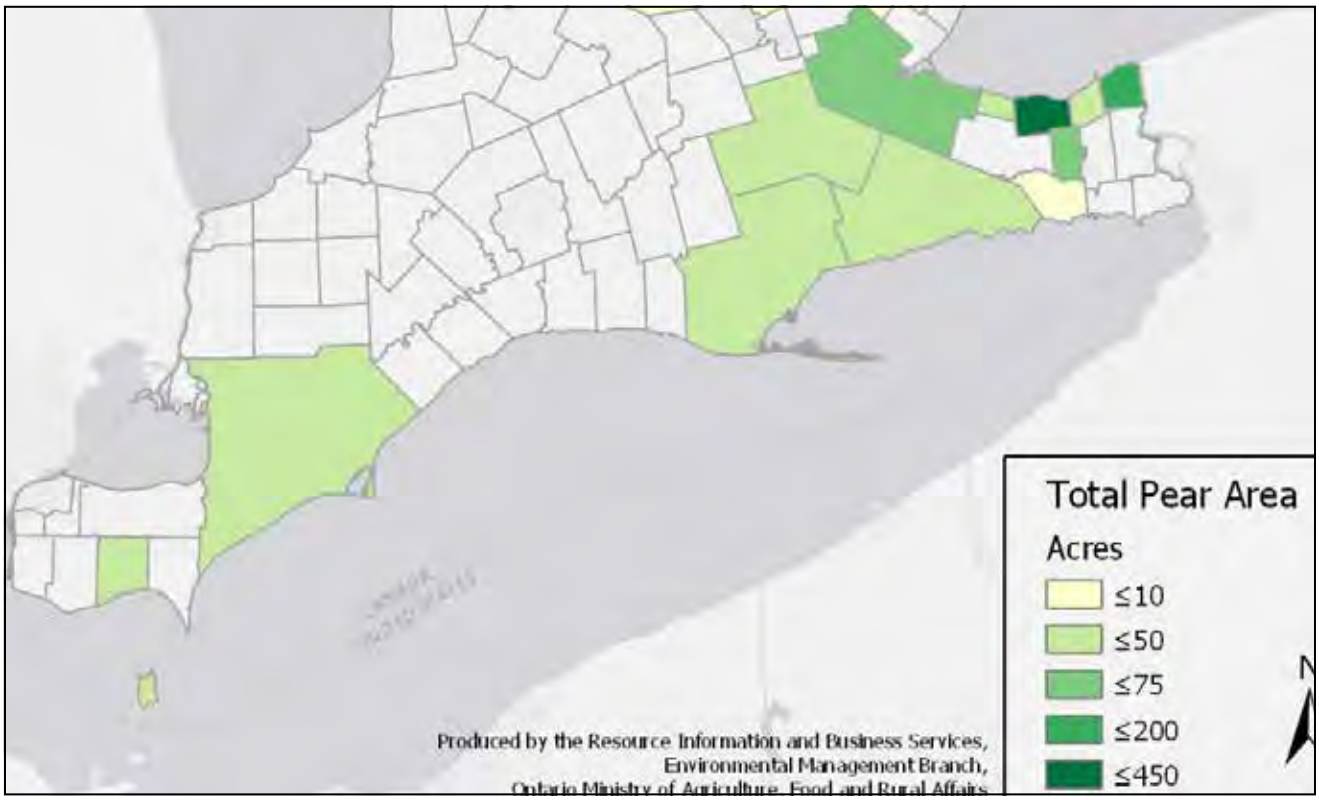

Figure 6.1 *Location of Pear Production in Ontario*

Source: Statistics Canada – 2016 Census of Agriculture with maps provided by the OMAFRA

Expansion by Existing Pear or Apple Growers

The areas suitable for expansion include regions such as Norfolk where there is apple production. Pear production is more similar to apple production than other tree fruits. An opportunity is for apple growers to diversify their operations by expanding tree fruit acres by adding pear acres. Industry representatives indicate that some apple growers grow pears as well. Given the location of much pear production is in the Niagara region, the growing expertise of apple growers can be leveraged into pear production.

Extending the Pear Market through Controlled Atmospheric Storage

Pears can be stored for four to six months, depending on the variety and storage conditions. Storage extends the marketing season for Ontario pears, particularly as production volumes increase. The quality of the fruit is enhanced through controlled atmospheric storage, but it is more costly than cold storage.

Most pears are stored by Ontario's pear marketers so they can provide an on-going supply of Ontario pears to retail distribution centres. As production expands, more investment is required in controlled atmospheric storage for pears. As production expands outside of the Niagara region, new storage will likely be needed where the expansion occurs.

Pear Grower Returns

Pear varieties planted must be in demand in the market to achieve a farm price of $0.75/lb., and the variety must be resistant to disease pressure and have sufficient winter cold tolerance. Some locations in southern Ontario have a lower risk of adverse weather events such as a late spring frost, or abnormally harsh winter conditions.

Grower returns for fresh market pears are established each year by the Ontario Tender Fruit Growers (OTFG), a marketing board with price setting authority. Prices are established by OTFG for packaged fruit ready to be delivered into retailer distribution centres. A number of dealer/marketers are licensed by OTFG to market fresh pears on behalf of all pear growers in the retail channel.

This marketing system provides the average grower with an available market channel to sell fresh pears to retailers. A number of the OTFG licensed dealer/marketers are also grower co-operatives or grower owned, which can help align grower and marketer interests.

The fresh market pear marketing system establishes a price for pears in advance of the harvest season – the price received by all growers for the same quality of product. Prices established for Ontario pears take into account the price of imported pears during the harvest season.

Pear growers received $0.76/lb. on average for Bosc pears and $0.64/lb. for Bartlett pears for their 2018 crop[15]. Prices received were slightly lower for the 2017 crop with a $0.71/lb. for Bosc pears and $0.60/lb. for Bartlett pears. The farm price does not include packaging and marketing costs which are part of the wholesale price.

Prices received by pear growers are affected by landed import values, with the average import value ranging between $0.74/lb. and $0.78/lb. over the last three crop years, as shown in Table 6.2.

15 As reported in the OTFG Annual Report.

Table 6.2 *Border Prices for Pear Imports into Ontario, Crop year 2014/15 to 2018/19*

Units	2014-2015	2015-2016	2016-2017	2017-2018	2018-2019
$/kg	$1.60	$1.83	$1.71	$1.73	$1.63
$/lb.	$0.73	$0.83	$0.78	$0.78	$0.74

Source: Statistics Canada, CATSNET Analytics, Ontario imports of selected fruit by July/June crop year

Marketing of Pears and Wholesale Pear Returns

Prices at the Canadian border show some seasonal variability with prices above yearly averages in the summer period prior to harvest season, as shown in Figure 6.2.

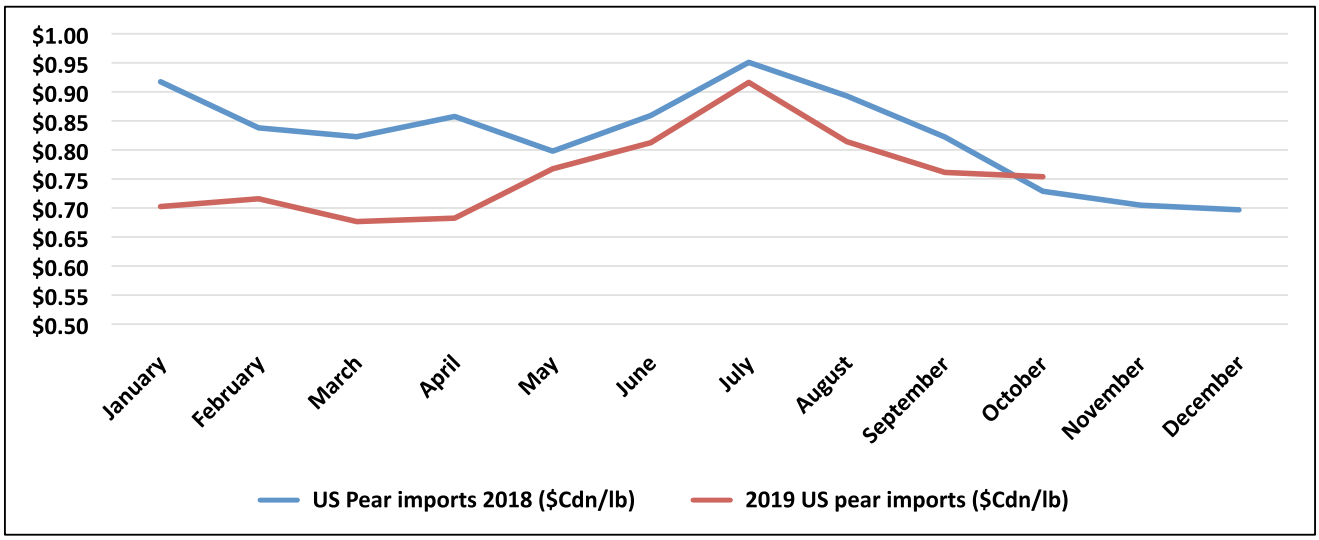

Figure 6.2 *US Pear Prices at the Canadian Border ($/lb.)*

Source: USDA GATS

The price pattern shown in Figure 6.2 suggests early harvested pears may provide greater returns than those harvested later in the harvest season.

Marketers of Ontario pears are licensed by the OTFG, with these dealers marketing the Ontario pear crop using the wholesale prices established by the OTFG. Wholesale prices of all Ontario pears that are packaged and ready for delivery to a retail warehouse were $0.91/lb. on average for the 2018 crop. These marketers work with retailers to market the crop. Some marketers have controlled atmospheric storage that provides a longer marketing season for stored pears.

Figure 6.3 provides minimum and maximum prices paid at the Ontario Food Terminal (OFT) for Bartlett pears on a monthly basis. In 2018, the minimum price average was $0.93/lb. and $1.02/lb. in 2019. In the August to December period, the minimum prices at the OFT were $0.96/lb. in 2018 and $0.98/lb. in 2019 for Bartlett pears. Most of these pears traded at the Terminal were imported pears. These prices indicate that Ontario pears were competitively price, given the established wholesale values before considering freight costs (of $0.05/lb. to $0.08/lb.).

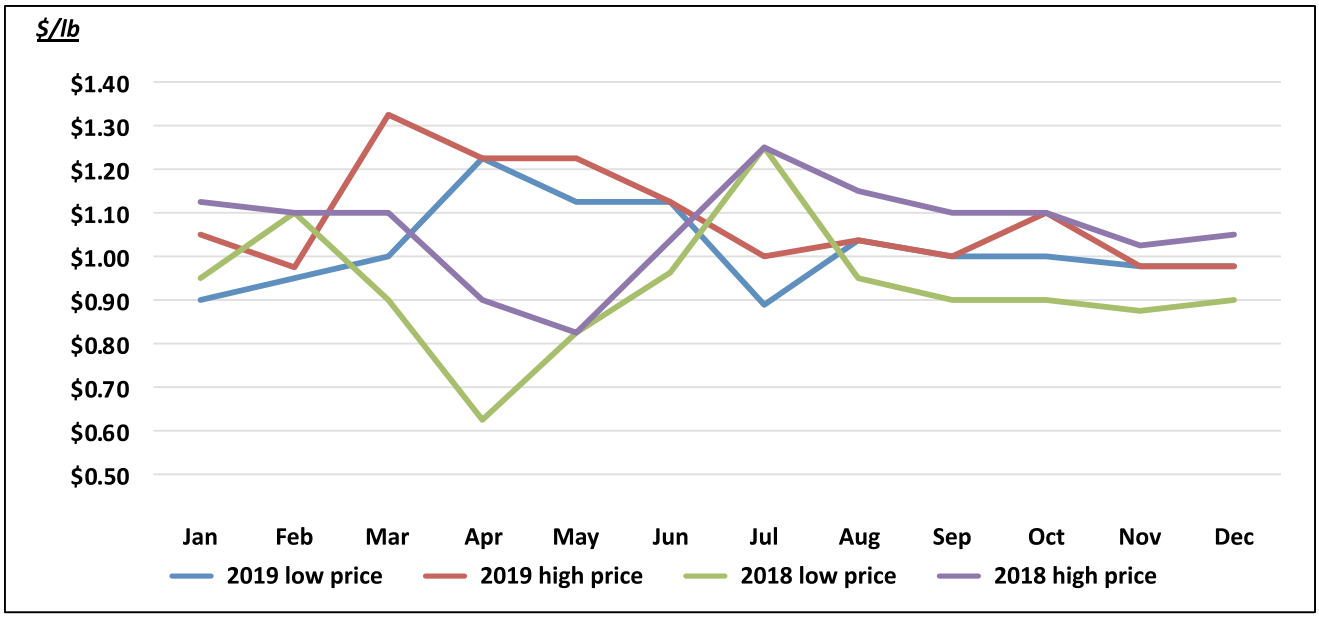

Figure 6.3 *Monthly Bartlett Pear Prices at the Ontario Food Terminal, 2018 and 2019*

Source: InfoHort (using prices for Bartlett pears and using Bosc prices in months where Bartlett prices not reported).

The price of Ontario-grown pears has been increasing at the wholesale level over the last number of years. With the low market share of pears today – and expansion of pear production not likely to create excess supply of Ontario pears in the Ontario market during the harvest and post-harvest season – the risk of needing to export surplus pears and receive lower returns is low with more Ontario-grown pears available into retail distribution channels.

Pears in the Retail Channel

Marketers of Ontario pears indicate that Ontario retailers are supportive of, and help promote, Ontario pears. Ontario competes with Washington State pears in the late summer and fall. More Ontario production should be a direct substitution of pears from Washington State. As more production comes on stream, Ontario pear marketers will need to inform retailers of expected pear volumes so the retail buyer can plan when their supply source shifts to an import supplier.

Finding a local market for Ontario pears is not a limiting factor for expanding production. Retailers are supportive of more local pear production and sales volumes through their operations.

Some retailers suggest that an improvement in the appearance of pears is beneficial to expansion. The appearance of Ontario-grown pears does not always compare to imported pears and that can affect consumer uptake of Ontario grown pears.

6.4 Factors That Will Enable Expansion

Several factors will help expand pear production in Ontario:

- Cultivar selection and/or a plant breeding program focused on differentiable attributes, product appearance, and on fireblight bacteria tolerance
- Growers investing in high-density pear orchards
- Investment in controlled atmospheric storage facilities to extend the marketing season for Ontario pears
- The pear industry investigating what factors are controllable to improve the appearance of Ontario pears when on display at retail, compared to imported pears
- Ongoing promotion by Foodland Ontario of Ontario-grown pears and the product offerings (based on the new varieties)
- Retailer support and sale of Ontario-grown pears
- Access to crop protection materials used by US counterparts
- Expansion of pear production outside of the Niagara region

7

Strawberries

Opportunity exists to expand strawberry production for sale into retail market channels based on the extended harvest season with day-neutral strawberries. One constraint to be addressed is having the same access to major retail accounts with Ontario-grown strawberries at the end of the traditional harvest period, compared to the access afforded by retailers for Ontario's traditional June strawberry crop. Another constraint is competing with the cost of imported day-neutral strawberries from California in the July to October period.

7.1 Supply and Disposition Overview

Strawberry production has been increasing over the last five years, with production in the range of 10% of imports at Ontario border crossings. Strawberry imports have been as high as 70,647 tonnes (Table 7.2) and with Ontario production, the supply volume is over 77,480 tonnes.

National average consumption data has Ontario using 49,414 tonnes of fresh strawberries in the July 2018 to June 2019 period, suggesting that Ontario strawberry production accounts for 14% and 16% of annual consumption (Table 7.1).

Table 7.1 *Supply and Disposition of Strawberries, Ontario Crop Year 2014 to 2018*

Item	2014 Crop	2015 Crop	2016 Crop	2017 Crop	2018 Crop
Ontario production (tonnes)	6,676	6,226	7,171	6,840	7,026
Imports at Ontario border points (tonnes)	58,640	54,932	66,613	70,647	62,862
Ontario supply (tonnes)	65,316	61,158	73,784	77,487	69,888
Ontario consumption (using national average) (tonnes)	43,985	43,726	45,095	48,265	49,414
Exports from Ontario border points (tonnes)	0	7	224	805	853
Additional Ontario consumption and inter-provincial shipments (tonnes)	21,331	17,425	28,465	28,417	19,622
Production to consumption ratio (%)	15%	14%	16%	14%	14%

Source: Statistics Canada Table 32-10-0365-01 for production, Statistics Canada Table: 32-10-0054-01 (food available in Canada), and Statistics Canada, CATSNET Analytics, Ontario imports and exports of selected fruit by July/June crop year

As with other produce, all imports at Ontario border crossings are not likely consumed in the province, with wholesalers using Ontario border crossings to supply produce to more easterly provinces, such as Quebec. In the 2018 crop year, approximately 19,000 tonnes of Ontario supply –mostly imported strawberries – was shipped into other provinces (Table 7.1).

The 2016 Census of Agriculture indicated that 675 farms grew strawberries in Ontario. Strawberry production is shown in Figure 7.1, with a focus along the northeast shore of Lake Erie. Not all strawberry growers are commercial growers, but the Berry Growers of Ontario suggest there are less than a dozen commercial growers that sell into retail channels. The majority of the 153 members of the Berry Growers of Ontario who grow strawberries focus on pick-your own operations, farm gate, and farmers' market sales channels. A consensus estimate is that approximately 50 strawberry growers supply strawberries to food retailers, with the remainder using pick-your own and farmers' market channels. The implication is that expansion will most likely occur with existing commercial growers who see an opportunity to expand their strawberry business.

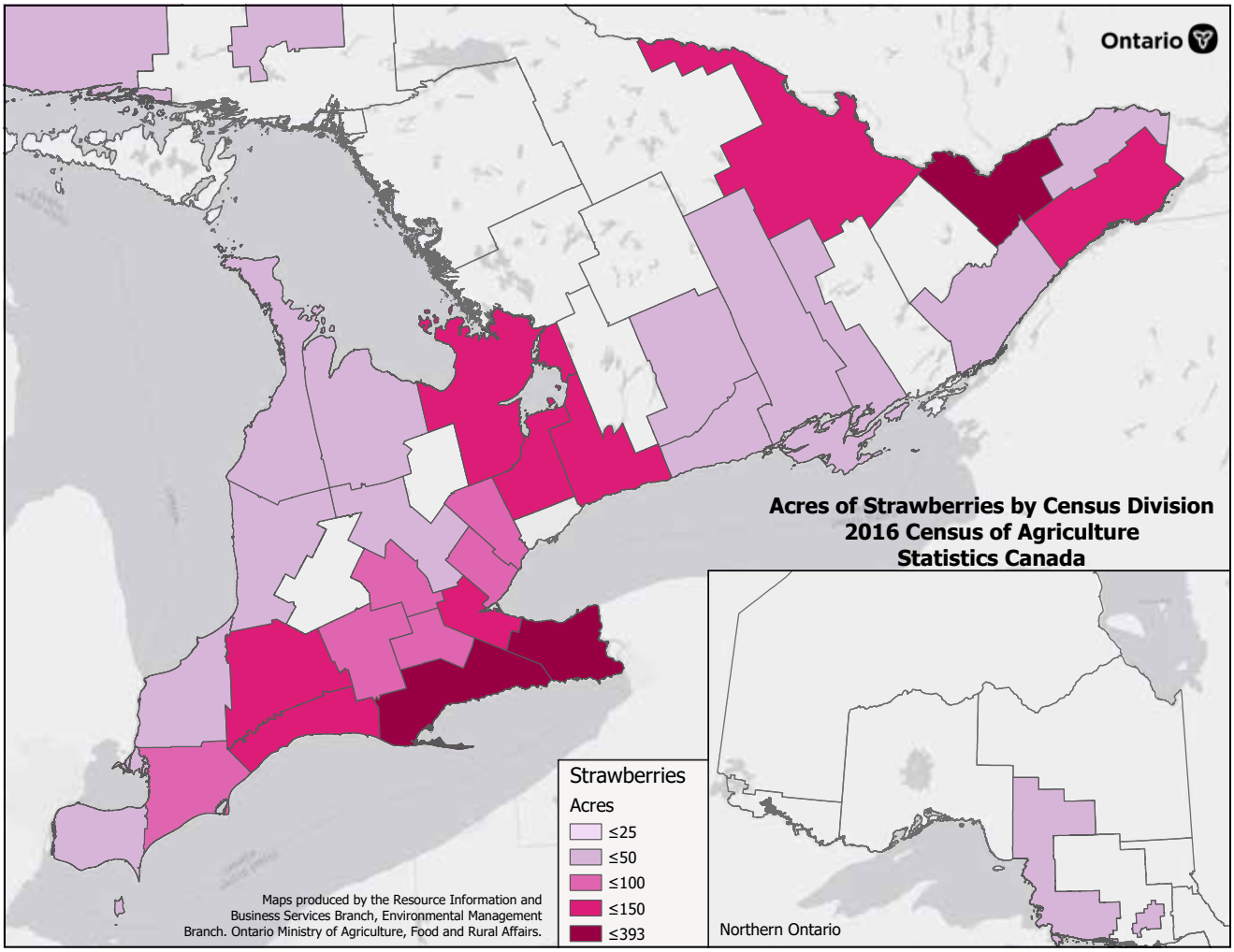

Figure 7.1 *Location of Strawberry Production in Southwestern Ontario*

7.2 Production Expansion Opportunity

Strawberry varieties have been introduced that allow the strawberry harvest season to expand to include the August to October period with day-neutral strawberries. Traditional perennial varieties are called June strawberries, after the month they start to have harvestable fruit. Fruits buds are set in August of the previous year when day-length shortens and become the harvested fruit the following June and July. The harvest period can be expanded through day-neutral strawberries, which are not dependent on shortening day-length to set buds. These annuals are planted in the spring with berries ready to pick about 12 weeks later. Day-neutral plants bear fruit through to the onset of cold weather and few hours of daylight in October. As the season progresses, day-neutral berries are larger than those picked earlier in the year.

Field-grown strawberries were traditionally harvested in June and July – a volume that could theoretically supply 16.7% of market needs, assuming no seasonal patterns to strawberry consumption. Strawberry consumption is much higher in the May to November period than in the winter months.

Using a 4.5-month harvest period with both June and day-neutral strawberries, there is an opportunity for 37.5% of annual consumption, assuming equal monthly volumes consumed through the year. This production potential is a 150% increase, or an additional 11,000 tonnes of field-grown strawberries. The import displacement opportunity is much higher given the higher consumption levels from May to November.

The average strawberry yield is ~ 3.5 tonnes/acre, which suggest another 2,850 acres could be grown in southern Ontario. Day-neutral strawberries offer higher yields per acre, and the actual acreage base increase could be closer to 1,500 acres.

Expansion is possible through genetic traits that allow for day-neutral strawberries that produce in more than the June-July period. Figure 7.2 shows the trend in strawberry yields over the last 20 years. Over the last six years, the yield improvement has been 5.5% per year – a combination of June and day-neutral varieties.

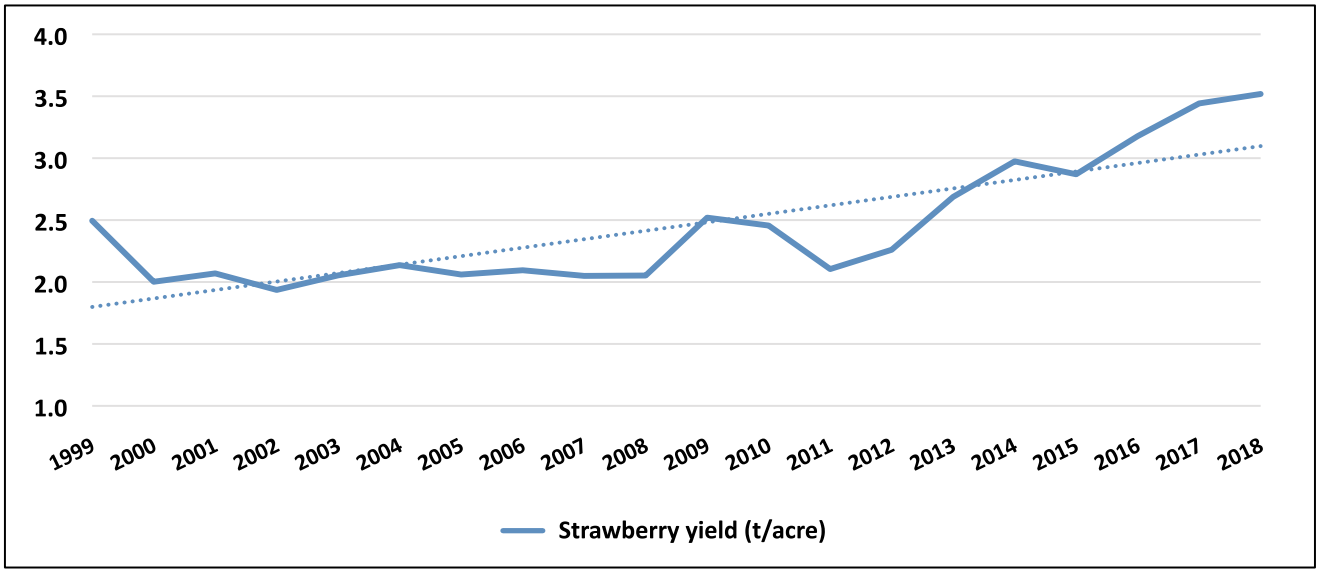

Figure 7.2 *Trend in Ontario Strawberry Yields, 1999 to 2018*

Source: OMAFRA data

The value of imported strawberries at the border was $1.87/lb. in 2018/19. Using this value to represent the farm value of commercially grown day-neutral strawberries increases strawberry revenues by $45.4 million, a 130% increase[16].

With current yields and prices, strawberry growers are realizing $17,600 in gross revenue per acre.

This expansion opportunity focuses on field-grown strawberries, using mostly the day-neutral type of strawberry. Greenhouse-grown strawberries in the province can supply a portion of the market through the October to mid-June period – before local field-grown strawberries are available. This indoor production complements field-grown strawberries, and year round greenhouse strawberry production allows for an expansion that exceeds the 37.5% of consumption to well over 50% of all consumption.

16 The 130% increase is from a base of $35.2 million as reported by OMAFRA, which has the average farm price at $2.25/lb., which is higher than used for the increase in volume due to the influence of pick-your own and farmer market selling prices in the OMAFRA per unit value.

7.3 Expansion Constraints and Impediments

Competing with California Strawberries

Commercial strawberry growers compete with strawberries from California from July to October. Using the same day-neutral varieties, California has up to 7 months of strawberry production, while Ontario's production season is limited to 4.5 months. Given the same plant costs, this longer production season provides a production cost advantage to California strawberries over those grown in Ontario. Labour costs are also lower in California, and California has access to low cost crop protection materials (e.g., fungicides) that are prohibited in Ontario (e.g., methyl bromide). A partial offset is the cost of transportation from California to Ontario. Ontario growers will need to be able to supply strawberries into the retail channel from August to October, and compete with imported values which have ranged from $1.68/lb. to $1.96/lb. at the border (Table 7.2). These are crop year averages, with distinct seasonal variability having prices lowest in the summer period.

Table 7.2 *Border Prices for Strawberry Imports into Ontario, Crop Year 2014/15 to 2018/19*

Units	2014-2015	2015-2016	2016-2017	2017-2018	2018-2019
$/kg	$3.83	$4.33	$3.99	$3.70	$4.12
$/lb.	$1.74	$1.96	$1.81	$1.68	$1.87

Source: Statistics Canada, CATSNET Analytics, Ontario imports of selected fruit by July/June crop year

In US dollars, strawberry prices at our border have been as low as US$1.00/lb. in June of 2018 and US$1.10/lb. in May of 2019. After conversion into Canadian dollars, Figure 7.3 shows the range in landed US strawberry prices of between $1.27/lb. and $4.02/lb. in 2018, and between $1.44/lb. and $3.55/lb. in 2019. The yearly average price is $1.74 for 2018 and $1.87 (to October) in 2019.

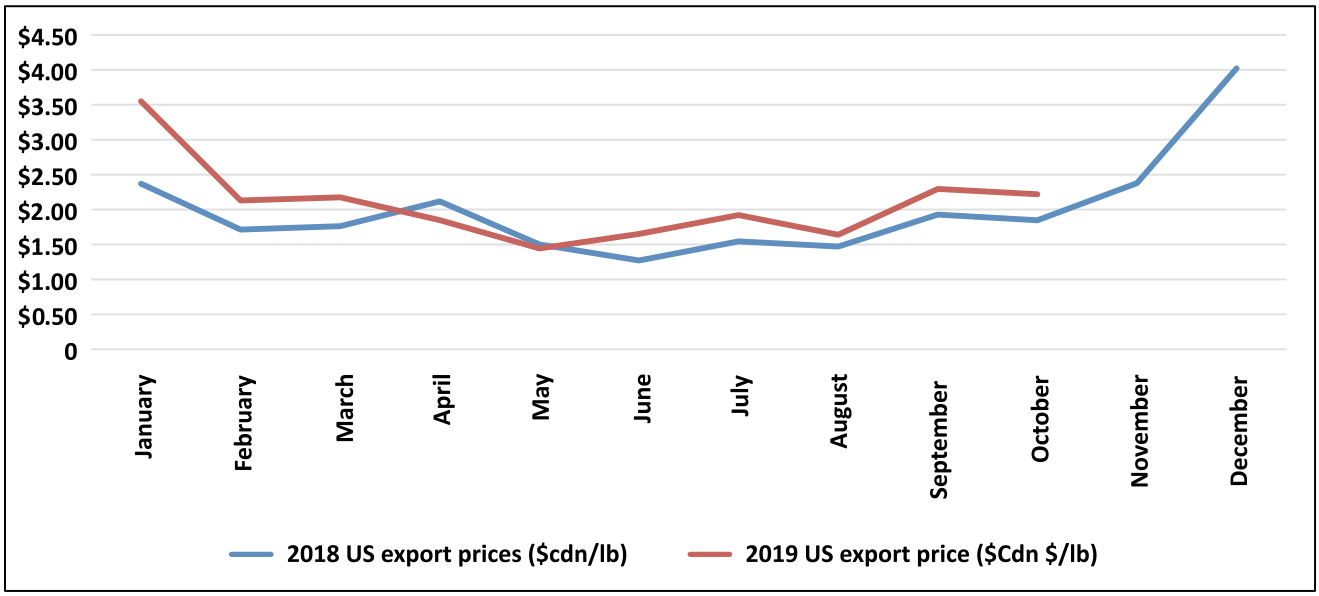

Figure 7.3 *US Strawberry Prices at the Canadian Border ($/lb.)*

Source: USDA GATS

June strawberries are typically merchandized at higher prices than day-neutral strawberries, creating margin pressure for commercial growers with their day-neutral strawberry volumes (after the completion of the June strawberry season). Commercial strawberry growers need more than $2.00/lb. to remain in the strawberry business, and at least $2.50/lb. to generate a profit. Import competition from California limits the profit margin and is a major constraint to acreage expansion. Some commercial growers have scaled back on their strawberry acreage.

Marketing of Ontario Strawberries

Ontario's commercial strawberry growers sell direct to major retailers on their own account, through wholesalers and through growers' marketing group. Ontario-grown strawberries are also marketed by growers through the Ontario Food Terminal (OFT). Figure 7.4 illustrates the seasonal trends in strawberry prices sold through the Terminal.

A large share of strawberry production is sold on-farm (e.g., pick-your own) and through farmers' markets. The challenge for marketers of Ontario strawberries is access to retail shelves at competitive prices.

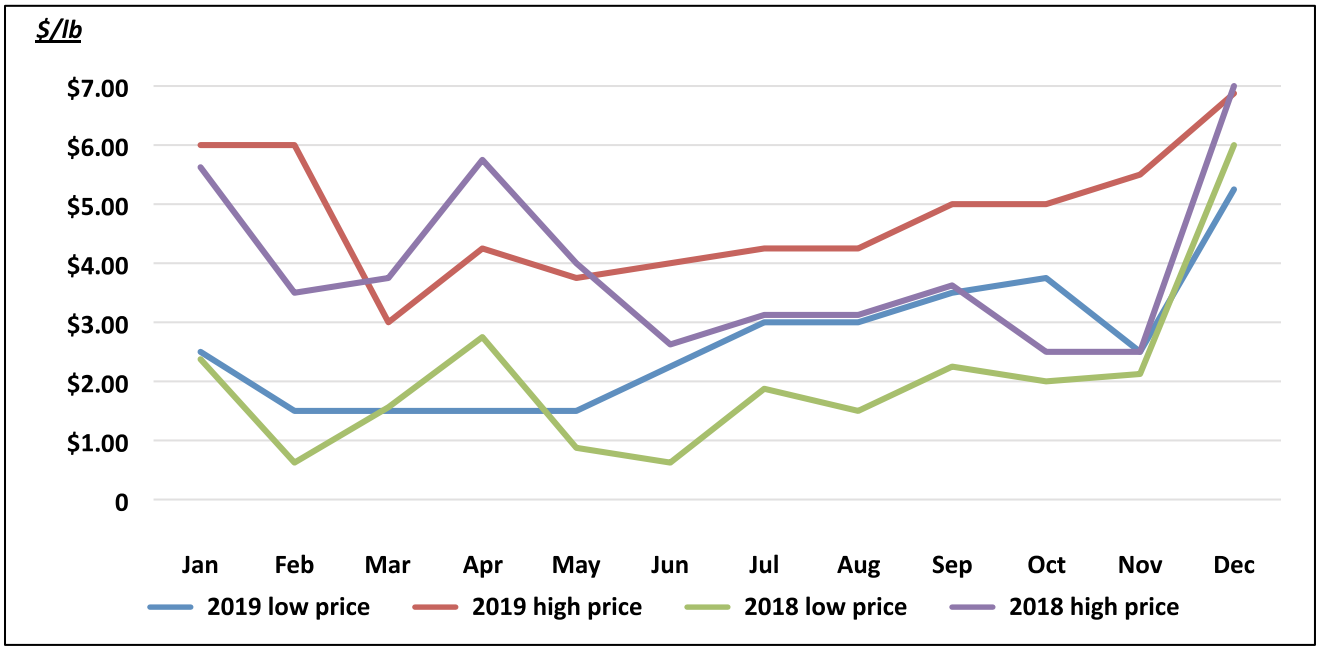

Figure 7.4 *Monthly Strawberry Prices at the Ontario Food Terminal, 2018 and 2019*

Source: InfoHort

Accessing Retail Shelves with Day-Neutral Strawberries

Retailers feature Ontario-grown strawberries during the June strawberry crop, when consumers expect to buy fresh Ontario-grown strawberries. After June, retailers do not provide any preferential treatment to Ontario-grown day-neutral strawberries, so Ontario strawberries are competing with California strawberries - at, for example, $2.50/lb. at retail. With a 30% to 40% retail markup, the wholesale value is under $2.00/lb (See Figure 7.2).

A large impediment to expanding strawberry consumption is the power balance between Ontario's major retailers and the multinational supplier of berries (strawberries, blueberries, raspberries, and blackberries). These multinationals, including Driscoll, Naturipe, and Dole, can supply fresh berries 365 days of the year and have significant market power. These multinationals establish the terms of trade, rather than the retailers, and they want their berries in the limited berry shelf space outside of the Ontario June strawberry crop period. This supply chain relationship with some of the large major retailers limits shelf space in retail outlets for Ontario-grown strawberries in the later July to October period.

Smaller and mid-size retailers carry Ontario day-neutral strawberries after the June strawberry harvest, but the pricing of Ontario strawberries compared to imported berries limits the volume potential.

Offering of a Critical Mass Throughout the Year

A large impediment to expansion is the competition of businesses such as Driscoll and Naturipe supplying berries 12 months of the year. Addressing this barrier can be one way to help expand Ontario strawberry production.

For Ontario growers of field strawberries, there is an option to become part of the year-round production base of the multinational suppliers of berries (e.g., Driscoll, Naturipe, Dole). Naturipe® berry growers are in many different locations in North and South America including Argentina, British Columbia, Chile, Mexico, Peru, and the US. Naturipe supplies all of their strawberries from California (over 12 months) and Mexico (in the November to March period). Large Ontario strawberry growers could align with Naturipe and be one of their supply sources over the June to October period.

Another option to expand Ontario production is for field strawberry growers to also enter the greenhouse strawberry business to supply Ontario strawberries 12 months of the year to retailers wanting Ontario-grown produce all year.

A third option for growers could be to joint venture with some southern US growers or Mexican growers, or own southern operations to supply field grown strawberries 12 months of the year to accounts across Canada and the US.

Cost Competitiveness

Expansion requires a cost profile that allows for competitive positioning of Ontario strawberries on retail shelves beside imported strawberries. Ontario production costs are higher due to shorter growing seasons, the lack of certain crop protection materials used on imported products, and higher labour costs. Access to the same crop protection materials as imported product would help level the playing field.

Mechanical harvesters of strawberries are being piloted as a way to lower labour costs. These harvesters are robotic with sensors that detect fruit size and quality. Commercial growers are interested in these developments and await results on consistent harvest quality and marketable yields.

Compete on Quality

Ontario's day-neutral strawberries have a quality advantage over the same imported variety. The berry is fresher due to the short distance travelled and has a known better taste due to Ontario soils and growing conditions. Promotion of this quality differential could build demand by Ontario's consumers for Ontario strawberries throughout the harvest season, with a potential quality premium.

Research Capacity to Support Competitiveness of Ontario Strawberries

Expansion of strawberry production will be primarily with day-neutral varieties, but there is currently no research capacity supporting variety development of day-neutral strawberries in Ontario. There was a researcher at the University of Guelph (Dr. Adam Dale) with a strawberry breeding program, but his program did not continue after his retirement.

In the absence of strawberry cultivars developed for Ontario conditions, commercial strawberry growers obtain their genetics from California. Restoring a strawberry breeding program can result in the development of day-neutral cultivars more suitable to Ontario growing conditions.

Greenhouse Strawberries as a Threat or an Opportunity

Greenhouse strawberry production is growing in Ontario, mostly as a product extension by greenhouse vegetable growers who have established relationships with retail operations. With established retailer relationships, and existing operations that supply greenhouse vegetables 365 days a year, these operations may be in a better position to access necessary shelf space for Ontario grown strawberries.

Investing in greenhouse strawberries is an option open to commercial strawberry growers to provide a year-round supply of strawberries to retailers.

For the strawberry industry, greenhouse strawberries are an opportunity that would supply Ontario strawberries to retailers 52 weeks of the year. An alliance between some field strawberry growers and greenhouse growers should allow for supplying major buyers with their 52-week strawberry supply requirement.

Production Issues and Expansion of Greenhouse Strawberries

Addressing some production challenges could bolster greenhouse production of strawberries. Some growers are experimenting with the right light spectrum and intensity throughout the growing season to optimize production and deliver on taste and texture attributes. The type of beneficial insects used to control pests and bees for pollination also requires some fine-tuning.

Indoor strawberry production may have better performance using different varieties than field production or are used in the EU (as tastes and preferences can be different), and varieties that are not grown outdoors. Plug plants or tray plants used in the greenhouse to begin production are typically provided from an outdoor propagation facility that does not provide the same level of disease-free seed stock as an indoor propagation operation. As the greenhouse strawberry sector grows, these cultivar and propagation issues will likely be addressed.

7.4 Factors That Will Enable Expansion

These factors will help the expansion of strawberry production in Ontario:

- Growers and/or marketers having a critical mass of day-neutral strawberries available to service major food retail accounts from July to October
- Retailer support for Ontario strawberries that extends beyond the June strawberry period
- Ongoing promotion by Foodland Ontario of Ontario-grown field strawberries and availability from June through to October
- Cultivar selection and/or a plant breeding program focused on Ontario growing conditions
- Field strawberry growers and greenhouse strawberry growers collaborating to offer a critical mass of strawberries 52 weeks of the year to major accounts
- Access to crop protection materials used by US counterparts

8

Garlic

Garlic production can expand in the province by differentiating from low-cost Chinese garlic. Higher yields, access to necessary volumes for major retail accounts, storage programs that lengthen the marketing season, and promotion of the differentiable attributes of Ontario garlic are some of the factors that support an expansion.

8.1 Supply and Disposition Overview

Per capita consumption of garlic is reported to be 0.57 kg/person (1.25 lb.) across Canada by Statistics Canada in 2018, corresponding to 8,164 tonnes (18 million lb.) of consumption in Ontario (Table 8.1). Ontario's garlic growers produced 818 tonnes in the 2017 crop year using an estimated 775 acres. The Ontario production base supplied between 6% and 11% of Ontario's consumption volume over the last five crop years.

Table 8.1 *Supply and Disposition of Garlic, Ontario Crop Year 2014 to 2018*

Item	2014 Crop	2015 Crop	2016 Crop	2017 Crop	2018 Crop
Ontario production (tonnes)	432	628	601	818	726
Imports at Ontario border points (tonnes)	6,628	6,323	5,912	5,873	5,671
Ontario supply (tonnes)	7,060	6,951	6,513	6,691	6,398
Ontario consumption (using national average) (tonnes)	6,809	7,128	7,076	7,176	8,164
Exports from Ontario border points (tonnes)	30	63	185	229	83
Additional Ontario consumption and inter-provincial shipments (tonnes)	222	-239	-748	-714	-1,850
Production to consumption ratio (%)	6%	9%	8%	11%	9%

Source: Statistics Canada Table 32-10-0365-01 for production, Statistics Canada Table: 32-10-0054-01 (food available in Canada), and Statistics Canada, CATSNET Analytics, Ontario imports and exports of selected vegetables by July/June crop year

There are some garlic exports including garlic seed (garlic cloves for seeding next year's crop). The local supply shortfall is provided through garlic imports from China, the US, Spain, and Mexico – ranging from 5,700 tonnes to 6,323 tonnes (13 to 14 million lb.) each year. The negative value for "additional Ontario consumption and interprovincial shipments" in Table 8.1 –the difference between consumption estimates and supply plus imports– suggests some imported garlic that landed in other provinces is shipped into Ontario, or the actual consumption level in Ontario is less than estimated.

China is the major import supplier of garlic into Ontario with 4,098 tonnes in crop year 2018/19 representing 72% of imports in the period. China's import share was 75% in the prior crop year. As shown in Table 8.2, Chinese imports were valued much lower than garlic imports from other countries such as the US, Spain, or Mexico, with Chinese garlic landed into Canada at $0.84/lb. This compares to $2.90/lb. from the US or $1.37/lb. from Spain. Ontario production is greater than imports from each of the other import suppliers, aside from China. Imports from the US were 639 tonnes in the 2018/19 crop year, compared to Ontario production of 726 tonnes.

Table 8.2 *Imports of Garlic, Average Price and Import by Major Supplier, Crop Year 2018/19*

Country	Price ($/lb.)	Imports (tonnes)	Share of Imports (%)
China	$0.84	4,098	72%
United States	$2.90	639	11%
Spain	$1.37	538	9%
Mexico	$1.96	264	5%
Argentina	$3.31	59	1%
Egypt	$1.34	65	1%
Ukraine	$2.14	5	0%
All Imports	**$1.21**	**5,671**	**100%**

Source: Statistics Canada, CATSNET Analytics, Ontario imports of selected vegetables by July/June crop year

8.2 Production Expansion Opportunity

The data in Table 8.1 suggest there is significant opportunity to expand garlic production in the province. There are two general garlic market segments -- Chinese garlic and anything other than Chinese garlic. Currently, 72% of the market is Chinese garlic, suggesting that if consumers are not switching from Chinese to Ontario garlic, the market opportunity for Ontario garlic is in the 28% non-Chinese garlic market segment – approximately 2,285 tonnes. Capturing 70% of this segment is approximately 1,600 tonnes (3.5 million lb.) and should result in a 20% market share for Ontario garlic, assuming investments are made to be able to store garlic for up to one year.

This expansion opportunity requires approximately 1,000 additional acres of garlic from the 2018 acreage estimate of 783 planted acres and 750 harvested acres, assuming average marketed yields of 1.6 tonnes per acre. With higher yields, such as 2.0 tonnes/acre, the acreage increase is approximately 800 additional acres. This expansion equals another $10 to $15 million in value at the farm level (from a 2018 farm value estimate of $6.7 million).

The opportunity is much larger if a portion of consumers switch from Chinese garlic and/or retailers reduce their sourcing of Chinese garlic.

Garlic Production

There are two types of garlic grown in Ontario - hardneck and softneck, with most production being hardneck garlic. Hardneck varieties bolt during late spring/early summer and produce a tall, flower stalk or scape. Bulbils – small aerial cloves – are produced at the tip of the scapes in place of a true flower. There is considerable variability in the size and number of bulbils produced by hardneck garlic. Cultivated garlic plants do not produce true seed. All garlic is propagated vegetatively from cloves or bulbils, with each clove or bulbil being a clone of the parent plant.

Bulbils may be used as planting stock but require three or more years of growth to develop into marketable bulbs. Hardneck garlic can produce 4-12 cloves per bulb. A general rule of thumb is that hardneck varieties are more winter hardy, produce larger cloves but have a shorter storage life than soft neck varieties.

The market demand is for large garlic bulbs, which requires removal of scapes (flower stalk) as soon as it is visible. If the scape is left to develop, it competes with the bulb for nutrients and results in a reduction in bulb size and quality.

Softneck garlic varieties can produce an average of 8-12 cloves/bulb, ranging from 5-6 cloves per bulb in northern areas and 40 or more per bulb in warmer, southern climates. Soft neck varieties do not produce a scape.

Commercial garlic production begins with farmers planting a garlic clove in the fall and harvesting the crop in the following summer period. The clove planted in the fall is selected from the garlic bulbs harvested a few months earlier. In the spring, growers need to remove the scapes to direct the plant's energy to garlic bulb development. Removal of scapes is typically done by hand.

Currently, most garlic production is labour intensive. Depending on the scale of operation, garlic can be hand planted, scapes are removed by hand, harvesting can be by hand, and cloves are usually separated by hand as required. The high labour component leads to a high cost per acre. Growers with larger acreage use planters and harvesting equipment to reduce labour costs.

There are approximately 400 garlic growers in Ontario. There are approximately six larger scale growers that have more than 30 acres in garlic production, and a number of growers with five or less acres in garlic production. The current grower base can be a part of the expansion, as well as vegetable growers who are currently not in garlic production.

8.3 Expansion Constraints and Impediments

Seed Supply is a Constraint

Most of Ontario's garlic acreage is hardneck where the average bulb has five cloves. Growers need to save more than 20% of the harvest to plant the same acreage in the fall as harvested a few months earlier. Saving more than 20% allows shrink and selection of only quality product as the bulb is cracked to isolate individual cloves. If a grower wants to expand acreage, a larger portion of the crop needs to be saved for subsequent planting, or seed (cloves) need to be acquired from a trusted seed supplier. Using farmer saved seed means holding back more garlic from the market to expand acres, which may limit future expansion plans.

Garlic can be affected by bulb and stem nematodes that can be transmitted to new fields if the seed is not free of the nematode. Ontario has started a clean seed program to provide assurance that purchased seed is free of disease. Clean seed is required to provide a quality product into the marketplace.

The bulbil is a starting point for seed production. But planting bulbils will not produce a commercial garlic crop – the harvested bulbs or roundels (from the planted bulbils) are replanted as part of seed production. It takes three to four years of seed production to provide commercial seed – when starting with bulbils – before there are enough cloves for seeding a commercial crop.

Expansion of the garlic industry requires the development of a supporting garlic seed business. There are growers that supply seed to other Ontario growers and into some US northern states. Once a larger seed supply source becomes available, acreage expansion can occur more quickly. Dedicated seed growers could take seed orders 12 months in advance from commercial growers and plant sufficient garlic to serve as a quality assured seed supply for subsequent planting (by commercial growers).

Reliance on One Cultivar

Music is the prominent garlic cultivar grown in Ontario. This cultivar may not be the most ideal cultivar for Ontario or for certain growing regions in Ontario. As the industry expands, other cultivars may be more conducive to Ontario growing conditions (e.g., disease tolerance, yields, bulb size, soil conditions, etc.) and allow for a longer storage period. A cultivar selection program based on selecting cultivars from other growing regions may be beneficial for industry expansion. Cultivar selection requires a few years of production for adaption to Ontario's agronomic conditions.

Competition of Low-Cost Chinese Garlic

Farmers indicate that prior to 1998, there were more than 4,000 acres of garlic grown in the province. This acreage disappeared after low cost Chinese garlic imports were made available to retailers.

In a number of channels, garlic growers can achieve returns that provide a profit margin. These channels include farmers' markets, garlic festivals and small independent retail outlets where growers receive over $5.00/lb. for their garlic. These returns are available to the smaller garlic growers and not available to the larger growers focused on major food retail accounts. Statistics Canada reports an average farm value of $4.30/lb. for the 2018 crop and $3.70/lb. for the 2017 crop. These returns are a combination of prices received for various grades and quality of garlic through various market channels, and are above prices received for Ontario garlic at the Ontario Food Terminal.

Figure 8.1 shows prices reported at the Ontario Food Terminal for Ontario garlic sold in boxes, where prices received ranged from $2.50/lb. and $3.64/lb. in the 2017/18 crop year and $3.07/lb. to $4.00/lb. in the 2018/19 crop year.

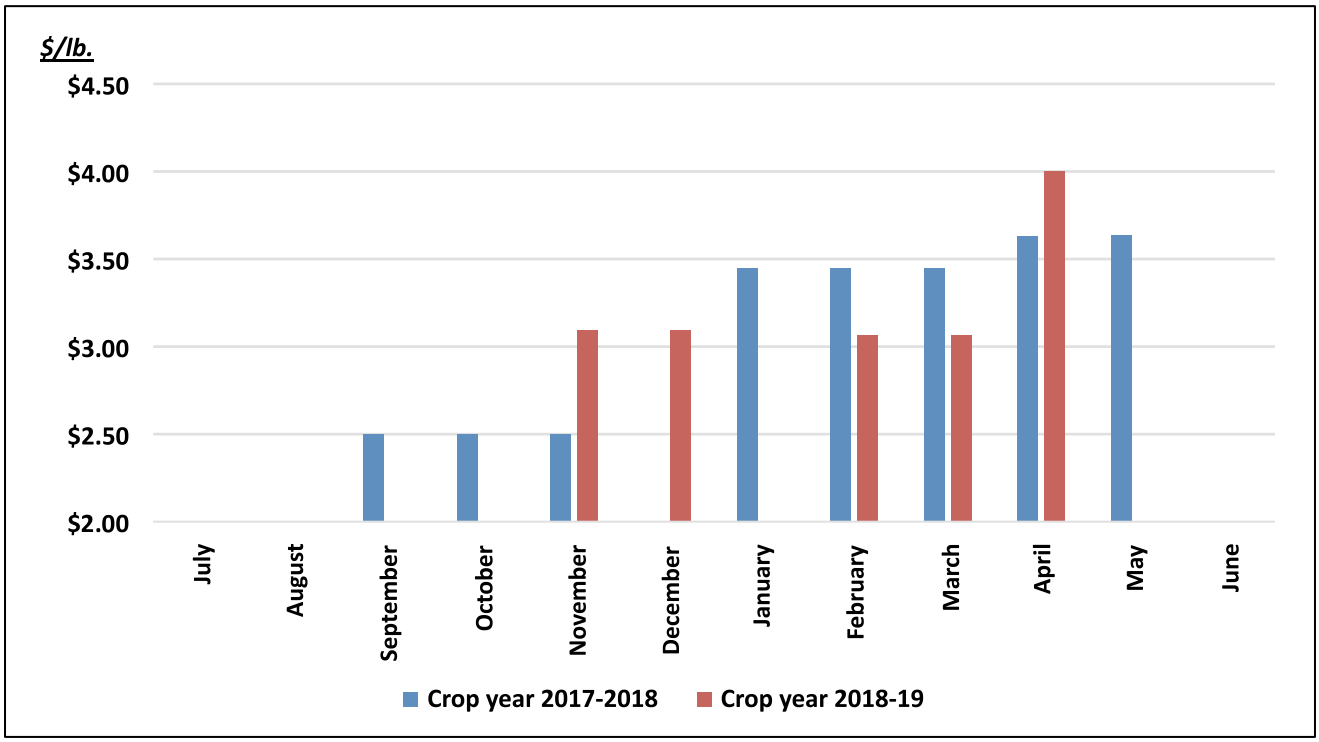

Figure 8.1 *Ontario Garlic Prices Reported at the Ontario Food Terminal, Crop year 2017/18 and 2018/19*

Source: InfoHort

The values in Figure 8.1 do not include organic garlic, where reported prices were $5.23/lb. in 2017, $3.64/lb. in 2018 and $3.55/lb. in 2019 at the Ontario Food Terminal.

In major food retail channels, Ontario garlic competes with Chinese imports, where there is a significant price differential. In February 2019, Chinese garlic sold at the Ontario Food Terminal at $0.90/lb., while Ontario garlic prices were between $3.05 and $3.55/lb. A portion of the market will purchase low cost Chinese garlic due to price, while another portion of the market will buy local, or buy anything but Chinese garlic. In the anything but Chinese garlic segment, the import competition includes Mexico (9%), the US (11%) and Spain (5%).

Prices for Ontario garlic are well above the value of imported garlic – Table 8.3 provides crop year average values of imported garlic prices. These values ranged from $1.08/lb. in the 2014 crop year to $1.95/lb. in the 2016 crop year.

Table 8.3 *Border Prices for Garlic Imports into Ontario, Crop year 2014/15 to 2018/19*

Units	2014-2015	2015-2016	2016-2017	2017-2018	2018-2019
$/kg	$2.38	$3.27	$4.29	$2.75	$2.66
$/lb.	$1.08	$1.48	$1.95	$1.25	$1.21

Source: Statistics Canada, CATSNET Analytics, Ontario imports of selected fruit by July/June crop year

These average import values are influenced by the large import share of Chinese garlic. Table 8.2 shows that Chinese imports at $0.84/lb. accounted for 72% of all Ontario garlic imports. After China, the US is the second largest supplier at $2.90/lb. for 11% of imports in the 2018 crop year. Figure 8.2 shows the monthly values of US garlic at the Canadian border for 2018 and 2019 (to October).

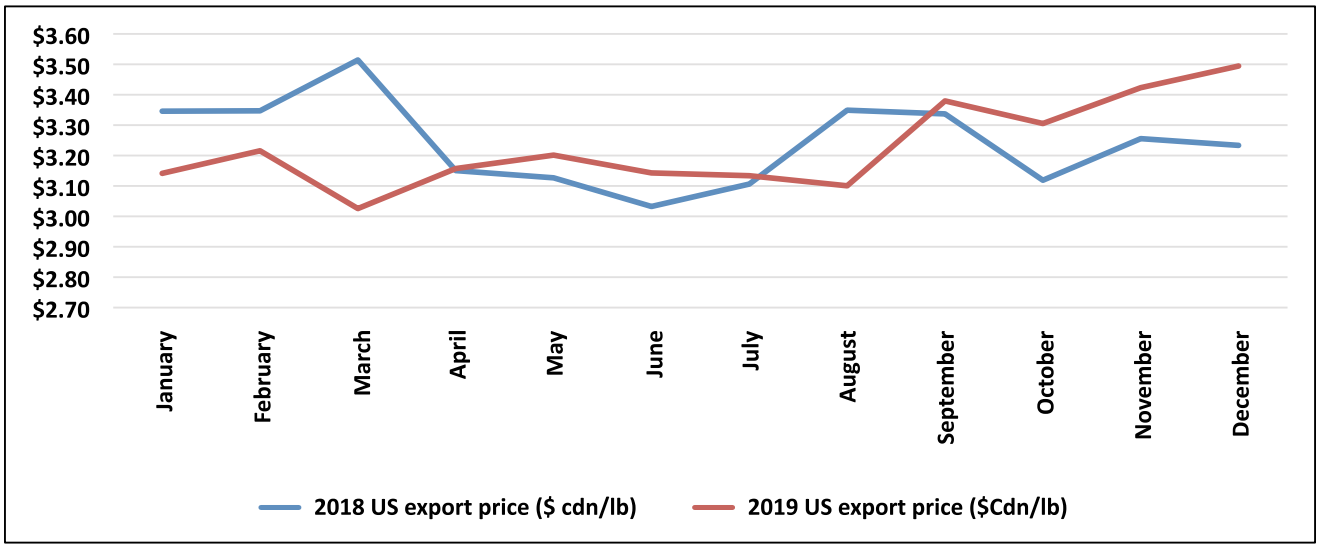

Figure 8.2 *US Garlic Prices at the Canadian Border ($/lb.), 2018 and 2019*

Source: USDA GATS

There is monthly variation in garlic import average prices, as shown in Figure 8.3 with variation based on the monthly per unit value of Chinese imports. In June 2019, the import value of Chinese garlic was $1.34/lb., which contrasted with $0.77/lb. a year earlier. In July of 2019, Chinese imports dropped to $0.70/lb. at the border.

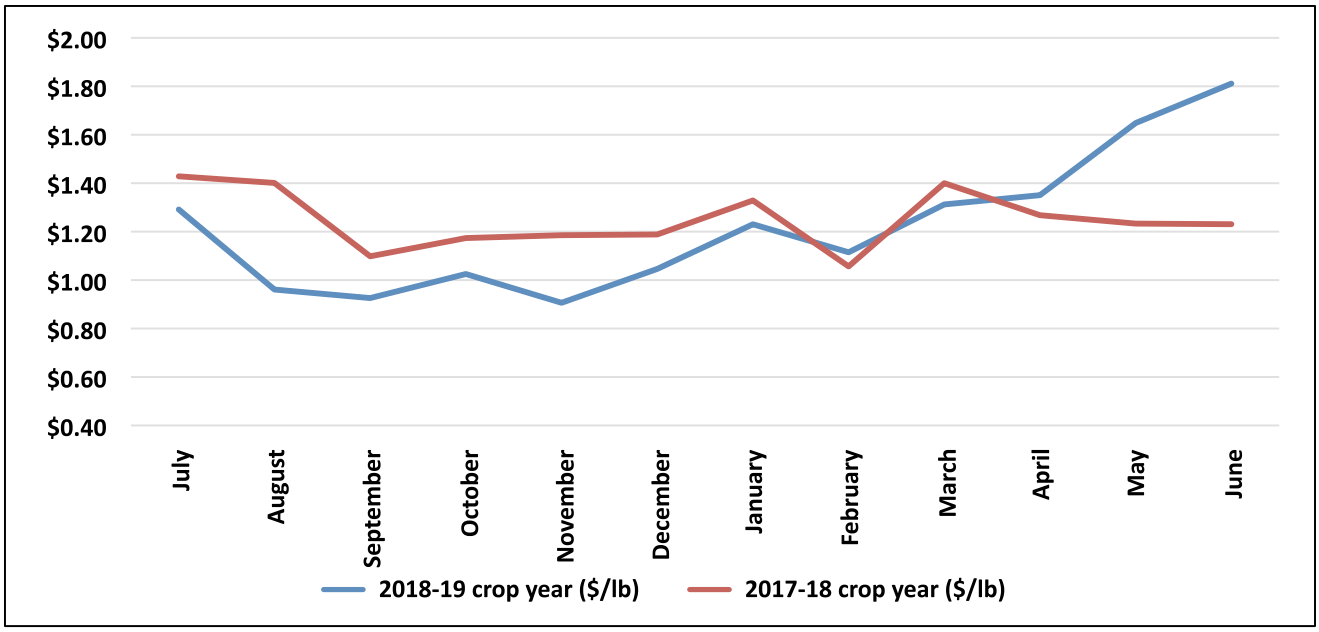

Figure 8.3 *Border Prices for Ontario Garlic Imports, Monthly, Crop Year 2017/18 and 2018/19*

Source: Statistics Canada, CATSNET Analytics, Ontario imports of selected fruit by July/June crop year

Sustainable Yields Are Required for Competitive Pricing into Major Retail Channels

Growing costs for garlic in Ontario are well above $10,000/acre, before considering a profit margin. With average yields of just over 1.0 tonne/acre (2,204 lb.), a break-even average price is $4.54/lb. A yield improvement to 1.6 tonnes/acre (3,526 lb.) of marketable product generates a breakeven price of $2.85/lb., and increasing yields to 2.0 tonnes/acre (4,408 lb./acre) results in a breakeven value of $2.27/lb., assuming per acre costs have not increased. Higher yields can entail higher input per acre costs. Competing in the marketplace with $3.00/lb. garlic is much more feasible than needing more than $4.00/lb. to generate an acceptable profit margin.

Yield improvement can be achieved through a number of approaches – using certified clean seed, crop rotation, appropriate cultivars for the growing region, fertilization programs, access to crop protection materials and overall agronomic management. Higher yields for commercial growers are a business imperative. Some Ontario growers have been able to achieve 6,000 lb./acre (2.7 tonnes/acre). In the US, garlic yields are reported to be between 2.5 and 5 tonnes/acre in certain states (Penn State suggests 6,000/ lb./acre), and in Australia (NSW) the expected yields range between 1.8 and 2.5 tonnes/acre. Spanish garlic yields average out to 3.6 tonnes/acre.

Assembling Critical Mass of Supply to Serve Major Retail Markets

Smaller scale growers use a number of channels to market their garlic including on-farm retail, farmers' markets, garlic festivals and small independent retailers. Garlic growers can receive prices that offset their costs through these channels.

Expanding garlic production depends on access to the major retail market – a market requiring a grower or marketer to have the supply that meets the volume needs of a major retailer. Only very large growers – or a grower/marketer that merchandizes garlic for a number of garlic growers – can achieve the scale needed to serve major food retail accounts.

Critical Mass Supports Development of a Garlic Seed Industry

Critical mass is also required to support specialization in garlic seed production by a few growers. With sufficient garlic acreage in Ontario, the market size should provide an opportunity for a few growers to specialize in garlic seed production to supply commercial growers, their own commercial production, and small-scale growers focused on diverse market channels.

Extend Marketing Period with Controlled Atmospheric Storage

At room temperature, hardneck garlic can be stored up to four months and softneck varieties for up to eight months. Cold storage can increase storage life of garlic. Controlled atmospheric storage with a temperature of -20C (as suggested by some sources) and relative humidity of 60% can provide 10 months of storage for hardneck varieties of garlic.

Investments in controlled atmospheric storage allows garlic growers, or a garlic marketer, to supply the market for a longer time, and allows the industry to be a reliable supplier for a longer period each year with supplies that could replace a larger portion of imports.

Uniformity of Ontario Garlic Through Grades and Standards

Consumers prefer large garlic bulbs with a number of well-sized cloves. Retailers need consistency in size and quality from Ontario garlic. The industry has a set of grades and standards that all growers and marketers could use in their respective market channels. Being a reliable supplier requires a consistent quality and sizing of product offering into major retail channels.

Differentiation of Ontario-Grown Garlic

Expansion in major retail can be bolstered by a broad-based Ontario garlic promotion campaign, assuming there is supply to market needs. A marketing campaign can differentiate Ontario garlic from all imported garlic based on selected attributes such as local food, low carbon footprint, support of local farmers, quality product, and the choice to buy local.

Broad based promotion through Foodland Ontario advertisements can help expand Ontario garlic production through consumer awareness.

Productivity Improvement to Lower Costs Sold into Major Retail Channels

Commercial growers must improve productivity through higher yields to support expanded garlic production. Productivity gains can occur through cultivar selection and/or a breeding program for Ontario growing conditions that focuses on more tonnage per acre and more cloves per bulb. These gains allow for a smaller portion of the crop to held back from the market and improve the productivity of garlic seed production.

The garlic scape is used in certain cultures as a food ingredient. A productivity gain for the industry can also include developing a market for scapes – as a food manufacturing ingredient or retail product – to increase revenue per acre. The cost of scape removal can bring additional revenue with garlic scapes that can retail for $4.50/lb.

8.4 Factors That Will Enable Expansion

These factors will help expand garlic production in Ontario:

- Development of a seed supply sector for Ontario garlic growers
- Growers using certified disease-free garlic seed
- Cultivar selection and/or a plant breeding program focused on higher yields and more cloves per bulb
- Growers and/or marketers having a critical mass of garlic available to service major food retail accounts
- Retailer support for Ontario grown garlic
- Selling garlic based on Ontario-wide grades and standards with attributes desired by consumers
- Ongoing promotion by Foodland Ontario of Ontario-grown garlic and its differentiated attributes
- Investment in controlled atmospheric storage facilities to extend the marketing season for high quality Ontario garlic
- Access to crop protection materials used by US counterparts

9

Eggplant

Eggplant is an example of a "world food' crop grown in Ontario that competes with imports from the US, Mexico, other central American countries, and some Caribbean countries. Eggplant can be field-grown or as a greenhouse vegetable.

9.1 Supply and Disposition Overview

In 2018, Ontario produced 1,355 tonnes of field-grown eggplant, compared to an estimated Ontario eggplant consumption of 8,594 tonnes (Table 9.1). Locally produced volume represents 16% of estimated consumption.

Table 9.1 *Supply and Disposition of Eggplant, Crop Year 2014 to 2018*

Item	2014 Crop	2015 Crop	2016 Crop	2017 Crop	2018 Crop
Ontario production (tonnes)					1,355
Imports at Ontario border points (tonnes)	15,916	16,085	16,527	16,467	16,493
Ontario supply (tonnes)	15,916	16,085	16,527	16,467	17,848
Ontario consumption (using national average) (tonnes)	8,034	7,813	7,909	8,161	8,594
Exports from Ontario border points (tonnes)	1,305	1,428	1,514	1,468	1,830
Additional Ontario consumption and inter-provincial shipments (tonnes)	6,576	6,844	7,103	6,837	7,424
Production to consumption ratio (%)	0%	0%	0%	0%	16%

Source: Statistics Canada Table 32-10-0365-01 for production, Statistics Canada Table: 32-10-0054-01 (food available in Canada), and Statistics Canada, CATSNET Analytics, Ontario imports and exports of selected fruit by July/June crop year

In the 2018/19 crop year, 16,493 tonnes of eggplant were imported at Ontario border crossings, with a reported value of $23.1 million (equivalent to $0.63/lb.).

With estimated consumption of 8,594 tonnes by Ontarians (national per capita consumption average of 0.6 kg/person in 2018), approximately 45% of the imported eggplant is shipped into other provinces, with an estimated volume of 7,424 tonnes in the 2018 crop year.

Eggplant exports (1,830 tonnes) go into nearby US states (e.g., New York, Illinois, Michigan, Massachusetts, Pennsylvania) with a volume larger than estimated field production, which suggests export volumes include Ontario greenhouse-grown eggplant.

Eggplant is a warm climate crop, and field-grown eggplant is transplanted after May 24 to avoid cold weather damage. Some growers use high tunnels to plant the crop earlier and capture some higher early market prices. Statistics Canada reported 212 acres of eggplant production in 2018, with an output value of $2.8 million, which represents a farm value of $0.94/lb.

9.2 Production Expansion Opportunity

Field-grown eggplant is harvested in early August until October, providing two to three months of production. Assuming comparable monthly consumption volumes, this supply is 25% of the market with three months of eggplant harvest. With Ontario eggplant having a 75% market share in the local harvest season, the annual production to consumption ratio can increase to 18.8%. This is a modest increase over the 16% reported in Table 9.1. This expansion potential does not account for the seasonality in eggplant consumption (higher consumption during the local harvest season) and the opportunity to ship Ontario-grown eggplant into nearby markets to displace imports in other provinces.

A 25% expansion of eggplant production, to 1,694 tonnes, would account for just under 20% of estimated annual consumption in the province Using 6 tonnes of production per acre, the expansion is by 57 acres, with the expansion representing another $700,000 of farm value.

9.3 Expansion Constraints and Impediments

Imported Eggplant Influences Ontario Prices

July to June average crop year prices for eggplant imported into Ontario ranged between $0.57 to $0.63/lb. over the 2016 to 2018 crop years (Table 9.2). These import values influence the price received by growers of eggplant in Ontario.

Table 9.2 *Border Prices for Eggplant Imports into Ontario, Crop year 2014/15 to 2018/19*

Units	2014-2015	2015-2016	2016-2017	2017-2018	2018-2019
$/kg	$1.12	$1.27	$1.25	$1.24	$1.40
$/lb.	$0.51	$0.57	$0.57	$0.56	$0.63

Source: Statistics Canada, CATSNET Analytics, Ontario imports of selected fruit by July/June crop year

Ontario imports eggplant from countries such as the US and Mexico, with the average monthly value of Canadian imports from the US shown in Figure 9.1. In 2018 and 2019, the seasonal low was in April and prices generally increased over the remainder of the year. The 2018 average value was $0.69/lb. and at $0.74/lb. for 2019 (to October).

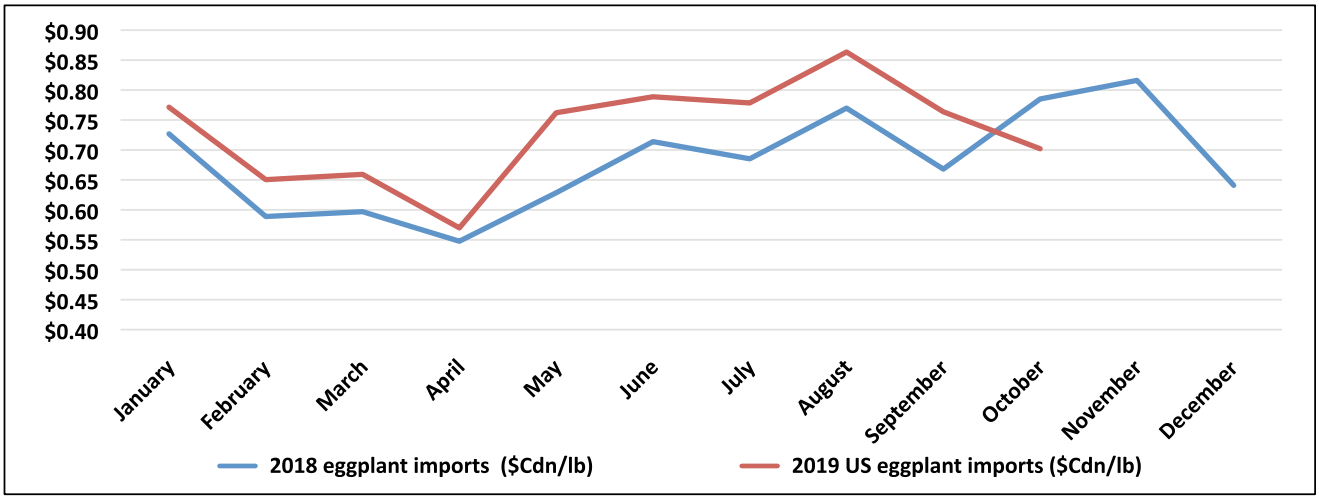

Figure 9.1 *US Eggplant Prices at the Canadian Border ($/lb.)*

Source: USDA GATS

The highest price for Ontario growers is through direct sales to food retailers, with the Ontario Food Terminal (OFT) offering slightly lower returns. In 2019, prices for Ontario field-grown eggplant ranged between $0.64/lb. and $0.95/lb. in the September to early November period. In 2018, prices at the Food Terminal for Ontario eggplant ranged between $0.90/lb. and $1.50/lb., starting in July. Figure 9.2 shows monthly low prices for eggplant at the OFT for eggplant from all sources, excluding greenhouse eggplant. Greenhouse eggplant prices at $2.50/lb. to $3.50/lb. are well above field grown eggplant values.

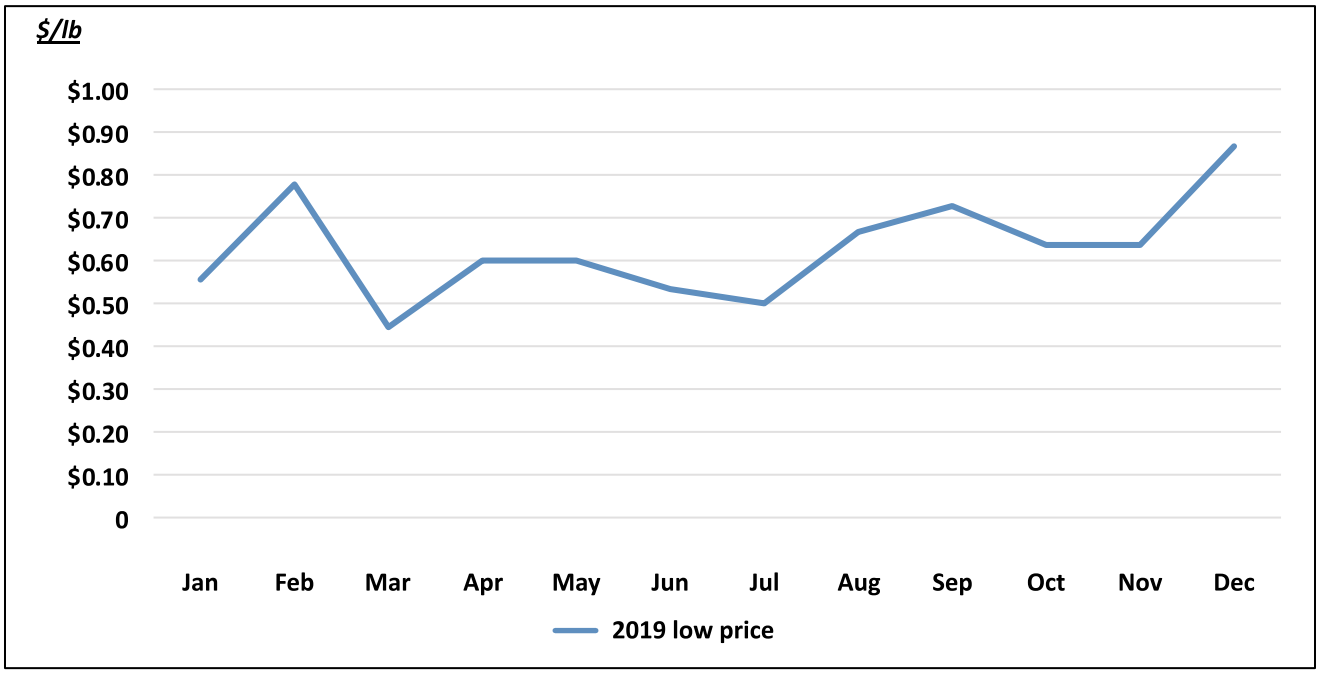

Figure 9.2 *Monthly Eggplant Prices at the Ontario Food Terminal, 2019*

Source: InfoHort

Competing with Lower Cost Imports

Ontario growers are competing with US operations that have a longer growing season and lower labour costs, resulting in lower per unit costs. The USDA reports farm gate values of eggplant at $(US)0.42/lb. in 2017 and 2018, or $0.55/lb. in Canadian dollars. These figures suggest Ontario growers should strive for a cost structure that is competitive with US growers.

Eggplant is susceptible to the Colorado potato beetle and requires effective crop protection products. As with other fruits and vegetables, Ontario growers do not have access to the same crop protection materials as in the US, which affects cost competitiveness.

Additional Ontario Field-Grown Eggplant Supply and Returns

With field-grown eggplant supply at 16% of estimated consumption, the expansion opportunity may be modest. Any additional local supply on the local market could lower prices if the additional supply had to move into export markets because of established supply lines. This risk applies to growers supplying field-grown eggplant but not Ontario greenhouse-grown eggplant that has a well-established premium over field-grown eggplant.

Supplying Major Retailer Requires Critical Mass

Major food retailers prefer to work with one or two suppliers to supply volume requirements throughout the year. With field-grown eggplant available up to three months, a large grower or marketer must assemble a critical mass of eggplant to meet retailer needs during this time, or eggplant may need to be directed through the OFT or other outlets.

Supplying major retail operations may require growers to be part of a North America supply chain that supplies accounts in Canada and the US from a number of supply sources. Another option is for Ontario growers of field-grown eggplant to align with greenhouse eggplant suppliers to be part of a 12-month Ontario grown supply offering.

9.4 Factors That Will Enable Expansion

These factors will help expand eggplant production in Ontario:

- Growers and/or marketers having a critical mass of Ontario eggplant available to service major food retail accounts
- Retailer support for Ontario-grown eggplant
- Ongoing promotion by Foodland Ontario of Ontario-grown eggplant and its differentiated attributes
- Access to crop protection materials used by US counterparts for field production

10

Sweet Potatoes

The sweet potato is a sub-tropical crop with some cost disadvantages for a locally grown crop. There are significant capital requirements for sweet potato production – post-harvest curing, storage, and being able to supply the market at a price competitive with imports from North Carolina. Sweet potatoes are an example of a crop where significant expansion in Ontario production may be disruptive and reduce grower margins because of the large US supply and established continental supply chains.

10.1 Supply and Disposition Overview

Sweet potatoes have been grown in Ontario by a few growers for at least 20 years. Statistics Canada started to provide production and acreage estimates for the 2018 crop, with a reported 10,132 tonnes of marketed production. With this production volume and 43,025 tonnes of imports into the province, the supply volume was 53,157 tonnes (Table 10.1). Statistics Canada estimated that per capita consumption was just under 1.1 kg per person across Canada, suggesting a consumption volume of 15,325 tonnes for Ontario when using the national average.

Table 10.1 *Supply and Disposition of Sweet Potatoes, Crop Year 2014 to 2018*

Item	2014 Crop	2015 Crop	2016 Crop	2017 Crop	2018 Crop
Ontario production (tonnes)					10,132
Imports at Ontario border points (tonnes)	30,223	37,873	40,131	41,336	43,025
Ontario supply (tonnes)	30,223	37,873	40,131	41,336	53,157
Ontario consumption (using national average) (tonnes)	18,520	19,190	17,344	15,901	15,325
Exports from Ontario border points (tonnes)	1,584	3,523	2,139	2,199	2,391
Additional Ontario consumption and inter-provincial shipments (tonnes)	10,118	15,160	20,648	23,237	35,441
Production to consumption ratio (%)	0%	0%	0%	0%	51%

Source: Statistics Canada Table 32-10-0365-01 for production, Statistics Canada Table: 32-10-0054-01 (food available in Canada), and Statistics Canada, CATSNET Analytics, Ontario imports and exports of selected fruit by July/June crop year

After accounting for some exports to the US and the Netherlands from Ontario, there were 35,441 tonnes of sweet potatoes shipped to other provinces and possibly higher consumption volumes within Ontario. US imports typically come from North Carolina. Large retailers may have their orders for Eastern Canada shipped to Ontario distribution centres with shipments to some of their regional distribution centres across the country. Exports can be in a processed form, such as those shipped to the Netherlands.

The national estimates from Statistics Canada suggest that sweet potato consumption has been declining, despite increased import volumes (Table 10.2).

Sweet potatoes move into the two channels of retail and food processing, with the majority going into the retail channel. Sweet potatoes are used to manufacture fries, chips, baby food, and used as an ingredient in other food and pet food products. The production to consumption ratio of 66% does not account for shipments of Ontario sweet potatoes into other provinces. After accounting for exports to other countries, the remaining Ontario production represents 51% of estimated Ontario-wide consumption of sweet potatoes.

10.2 Production Expansion Opportunity

There is an opportunity for sweet potatoes to replace imports throughout the year. Once they are cured, they can be stored for up to a year. Import replacement can be at two levels – replacing imports sold in Ontario retail stores and replacing imports in other provinces. These import replacement opportunities can more than double current production levels.

The Ontario production volume of 10,132 marketed tonnes in 2018 was grown on 1,755 acres with 1,565 harvested acres, resulting in a yield of 6.5 tonnes/acre (14,270 lb./acre). Statistics Canada estimated the farm value at $10.2 million, suggesting a value of $0.36/lb. across all production and $0.45/lb., after considering the volume marketed (20% cull rate).

A hypothetical 20% expansion implies an additional 313 acres of sweet potatoes harvested, corresponding to an additional $2.0 million in farm value. The 20% higher volume results in an Ontario production volume of 12,100 tonnes, representing 79% of Ontario's volume of consumption before considering shipments into other provinces.

There are some factors that limit expansion opportunity, and a significant expansion of Ontario's production volume maybe disruptive to the production sector if retailers have not committed to merchandize the larger supply volume at prices that cover growing costs.

10.3 Expansion Constraints and Impediments

Sweet Potatoes Are a Sub-Tropical Crop

Sweet potatoes are also grown in North Carolina, which has a more conducive climate for a sub-tropical crop. To grow sweet potatoes in Ontario, growers must plant sweet potato slips in the spring to bring the crop to maturity by the end of the growing season. These slips are field-grown for Ontario growers in the US growing region, then shipped into Ontario – a cost not experienced by US growers. An Ontario supply of these slips would need to be greenhouse-grown by plant propagators, adding a cost structure much higher than field-grown US sweet potatoes.

Higher Operating Cost Structure of Sweet Potato Production

The cost structure for Ontario sweet potato growers is higher because of the northerly production location and the need for slips. Costs are also higher since some crop protection materials are not available in Ontario but are regularly used with US production. Crop protection products can result in higher yields, less product downgrade, and higher per acre revenues. As with other horticultural crops, Ontario growers are at a disadvantage when imported product sold by retailers have been grown using crop protection materials not allowed (registered) for use in Canada.

Sweet potato production is labour intensive with higher per hour labour costs in Ontario than US production regions.

High Capital Costs

Sweet potato production incurs high capital costs from planters, harvesters, curing equipment, and proper post-harvest storage equipment. From a cost efficiency perspective, expansion is in 100 to 150 acre increments to minimize per unit capital costs. Capital costs for expansion can be $3 to $6 million, a large outlay for a new entrant into sweet potato production, and for existing producers would require adequate per acre margins on existing production and assurances that retailer customers will purchase the additional production volume.

Ontario Growers Must Compete with Imported Sweet Potatoes

Crop year average border prices for sweet potatoes imported into Ontario are provided in Table 10.2, indicating import prices have ranged between $0.43/lb. and $0.45/lb. over the last three seasons. These import values represent both the value of sweet potatoes used for processing (~ $0.20/lb.) and sold fresh into retail channels (~$0.70/lb.). Grower returns are influenced by these replacement values.

Table 10.2 *Border Prices for Sweet Potato Imports into Ontario, Crop year 2014/15 to 2018/19*

Units	2014-2015	2015-2016	2016-2017	2017-2018	2018-2019
$/kg	$1.18	$1.07	$1.02	$0.94	$0.98
$/lb.	$0.53	$0.49	$0.46	$0.43	$0.45

Source: Statistics Canada, CATSNET Analytics, Ontario imports of selected fruit by July/June crop year

The monthly per unit value of sweet potato imports into all of Canada from US supply sources are provided in Figure 10.1 –a 2018 average value of $0.40/lb., and to October 2019 the average value was $0.46/lb.

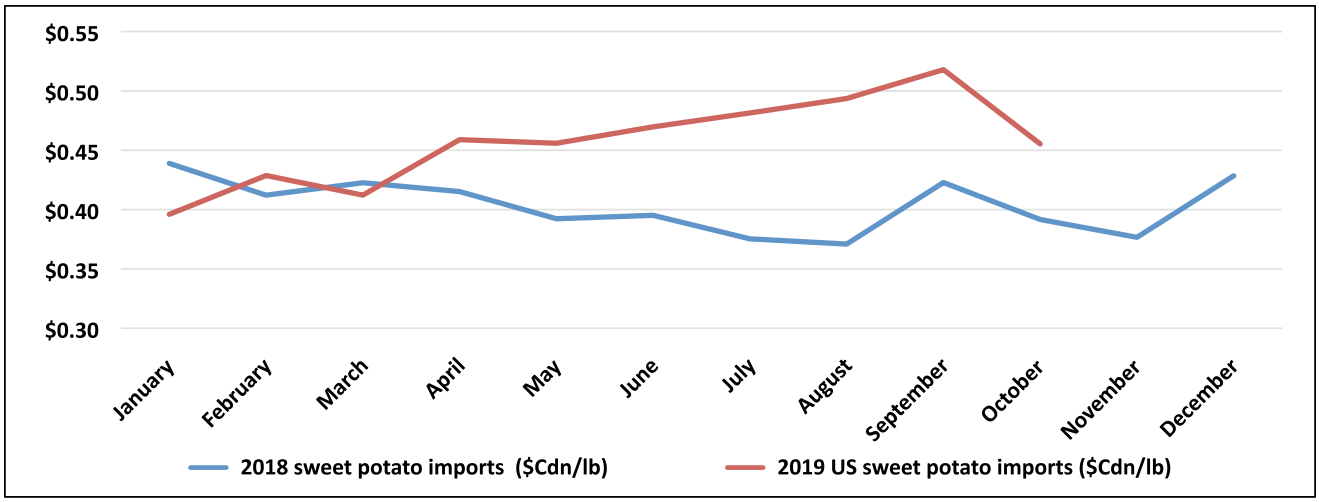

Figure 10.1 *US Sweet Potato Prices at the Canadian Border ($/lb.)*

Source: USDA GATS

The USDA reported that in 2018/19, the export prices (US funds) for sweet potatoes ranged between 28¢ and 33¢/lb. – with the Canadian dollar at $1.31 per US dollar means export values of $0.37 to $0.43/lb. (Canadian funds). With 6¢/lb. to 7¢/lb. freight costs from the US, prices and cost of growing in the US supply regions are below these landed import prices. The USDA reports grower farm gate values of 24¢/lb. in 2018 and just over 18¢/lb. in 2017, which reflects returns from fresh market sales and sales into processing markets. Returns to Ontario sweet potato growers are influenced by these values.

Expansion means growers must be able to profitably grow, store, and ship sweet potatoes into distribution centres at prices near US import values. Growers have indicated that overall production costs are above $0.50/lb. (marketed) and returns from the retail market are higher than sales to processors. This suggests that expansion opportunities for sweet potatoes are limited unless growers can offer a supply to retailers at a competitive price.

Excess Supply of US Sweet Potatoes

The US sweet potato crop averages just over 3.0 billion pounds (1.4 million tonnes) and is 136 times Ontario's production. The US has surplus sweet potato production and has exports of more than 600 million lb. in 2017 and 2018 (275,000 tonnes) – export that went primarily to the U.K., the Netherlands, and Canada (26% of the US export volume). This export volume of 275,000 tonnes compares to Ontario production of just over 10,000 tonnes and consumption of just over 15,000 tonnes.

In 2007, the US export volume was less than 100 million lb., which increased six-fold by 2018 and 2019 (~ 600 million lb.) in response to sweet potato production increasing from under 2 billion pounds to over 3.0 billion pounds. In other words, the US needs exports to clear the market, and Ontario is the closest export market for excess US production. The need to export surplus product – and resulting margin pressure – resulted in some bankruptcies by large US growing operations.

This export situation needs to be addressed in any expansion plans. The US export market dependency means established marketers of US sweet potatoes will probably use price to maintain market share and sales into various market channels, if challenged by a large increase in Ontario sweet potato production. Ontario expansion must be based on agreements with food retailers that commit to stocking additional Ontario sweet potato volumes.

Exchange Rate Risks

A strengthening of the Canadian dollar from current values of $1.32 for US dollars creates much more margin pressure on Ontario sweet potato growers. With US export values of $(US)0.35/lb., this translates into a border price of $0.46/lb. A strengthening of the Canadian dollar to $1.20 for US dollars results in a $0.42/lb. border price. With estimated costs in Ontario of about $0.50/lb., a strengthening of the Canada dollar will place significant margin pressure on additional sweet potato production.

Marketing of Sweet Potatoes

There are less than five larger growers of sweet potatoes in Ontario, and between five and 10 smaller growers. Large growers market their sweet potatoes directly to major retailers and food processors. Smaller growers use a combination of market outlets, such as sales through the Food Terminal, sales to smaller and independent retailers, and using the marketing services of the larger growers. Sweet potato prices reported by the Ontario Food Terminal are provided in Figure 10.2 and show periods when prices approached $0.80 to $0.90/lb.

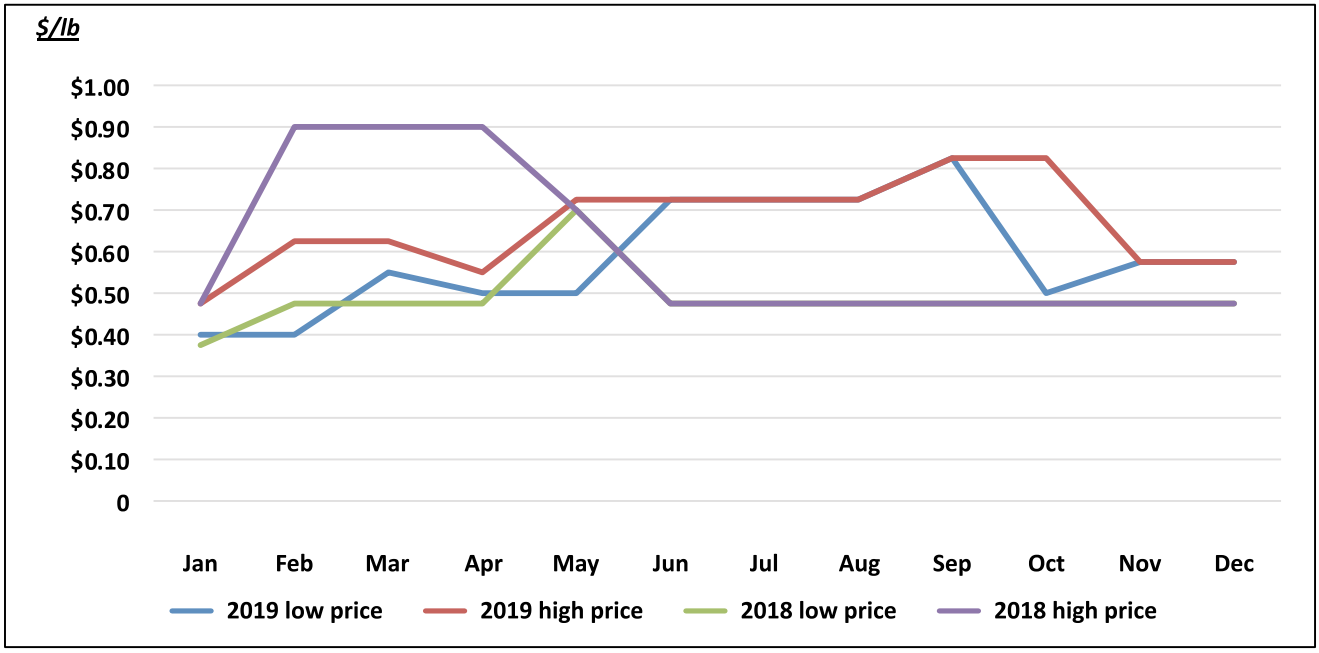

Figure 10.2 *Monthly Sweet Potato Prices at the Ontario Food Terminal, 2018 and 2019*

Source: InfoHort

As with most fruits and vegetables, major retailers only want to access sweet potatoes from large growers/marketers that can assure a consistent and reliable supply of quality product. This requires marketers to have access to a critical mass of retail ready sweet potatoes.

There are also importers of sweet potatoes who are wholesalers or retailers.

Product Quality and Taste

Some retailers suggest Ontario sweet potatoes have a different taste profile than US sweet potatoes – but it is not clear if this is positive or negative for the Ontario industry. Consumer sensor and taste panel data can provide any necessary information on taste preference. Any fact-based need to modify the Ontario sweet potato taste/texture profile can be addressed through agronomic and curing/storage practices and/or through cultivar selection.

Accessing the Retail Shelf

Sweet potato growers need a high proportion of their crop graded to meet retail market requirements due to the significant difference between prices received at retail versus processing. A few retailers purchase Ontario sweet potatoes at a pre-determined price, established in the spring by negotiation between the retailer and the large growers/marketers. Other retailers prefer to buy sweet potatoes based on open-market prices through the year. To gain market share, additional Ontario production must be priced to be competitive with product coming from the US.

Most retailers have Ontario sweet potatoes in the harvest and post-harvest season, and then switch to imported sweet potatoes for the majority of the year.

10.4 Factors That Will Enable Expansion

These factors will help expand sweet potato production in Ontario:

- Cultivar selection and/or a plant breeding program focused on higher yields and/or a shorter growing season to lower per unit costs
- Investigation into cultivar selection and/or growing conditions that affect the taste of Ontario sweet potatoes, and offer a taste more comparable to imported product
- Access to crop protection materials used by US counterparts
- Growers and/or marketers having a critical mass of sweet potatoes to supply the requirements of major food retail accounts
- Retailer support for Ontario-grown sweet potatoes
- Ongoing promotion by Foodland Ontario of Ontario-grown sweet potatoes

11

Snap Beans

Ontario growers supply snap beans, also referred to as succulent beans, to both fresh market channels and into a food processing channel. Over the last 20 years snap bean production has increased by 2.2% on average each year. There is an opportunity to further increase snap bean production in the province.

11.1 Supply and Disposition Overview

Ontario farmers supply snap beans to both the fresh market and the processing market, with processing beans accounting for approximately 83% of annual production. Table 11.1 provides supply and disposition data for both fresh and processing beans, with production in 2019 at 33,907 tonnes. In addition to this supply, Ontario imports between 10,000 tonnes and 14,000 tonnes of beans, with imports around 30% of the Ontario supply. Assuming Ontario consumes beans similarly to the national average, consumption of fresh and processed beans ranged from just under 29,000 tonnes in 2014 to just over 32,500 tonnes in 2019.

Table 11.1 *Supply and Disposition of All Snap Beans, Ontario, Crop Year 2014 to 2019*

Item	2014 Crop	2015 Crop	2016 Crop	2017 Crop	2018 Crop	2019 Crop
Ontario production (tonnes)	31,653	25,457	27,603	27,429	31,226	33,907
Imports at Ontario border points (tonnes)	10,283	11,310	12,616	12,068	12,769	14,367
Ontario supply (tonnes)	41,936	36,767	40,219	39,497	43,995	48,274
Ontario consumption (using national average) (tonnes)	28,931	28,980	29,706	28,997	30,619	32,590
Exports from Ontario border points (tonnes)	5,356	5,858	3,216	5,078	2,092	4,813
Additional Ontario consumption and inter-provincial shipments (tonnes)	7,649	1,928	7,298	5,423	11,284	10,872
Production to consumption ratio (%)	109%	88%	93%	95%	102%	104%

Source: Statistics Canada Table 32-10-0365-01 for production, Statistics Canada Table: 32-10-0054-01 (food available in Canada), and Statistics Canada, CATSNET Analytics, Ontario imports and exports of selected vegetables by July/June crop year.

The supply of 48,274 tonnes for the 2019 crop is greater than the estimated consumption in the province of 32,590 tonnes, and exports of 4,813 tonnes. The residual of 10,872 tonnes are either shipments of beans (fresh and processed) to other provinces and/or higher per capita consumption in Ontario compared to the national average. As with many fruit and vegetable crops, Ontario is an entry point for imported produce that is shipped into other provinces.

After accounting for exports, the data indicates that Ontario production (of 33,907 tonnes in 2019) is slightly above estimated Ontario consumption of all snap beans (see last row in Table 11.1 at 104%).

The processing market accounts for 83% of the tonnage, as noted in Table 11.2. At the same time, the fresh market accounts for 68% of the value of farm gate cash receipts. In 2019, the farm value of cash receipts for all beans was $19.4 million, with fresh market beans valued at $13.5 million.

Table 11.2 *Market Shares of Fresh and Processing Snap Beans (2014-19 average)*

Item	Fresh Market	Processing Market	Total
Acreage	29%	71%	100%
Tonnage	17%	83%	100%
Farm value	68%	32%	100%
Farm value (2019 $ million)	$13.5	$5.9	$19.4

Production, imports and consumption data are available for fresh market beans and processed snap beans. Table 11.3 provides comparable information (as Table 11.1) for processed beans and Table 11.4 provides this for fresh market beans. Per capita consumption of processed beans is higher than for fresh market beans, with Statistics Canada reporting 1.33 kgs/person for processed beans and 0.92 kg for fresh market beans.

The data in Table 11.3 indicate that in addition to Ontario processing bean production, some raw beans are imported for processing, with 3,687 tonnes imported in the 2019 crop year for a supply volume of 31,5973 tonnes. Based on the average per capita consumption, Ontarians consumed 19,264 tonnes of processed beans (frozen and canned), which indicates that 12,309 tonnes of processed beans were shipped out of Ontario into other provinces and some exports. The export data in Table 10.3 of 47 tonnes (46,975 kgs) are exports of processed beans.

The data indicate that Ontario production of processed beans exceeds average consumption volumes by 145% (in 2019), implying growth opportunities will be based on supplying processed bean products across Canada and into select export markets.

Table 11.3 *Supply and Disposition of Processing Beans, Ontario, Crop Year 2014 to 2019*

Item	2014 Crop	2015 Crop	2016 Crop	2017 Crop	2018 Crop	2019 Crop
Ontario production (tonnes)	26,489	25,965	25,246	27,106	25,506	27,886
Imports at Ontario border points (tonnes)	884	1,541	1,547	2,537	2,048	3,687
Ontario supply (tonnes)	27,374	27,506	26,793	29,643	27,554	31,573
Ontario consumption (using national average) (tonnes)	17,386	16,677	17,133	16,950	17,944	19,264
Exports from Ontario border points (tonnes)	0	0	4	29	68	47
Additional Ontario consumption and inter-provincial shipments (tonnes)	9,988	10,829	9,657	12,664	9,542	12,262
Production to consumption ratio (%)	152%	156%	147%	160%	142%	145%

Source: Ontario Processing Vegetable Growers for production, Statistics Canada Table: 32-10-0054-01 (food available in Canada), and Statistics Canada, CATSNET Analytics, Ontario imports and exports of selected vegetables by July/June crop year. Note, the Ontario supply and additional Ontario consumption/inter-provincial shipments are measured on a fresh equivalent basis.

Ontario fresh bean production, on the other hand, only accounts for 45% of fresh market requirements in the province (see last row in Table 11.4). After accounting for imports of fresh beans (10,681 tonnes in crop year 2019-20), which exceeds Ontario production (6,047 tonnes), an estimated 3,402 tonnes of fresh beans were shipped into other provinces. This inter-provincial trade is predominantly imported produce that enters through Ontario first. The trade data is not detailed enough to ascertain whether there are exports of fresh market snap beans into select US states.

Table 11.4 *Supply and Disposition of Fresh Beans, Ontario, Crop Year 2014 to 2019*

Item	2014 Crop	2015 Crop	2016 Crop	2017 Crop	2018 Crop	2019 Crop
Ontario production (tonnes)	5,223	5,418	4,709	5,612	5,716	6,047
Imports at Ontario border points (tonnes)	9,399	9,769	11,069	9,531	10,721	10,681
Ontario supply (tonnes)	14,622	15,186	15,778	15,143	16,437	16,727
Ontario consumption (using national average) (tonnes)	11,545	12,303	12,573	12,047	12,675	13,326
Exports from Ontario border points (tonnes)	0	0	0	0	0	0
Additional Ontario consumption and inter-provincial shipments (tonnes)	3,076	2,883	3,205	3,096	3,762	3,402
Production to consumption ratio (%)	45%	44%	37%	47%	45%	45%

Source: Statistics Canada Table 32-10-0365-01 for production, Statistics Canada Table: 32-10-0054-01 (food available in Canada), and Statistics Canada, CATSNET Analytics, Ontario imports and exports of selected vegetables by July/June crop year.

Additional Ontario consumption and inter-provincial shipments (at 3,402 tonnes with the 2019 crop) (see Table 11.4) accounts for 20% of the Ontario supply. This may mean that excess supply in Ontario is shipped into other provinces, and/or Ontario's per capita consumption is above the national average.

This supply disposition data suggests that a growth opportunity is for Ontario growers to produce more fresh market beans. The opportunity will be based on factors such as seasonality of consumption, supplying nearby provinces, the length of the harvesting season and packaging/storage opportunities for fresh market sales.

11.2 Production Expansion Opportunity

Snap bean production has grown in the province from around 20,000 tonnes per year to just under 35,000 tonnes, which is a 2.2% annual growth rate. Yield increases account for most of the growth, measuring 2.8% per annum over the 2000 to 2019 period (see Figure 11.1). Over this time frame, harvested area slightly decreased from just over 10,000 acres to just under 10,000 acres.

In 2019, there were just under 6,700 acres of processing beans and 3,000 acres of fresh market beans. The farms accounting for 90% of the acreage had an average operation size of just under 100 acres of beans.

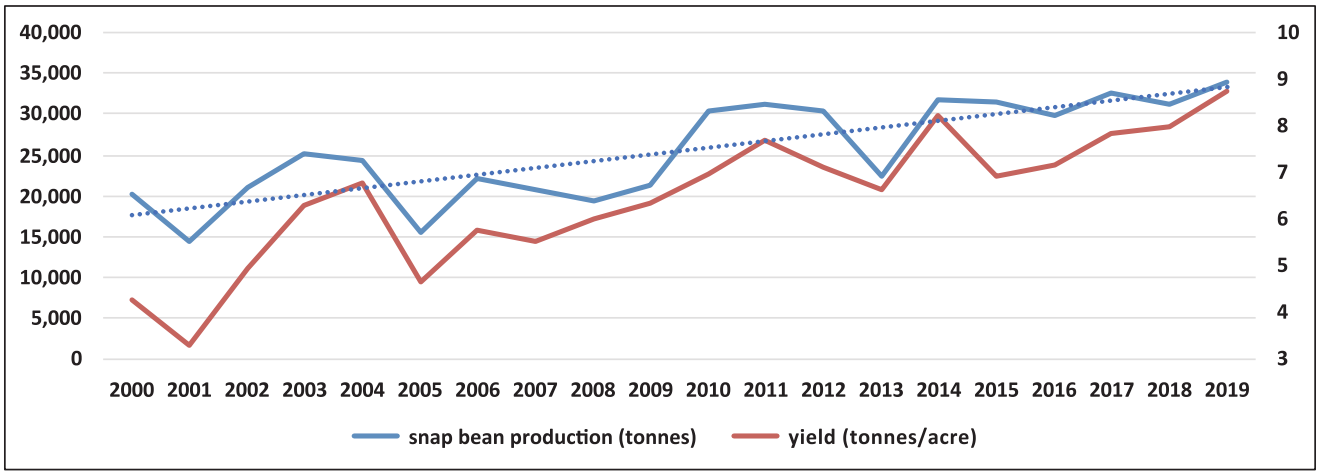

Figure 11.1 *Trend in Snap Bean Production and Yield, 2000 to 2019*

The majority of snap beans are grown in southwestern Ontario, as illustrated in Figure 11.2. At the County/Region level, Middlesex accounts for just under 25% of production, followed by Chatham Kent (19%), Elgin (10%) and Brant (9%). The areas where snap beans are grown suggest that there are many areas in Ontario where expanded acreage can occur. Much of the land base used to grow soybeans can be used for snap bean production, suggesting no agronomic limits for any planned expansion.

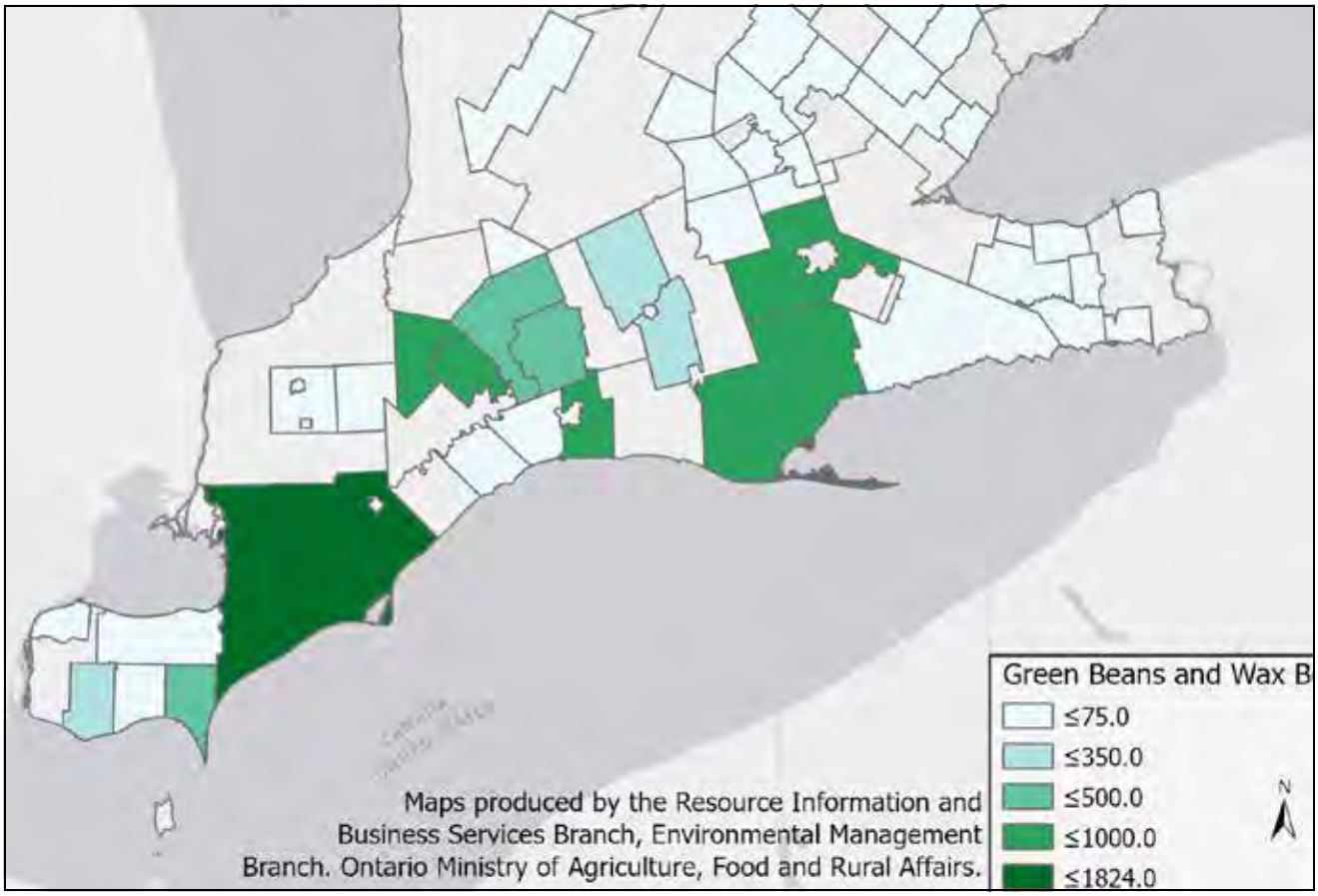

Figure 11.2 *Location of Snap Bean Production in South Western Ontario*

Source: Statistics Canada – 2016 Census of Agriculture with maps provided by the OMAFRA

Expanding Market Share for Fresh Beans

Between 60 and 62% of all fresh bean imports into Canada enter through Ontario, with some of this produce destined for markets in more eastern provinces. Figure 11.3 shows the seasonal pattern of fresh bean imports for Ontario and Canada. Ontario imports around 300 tonnes per month in the July to September period and just over 1,000 tonnes/month in the December to May period. The US is the largest supplier of imported fresh beans throughout the year at 85% of all imported beans, and Mexico is also a source of supply.

Consumption of fresh beans is rather seasonal: approximately 55% of fresh bean consumption occurs in the fresh bean harvest season of July through to September. Figure 11.4 illustrates the per capita consumption in the non-harvest season, which is based on Canada-wide fresh bean import data, with the July, August, and September consumption estimate based on consumption of domestic production plus imports. After accounting for the volume of imported fresh beans, in the months of October through to June, the amount consumed in the three summer months is an estimate of market potential for consumption of locally grown fresh beans.

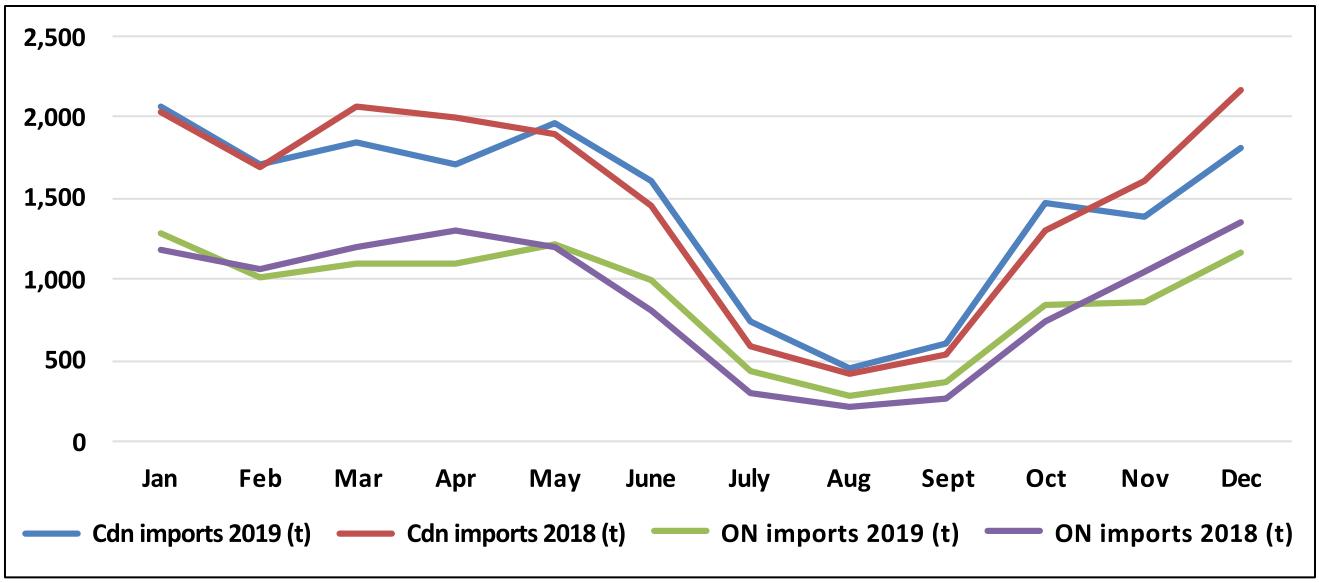

Figure 11.3 *Ontario and Canadian Imports of Fresh Beans, 2018 and 2019*

Source: Statistics Canada, CATSNET Analytics, Ontario imports and exports of selected vegetables

The volume of fresh beans imported in the summer months is a growth opportunity. In the last crop year, Ontario summertime fresh bean imports were 1,086 tonnes, which is 18% of production. Replacing 50% of this import volume is a 9% increase in fresh market bean production. Some of these imports are sold in Ontario retail stores, some distributed by food service distributors, and some shipped into other provinces. Using $1.50/lb. at the farm level (for fresh market beans), this represents a $1.8 million opportunity.

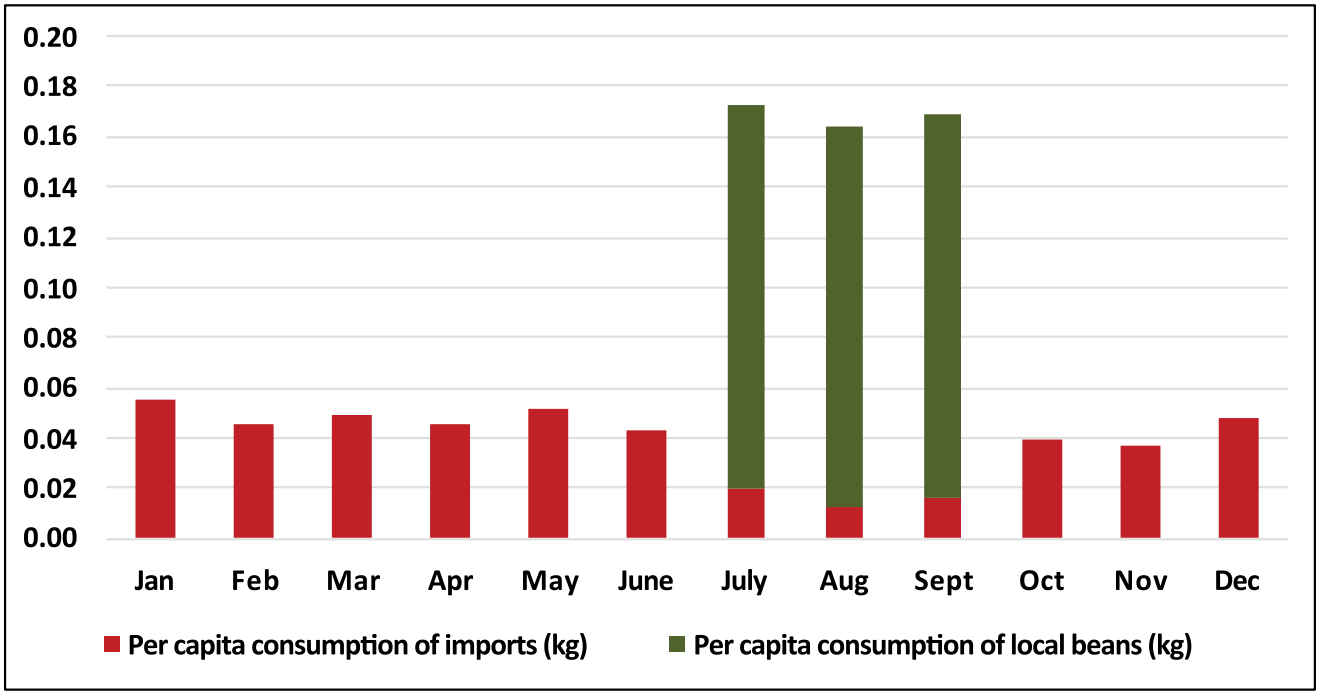

Figure 11.4 *Canadian Per Capita Consumption of Fresh Market Beans, 2018 ad 2019*

Extending Shelf Life and Marketing Season with Modified Atmospheric Packaging

When fresh beans are chilled at harvest and maintained at 5°C the shelf life is 9 to 10 days. Packaging technologies can extend the shelf life to 18 days.

Modified Atmospheric Packaging (MAP) is used in the food industry to displace oxygen as food is exposed to oxygen typically begins to exhibit biochemical spoilage, and oxygen enables the growth of aerobic microorganisms, resulting in microbial spoilage. MAP replaces oxygen with other gases such as carbon dioxide or food grade nitrogen. MAP is used to prevent biochemical and microbial spoilage of food, which in turn extends food shelf life by prolonging the period of time that the food is safe and appealing for consumption.

In the case of fresh beans, MAP can improve shelf life by 8 to 9 days if the product is stored at less than 5°C. Fresh bean consumption in the summer is ~0.15/kg/person/month, and with extended shelf life this is 27% of a month. MAP, therefore, provides an opportunity of another 540 tonnes of local bean consumption. This represents another 9% growth opportunity, and another $1.8 million at the farm level (before the extra value of MAP).

However, significant investment is required for MAP technology and associated packaging equipment. Necessary scale and retailer commitment are required for a grower/marketer to invest in this market expansion. Growers/marketers would be competing with packaged fresh market beans from exporting countries such as Guatemala.

Growth in the Processing Market

Ontario imported 3,687 tonnes of beans for processing in the 2019 calendar year, with 1,868 tonnes imported in July when presumably Ontario production could be available. One growth opportunity is to expand local production to reduce imports of processing beans. Imports typically occur in the winter months (imports from the southern US or Mexico), which are then processed. An expansion opportunity that would replace wintertime imports is dependent on the processing capacity that exists in Ontario. However, some of the processing capacity for beans at harvest may compete with the need to process other vegetable crops, like sweet corn and carrots. Investments in processing capacity may be the limiting factor to expansion.

The Ontario bean processing sector is characterized as one where Ontario has an excess supply of processed beans and ships processed beans into other provinces. As noted above in Table 11.3, 45% of Ontario production is shipped into other provinces. Across Canada consumption of processed beans is just under 50,000 tonnes. With an Ontario supply base of just over 31,000 tonnes, this presents an opportunity to expand shipments into other provinces beyond the 12,200 tonnes currently shipped (see Table 11.3). For example, increasing the volume by another 4,000 tonnes is a 14% increase in production. There are two possible constraints: one is whether investments are required in processing capacity, and the second is whether such expansion will disrupt the overall processing bean market across Canada.

In the case of the latter, consider, for example, Quebec's bean production: if 60% of their overall bean production (fresh and processed) of around 23,000 tonnes is processed, that equates to 13,800 tonnes of processed vegetable supply. Combined with Ontario's volume of 31,000 tonnes, the total is just over 45,000 tonnes. This volume is less than the overall Canada consumption of 50,000 tonnes, suggesting the opportunity exists, subject to processing capacity in Ontario. At the farm level, this adds another $0.85 million in farm cash receipts.

Promoting the Nutritional Attributes of Frozen Beans

Frozen Ontario-grown beans have the advantage that there is minimal product degradation between field harvest and flash freezing of the processed product. This results in a consumer-ready bean product that has much, if not more, nutritional value than a fresh market bean. A UC Davis study indicates that fresh market green beans can lose as much as 77% of their vitamin C content when stored at 4°C (39°F) for seven days. This loss will increase to 90% if the beans are stored for 16 days in the refrigerator, says a 1999 study published in the Journal of Food Science. In contrast, green beans lose only about 28% of vitamin C during blanching and subsequent freezing[17].

Consumer awareness of this attribute can enable higher frozen bean consumption in the non-harvest season of October through to June. Foodland Ontario can assist in this growth by working with processors to place Foodland Ontario logos on their packaged products, as well have awareness building programs of the nutritional value of freshly frozen Ontario beans. The Ontario government may choose to commission research to further verify the nutritional profile of freshly frozen Ontario beans versus imported table market beans.

11.3 Expansion Constraints and Impediments – Processing Beans

Returns to Growing Processing Beans

Prices for processing beans were $192/tonne, or $0.10/lb. for the 2019 crop, while the imported price for processing beans was $0.17/lb. Prices received by processing bean growers do not reflect seed costs or harvesting costs, which accounts for some of the price differential with imported processing beans. The import price can also reflect processors importing snap beans in the offseason from the south-east U.S.

Table 11.5 *Border Prices for Fresh Bean Imports into Ontario, and Farm Price for Fresh Market Beans, Crop Year 2014/15 to 2019/20*

Item	2014-15	2015-16	2016-17	2017-18	2018-19	2019-20
Imported processing beans ($/lb)	$0.17	$0.17	$0.17	$0.17	$0.17	$0.17
Imported fresh beans ($/lb)	$1.02	$1.21	$1.20	$1.30	$1.43	$1.61
Ontario fresh bean farm price ($/lb)	$0.92	$0.98	$1.00	$0.93	$0.96	$1.02

Source: Statistics Canada, CATSNET Analytics, Ontario imports of selected vegetables by July/June crop year, and JRG calculations for Ontario fresh bean farm price.

Grower prices for processing beans are based on negotiations between growers and processors. Factors such as landed costs of imported processing beans, cost of production, returns from other field grown crops are determinants in establishing a grower price.

17 https://www.healwithfood.org/nutritional-differences/frozen-fresh-vegetables.php#ixzz6bdTmioXq

Processing Beans as An Alternative to Soybeans

Growers indicate that returns per acre for growing processing beans are higher than a close alternative, soybeans. OPVG statistics indicate that the average grower of snap beans received $885/acre in the 2019 growing season, which is before seed and harvesting costs that are covered by the processor. By contrast, a 65 bushel/acre soybean crop can generate gross revenue of between $750 and $850/acre with seed and harvesting costs included in this return.

This higher per acre return needs to be adjusted by the potential soil compaction costs associated with snap bean harvesting, as snap beans need to be harvested in a short time window (based on maturity). As a result, harvesting may sometimes occur after a rain that causes field ruts and compaction. The grower will incur additional field work costs (ripping, discing, etc.) to create a seed bed for the following rotation crop.

As noted above, snap beans can be grown in many parts of southern Ontario, and there does not appear to be an economic or agronomic constraint to expansion of snap beans for the processing market. As long as there is an adequate premium over growing soybeans, the supply base should be available to the processing sector.

Investment in Additional Processing Capacity

The constraint to additional processing bean production is sufficient processing capacity in the province. Vegetable processing plants can process a number of vegetables, and plant operations and plant capacity utilization is based on the availability of specific crops throughout the growing season. Vegetable processing plants are designed to process more than one vegetable crop. A processor may only have a fixed number of processing days allotted to snap beans, given that other crops (e.g., peas, sweet corn) need to be processed. Additional processing capacity in the province is likely required to expand acreage in processing bean production.

Currently, Ontario has one major snap bean processor and one smaller processor. Expansion by either company is a requirement for more acreage in processing beans. This investment decision will be based on market opportunities, which can include import replacement, increase in export volumes, or overall growth in market requirements for specific processed bean products within Ontario. Notwithstanding the market opportunity, without additional investment in processing, by either an existing business or by a new entrant, the expansion opportunity is rather limited for processing beans.

Promotion of Processed Bean Nutritional Attributes by Foodland Ontario

Processed beans, such as frozen beans, can have more nutritional attributes than fresh market beans: processed beans can be flash frozen the same day they are harvested, while fresh market beans can be over a week old before they reach the consumer's kitchen. With the majority of frozen beans retailed as private label, there is not a major brand that is willing to promote the attribute of a processed vegetable such as frozen beans.

However, Foodland Ontario is perfectly placed to promote frozen (processed) Ontario vegetables and the associated nutritional attributes. Such promotion can expand consumer demand that may alter the investment decision for more plant capacity in Ontario.

Processors can access raw product from adjoining regions to fill out a production run. This feature can limit the ability to have one package that is labeled grown in Ontario. Some packaged products can be segregated and packaged as Ontario-grown, which would support the Foodland Ontario promotion. Retailers may be in a position to request such packaging of Ontario-grown frozen vegetables for gaining market share of their private label and store brands.

11.4 Expansion Constraints and Impediments – Fresh Market Beans

Critical Mass to Access the Marketplace

Critical mass of the supply offering is required to access major retail chains. This can be achieved by growers having a large acreage base, such as 400 acres, or by a network of growers supplying product through a broker/marketing organization.

The Food Terminal is also a market outlet for smaller growers and for excess supplies not required to meet committed volumes to retail accounts. Off-grade product can also be merchandized through the Food Terminal.

The farmer's market channel is an outlet that is used by the small acreage growers to market their bean crop.

Twelve Month Supply Chain

Ontario growers have a four month marketing season, while retailers offer fresh beans 12 months of the year. There are supply chains that can offer 12 month supply based on growing operations dispersed across North America and Central America. Larger Ontario growers could seek out opportunities to be part of such a supply chain with opportunities to supply beans into US markets during the growing season, as well as become the supply source for the supply chain that is part of the imported beans in the summer months (see Figure 11.3 and 11.4).

Competing with US Fresh Market Beans During the Growing Season

Fresh bean prices are influenced by the price of fresh bean imports. Wholesale prices at the border are shown below in Figure 11.5, where import prices from the US range from $1.20/lb. to $1.80/lb. (for all of Canada). Ontario-grown beans must compete with these import prices.

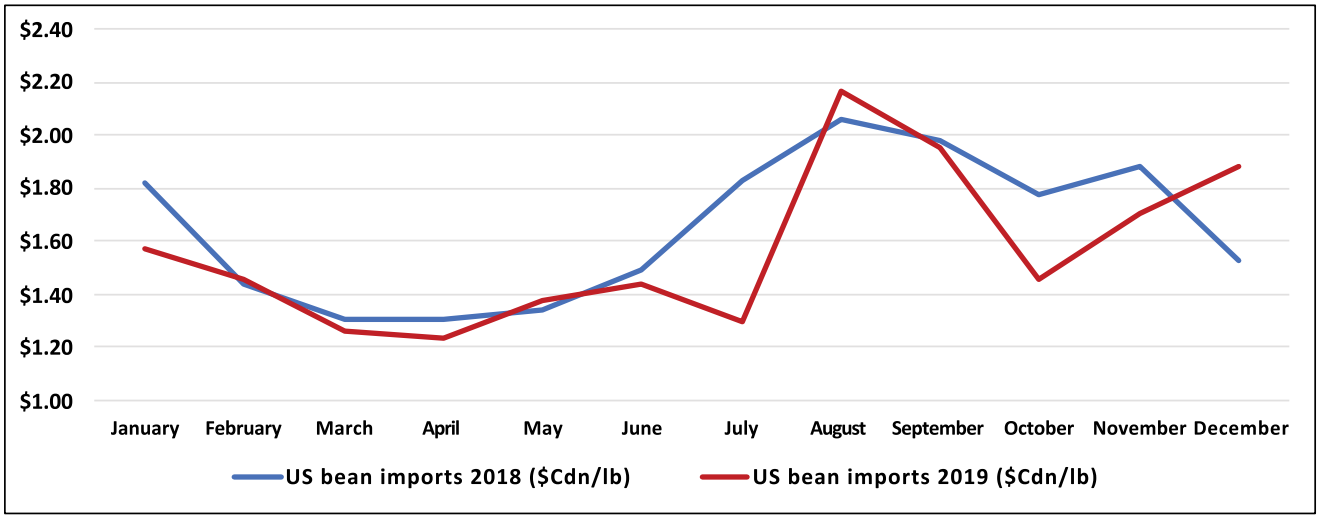

Figure 11.5 *US Fresh Bean Prices at the Canadian Border ($/lb.)*

Source: USDA GATS

Table 11.5 (above) indicates that the average landed price into Ontario from all exporting countries was $1.43/lb. for the 2018 crop year and $1.61/lb. for the 2019 crop year. Monthly prices at the Food Terminal show that wholesale values averaged around $1.80/lb. during the July to September period, when Ontario's fresh market beans are supplied to the market. Figure 11.6 illustrates monthly wholesale price over the 2018 and 2019 calendar years. In 2020 growers were able to achieve $2.00/lb. for most of the season at the Food Terminal.

Suppliers of fresh market beans will bring in US beans during the Ontario marketing season when Ontario prices exceed the cost of landed US fresh market beans. Import values help establish Ontario snap bean prices. The value of the Canadian dollar directly influences the Ontario price for beans.

Prices published by the Food Terminal are wholesale prices and are not prices received by growers of fresh market beans in the field. There are marketing costs that need to be accounted for after the crop is harvested. Growers indicate that they need to receive at least $1.50/lb. to $1.80/lb. for green beans delivered to the Food Terminal. Table 11.5 (above) indicates that the estimated grower price for fresh market beans at the farm level ranged between $0.93/lb. and $1.02/lb. over the last 4 years.

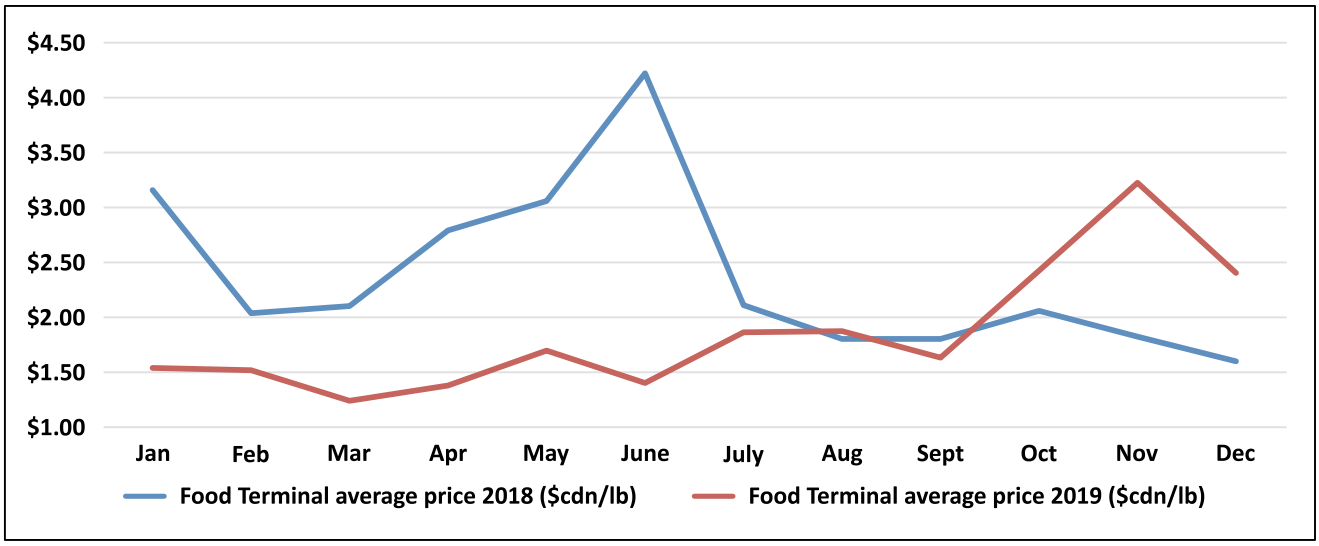

Figure 11.6 *Monthly Fresh Green Bean Prices at the Ontario Food Terminal ($/lb.)*

Source: InfoHort

Additional Production and Disruption of the Market

Supply and demand conditions for fresh market beans determines the price received by growers in the province. An over-supply will cause prices to decline, with the lower value clearing the local market and/or the price dropping based on shipping excess supplies into other markets.

Expansion should not disrupt the supply/demand balance and create an excess supply. Given that US beans are imported in the Ontario harvest season, a moderate expansion should not disrupt the market as Ontario-grown beans would replace US imports. This suggests that expansion should be based on growers/marketers and retailer working together on marketplace requirements and retailers only using Ontario product, with imports occurring when production volumes fall short of market needs.

Hand Harvesting versus Machine Harvesting and Labour Requirements for Fresh Market Beans

Fresh market beans can be machine harvested, though some smaller scale growers still hand pick fresh market beans. With machine harvesting, labour is still required to grade and pack fresh market beans in the barn/packing shed. Grading and packing equipment is available to limit labour requirements for these activities. Investment begins at more than $1 million for growers/marketers for packaging.

For some more niche markets, fresh market bean growers hand pick beans to meet customer requirements. The cost of hand harvesting is ~$0.85/lb., which is just under half of a market price of $1.80/lb. Access to labour is essential for expansion for many fresh market bean growers. With machine harvesting the cost structure for fresh market beans is much lower than hand harvested beans.

Per unit variable costs of fresh market bean production decrease as capital is substituted for labour, where labour availability and cost is becoming a larger issue for fruit and vegetable growers. With processors supplying the capital-intensive harvesting equipment, the size of operations for processing market beans is less of an issue compared to fresh market beans.

Scale of Fresh Market Growing Operations

Investments in machine harvesting of green beans, investments in grading and packing technologies as well as possible investments in MAP to extend the market season requires a sizeable production base upon which to support such investments. More than 200 acres of snap beans are required to support such investments, but many fresh market growers are only in the 100 to 200 acreage range. The larger the size of operation, the more contribution margin[18] is returned to pay for such investments.

Maintaining a Cold Supply Chain

The shelf life of beans deteriorates as holding temperature increases above 5°C. A cold supply chain is required between when beans leave the harvested field until they are used in a household, food service operation, or processed.

Weather Risks

Large Ontario bean growers organize plantings to have a stable flow of fresh picked beans in the July to October period. These scheduled plantings do not always result in an even flow of beans to the grower's customers if weather patterns delay growth for a week or two, resulting in a weekly undersupply at harvest time and then a weekly oversupply. Such risk can be minimized by growers being part of a larger grower network to maintain an even flow of beans to the market.

11.5 Factors That Will Enable Expansion

The following are factors that will enable the expansion of snap bean production in Ontario:

- Growers and/or marketers having a critical mass of fresh market beans available to service major food retail accounts from July to October
- Growers being part of North America supply chains for fresh market beans that can supply retailers in Ontario and the US 12 months of the year
- Programs that assist growers with accessing necessary labour as required through the growing and harvesting periods
- Retailer support for using only Ontario-grown beans in the main growing season
- On-going promotion by Foodland Ontario of Ontario-grown beans and availability from July through to October
- Investments into MAP to extend the marketing season for fresh market beans
- Foodland promotion for the nutritional value of frozen (processed) Ontario-grown beans
- Investment in additional bean processing capacity that can supply a larger portion of Canadian consumer requirements for processed beans

18 Contribution margin is a form of operating profit to pay for capital items

12

Apples

Provincial apple production supplies approximately 50% to 60% of Ontarian's consumption of both fresh and processed apples. Since apples can be stored through most of the post-harvest season, there is an opportunity to increase Ontario's production of apples by at least 11%, which would require planting 700 acres of specific apple varieties, such as Honeycrisp or Royal Gala.

12.1 Supply and Disposition Overview

Ontario produces on average between 100,000 tonnes and 160,000 tonnes of apples each year, with weather impacting the variability in production. This production volume supplies between 37% and 66% of market needs within the province (see last row in Table 8.1), with apple imports accounting for 40% to 50% of the Ontario supply, depending on the year. Some of these imports at the Ontario border are ultimately consumed in other provinces. Total apple consumption in the province ranged between 226,000 to 253,000 tonnes over the prior three years (see 4th row in Table 8.1). This consumption volume is for both fresh apples and processed apples, with apple juice the largest processed apple product.

Across Canada, 33% of apple consumption is as apple juice. In recent years the average Canadian consumes 12.0 lbs. of apples as apple juice (3.9 litres of apple juice), which is 170 million lbs. of apples (or 78,000 tonnes).

Table 12.1 *Supply and Disposition of All Apples (Fresh and for Processing), Ontario, Crop Year 2014 to 2019*

Item	2014 Crop	2015 Crop	2016 Crop	2017 Crop	2018 Crop	2019 Crop
Ontario production (tonnes)	148,871	92,320	158,955	122,232	164,182	135,804
Imports at Ontario border points (tonnes)	88,450	90,416	81,935	80,995	81,804	83,000
Ontario supply (tonnes)	237,321	182,736	240,890	203,227	245,986	218,804
Ontario consumption (using national average) (tonnes)	260,517	251,799	248,007	253,267	246,946	226,244
Exports from Ontario border points (tonnes)	16,149	15,872	13,059	9,095	15,792	10,000
Additional Ontario consumption and inter-provincial shipments (tonnes)	-39,345	-84,935	-20,176	-59,135	-16,752	-17,440
Production to consumption ratio (%)	57%	37%	64%	48%	66%	56%

Source: Statistics Canada Table 32-10-0364-01 for production, Statistics Canada Table: 32-10-0054-01 (food available in Canada), and Statistics Canada, CATSNET Analytics, Ontario imports and exports of selected fruit by August/July crop year.

Ontario apple marketers export apples into US and global markets as well as ship apples into other provinces. After accounting for the export volume of 9,000 to 16,000 tonnes, there is an additional inflow of apples and apple products into Ontario (see the second last row in Table 8.1) of 17,440 tonnes to 59,135 tonnes over the last three crop years (of apples and apple products in fresh apple equivalents). Most of this inflow is apple products such as apple juice[19] and apple sauce with some apples shipped into Ontario from Nova Scotia, Quebec and BC.

Ontario-grown apples marketed as fresh apples represent a larger share of fresh apple consumption in the province. As shown in the last row in Table 12.2, this ranged between 62% and 87% over the last three years. The supply of fresh apples in the province, after accounting for imports at Ontario border points, is much larger than estimated Ontario fresh apple consumption. The excess supply includes Ontario fresh apple exports (at 4,125 tonnes in the 2019/20 crop year) and apples (Ontario-grown and imported) shipped into other provinces, and/or Ontario fresh apple consumption in Ontario may be higher than the national average (at 26,296 tonnes in the 2019/20 crop year). As is the case with other produce, Ontario is an entry point for imported apples, which are then distributed into other provinces.

19 For example, Ontario had imports of 12 million to 16 million litres of apple juice and apple concentrate in this time frame, which is equivalent to 26 million to 39 million litres of only apple juice, which in turn is equivalent to 36,000 tonnes to 54,000 tonnes of apples.

Table 12.2 *Supply and Disposition of Fresh Apples, Ontario, Crop Year 2014 to 2019*

Item	2014 Crop	2015 Crop	2016 Crop	2017 Crop	2018 Crop	2019 Crop
Ontario production (tonnes)	123,045	68,318	117,727	95,364	130,566	105,920
Imports at Ontario border points (tonnes)	80,622	81,278	79,602	73,102	62,471	61,088
Ontario supply (tonnes)	203,668	149,596	197,329	168,466	193,037	167,008
Ontario consumption (using national average) (tonnes)	156,745	151,462	147,284	153,389	149,392	136,586
Exports from Ontario border points (tonnes)	6,287	4,121	5,352	3,839	4,334	4,125
Additional Ontario consumption and inter-provincial shipments (tonnes)	40,636	-5,987	44,692	11,238	39,311	26,296
Production to consumption ratio (%)	79%	45%	80%	62%	87%	78%

Source: Statistics Canada Table 32-10-0364-01 for production, Statistics Canada Table: 32-10-0054-01 (food available in Canada), OMAFRA and Ontario Apple Growers on fresh apple marketing and Statistics Canada, CATSNET Analytics, Ontario imports and exports of selected fruit by August/July crop year.

In crop year 2015-16, weather impacted apple crops. With only 68,318 tonnes of Ontario apples directed to the fresh market, almost 6,000 tonnes of fresh market apples were required from other provinces to address the production shortfall (see the second last row in Table 8.2).

Table 12.3 provides the same information for all processing apples, where 22% of 2019 Ontario apple production was directed into processing markets.

Table 12.3 *Supply and Disposition of Processing Apples, Ontario, Crop Year 2014 to 2019*

Item	2014 Crop	2015 Crop	2016 Crop	2017 Crop	2018 Crop	2019 Crop
Ontario production (tonnes)	25,826	24,002	41,228	26,868	33,616	29,884
Imports at Ontario border points (tonnes)	8,660	7,554	5,852	8,670	13,663	16,733
Ontario supply (tonnes)	34,486	31,555	47,079	35,538	47,279	46,617
Ontario consumption (using national average) (tonnes)	103,772	100,337	100,723	99,878	97,553	89,657
Exports from Ontario border points (tonnes)	12,030	9,120	14,669	4,789	13,119	5,262
Additional Ontario consumption and inter-provincial shipments (tonnes)	-81,316	-77,901	-68,312	-69,129	-63,394	-48,302
Production to consumption ratio (%)	25%	24%	41%	27%	34%	33%

Source: Statistics Canada Table 32-10-0364-01 for production, Statistics Canada Table: 32-10-0054-01 (food available in Canada), OMAFRA and Ontario Apple Growers on processing apple marketing, and Statistics Canada, CATSNET Analytics, Ontario imports and exports of selected fruit by August/July crop year.

Ontario has an apple processing industry (e.g., juice, cider, apple pies, etc.). Both imported and Ontario-grown processing apples are used to make processed apple products. With a processing apple supply of 47,000 tonnes and consumption of processed apples (on a fresh equivalent basis) of 90,000 tonnes, Ontario imports a significant amount of processed apple products, which ranged between 48,000 tonnes and 69,000 tonnes over the last three years. These imports include apple juice and apple sauce (in apple equivalents), for example.

12.2 Production Expansion Opportunity

The expansion opportunity is primarily for fresh market apples. The average price received in the export market was $0.86/lb. over the last three crop years, while the average price received for processing apples was $0.11/lb.[20]

In 2019, there were 13,988 acres of fruit bearing apple orchards[21]. The province's major apple-producing areas are located along the shores of Lake Ontario, Lake Erie, Lake Huron and Georgian Bay as illustrated in Figure 12.1. These bodies of water help maintain a moderate temperature, providing Ontario with an advantage in Canadian apple production.

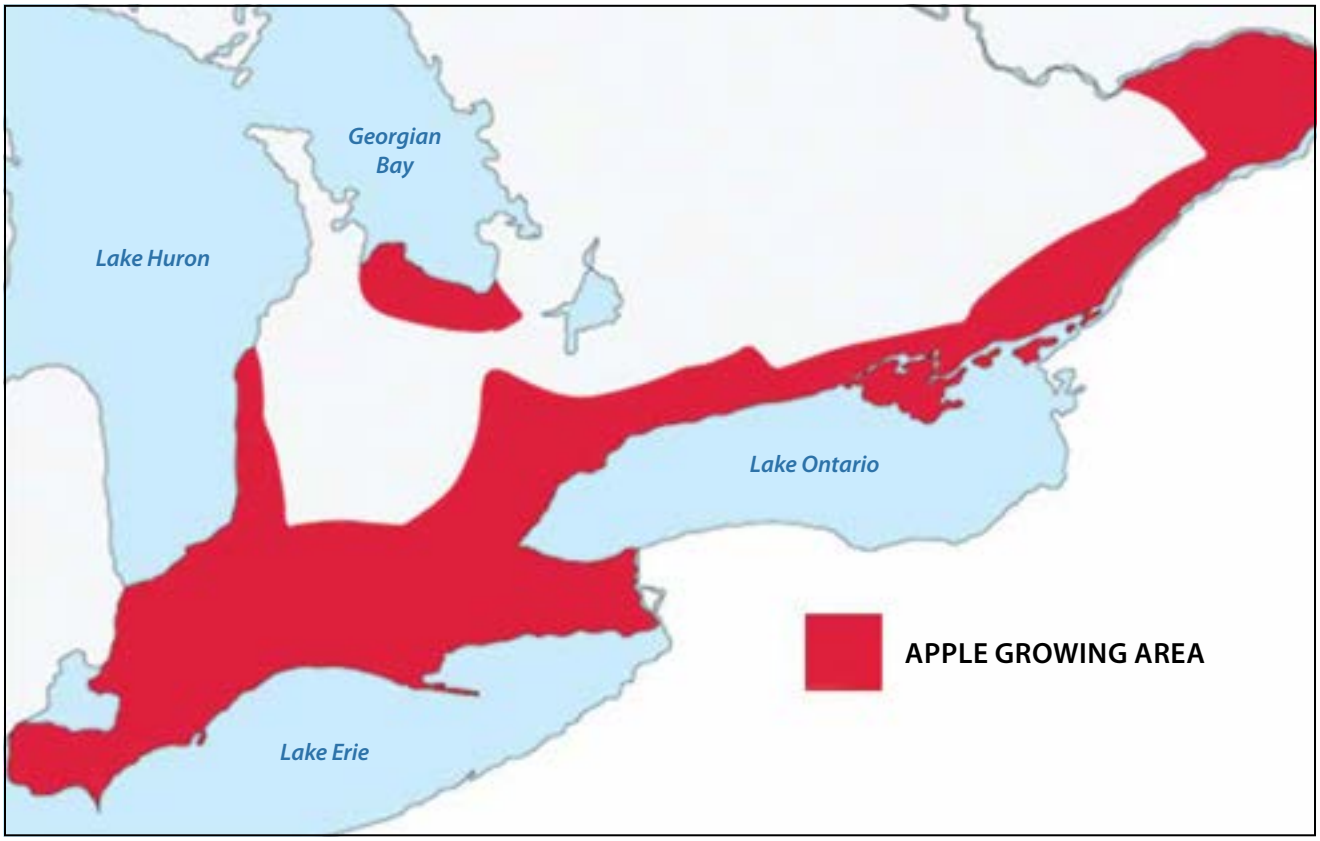

Figure 12.1 *Ontario's Apple Growing Areas*

Source: Ontario Apple Growers

20 The same relationship occurs with imported apples where the fresh market price of $0.81/lb. was 4.5 times higher than the processing apple price of $0.18/lb.

21 Ontario Apple Growers indicate that there was an additional ~ 2,757 acres that were planted over the last 5 years and not fruit bearing in 2020.

The areas suitable for apple production provide for a significant land base upon which to expand apple production. In 2016, the Census of Agriculture indicated that there are a few pockets of more intensive apple production as shown in Figure 12.2: the Norfolk region, part of Essex County, some townships on the southern shores of Georgian Bay, and a production area east of Oshawa on the northern shores of Lake Ontario[22]. On a county basis, Grey County is the largest apple growing area with 2,951 acres, followed by Norfolk County with 2,074 acres (in 2019), with most of the latter in the Norfolk region.

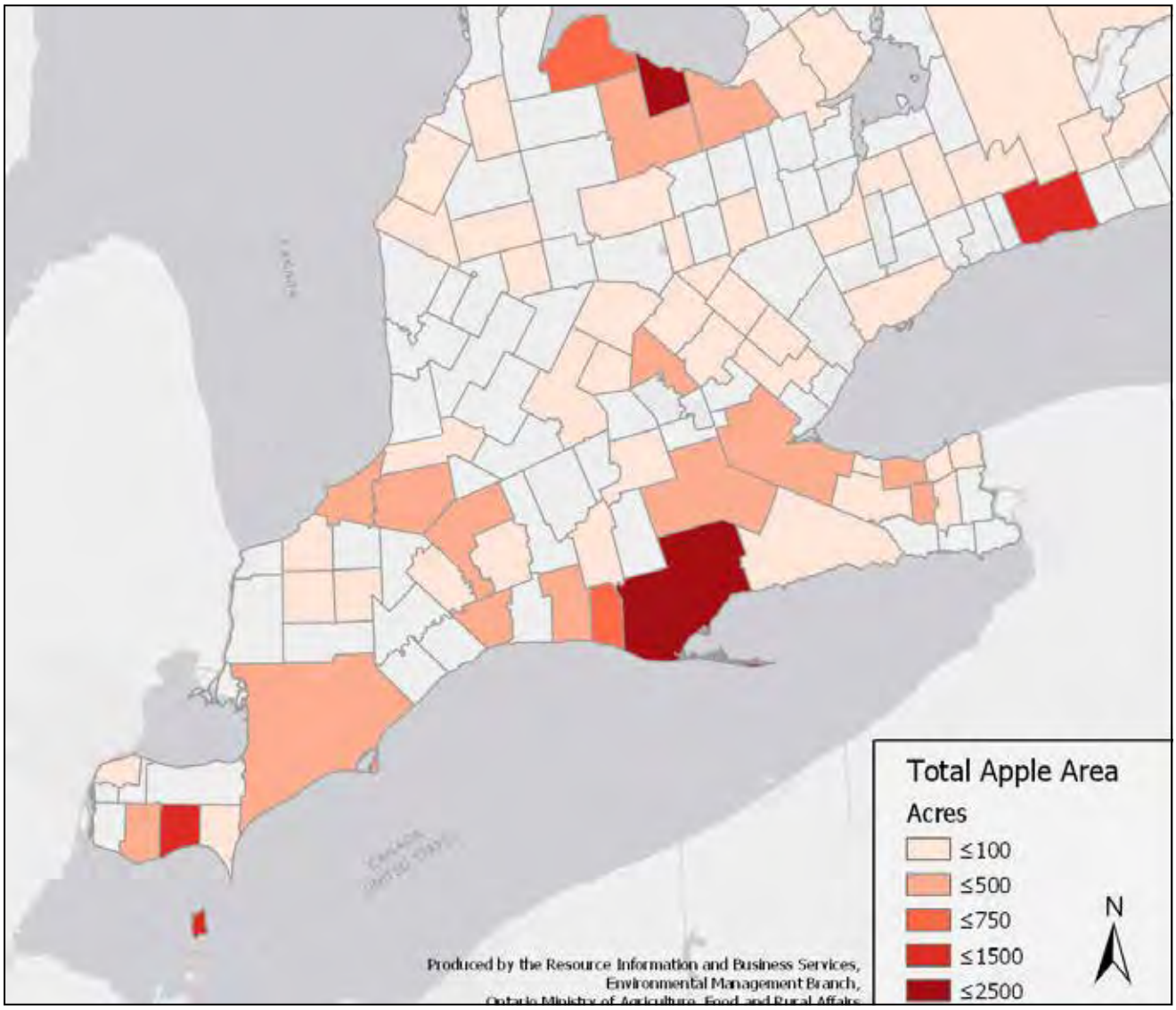

Figure 12.2 *Location of Apple Production in South Western Ontario*

Source: Statistics Canada – 2016 Census of Agriculture with maps provided by the OMAFRA

22 Actual production may be greater than highlighted in some townships when Statistics Canada needs to suppress data for operator confidentiality reasons.

Currently, the average acre of harvested apples yields 10.5 tonnes/acre (23,000 lbs./acre). The trend in yield over the last 30 years is illustrated in Figure 8.3, with an average annual increase of 180 lbs./year. This yield data reflects a mix of orchards in older low-density plantings and newer orchards with high-density plantings. Growers with high-density orchards can achieve yields of over 60,000 lbs. per acre. Over the last 10 years, the average yield increase has been 0.8% a year, which contrasts with the 1.5% per annum increase average over the last 30 years.

At the same time, production has decreased by on average -.04% per annum over the past 10 years due to a reduction in acreage of -1.2% per annum. This reduction in acreage is offset by the 0.8% higher yield in the average apple orchard. Notwithstanding the trend of lower acreage, there is opportunity to reverse the trend and increase apple acreage and overall production.

Apple orchards can produce apples for more than 25 or 30 years. In 2019, there were 3,924 acres of apples that were planted at least 30 years ago, which represents 26% of all apple acreage as reported by the Ontario Apple Growers. Of these, 35% of the acreage was in McIntosh, followed by Spy apples at 14%, and Red Delicious at 12%.

Variety selection by apple growers is the key to successful expansion. There has been a replacement of lower valued apple varieties by higher valued apple varieties. However, switching varieties cannot happen overnight, since it takes many years of production after planting an orchard before there is a return on the investment.

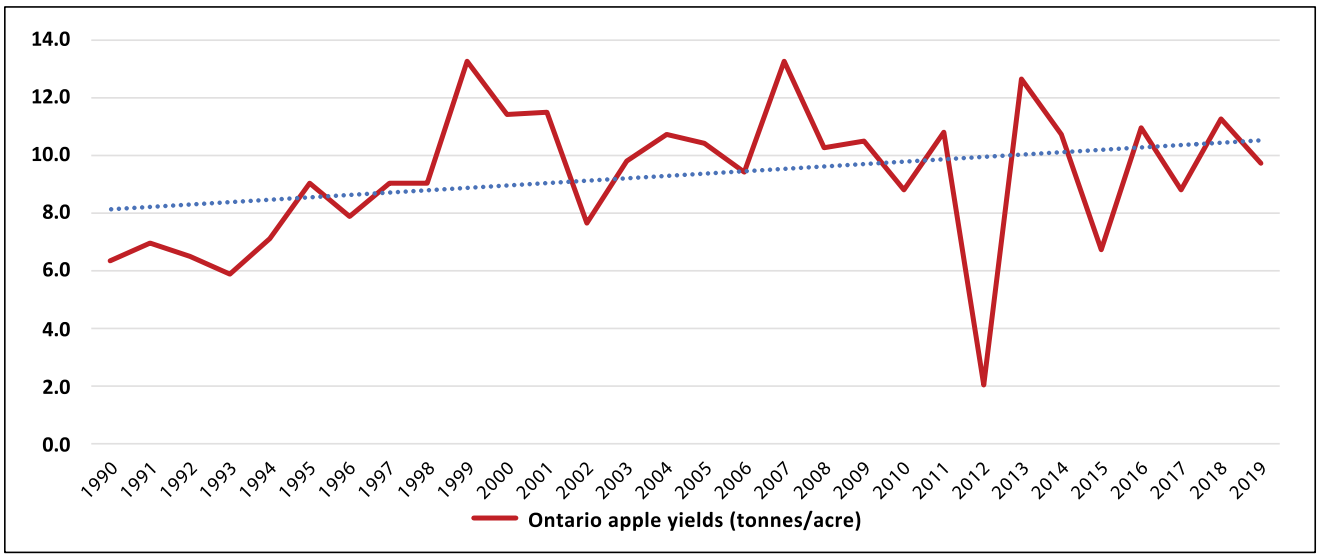

Figure 12.3 *Trend in Ontario Apple Yields, 1990 to 2019*

Source: OMAFRA data

The yields shown above are an average across all apple varieties and planting densities. Newer plantings are higher density orchards (more trees per acre) that have much higher yields, such as at least 50,000 lbs./acre (22.5 tonnes/acre), which is essentially double the provincial average.

The growth opportunity is in the fresh apple market given the price differential between fresh and processing apples. Certain varieties return more in the market than other varieties. For example, as shown in Table 12.4, Empire and Cortland apples were valued at $0.67 and $0.72/lb. at the Ontario Food Terminal. This compares to varieties such as Honey Crisp valued at $1.19/lb., or Fuji at $1.19/lb., or Granny Smith at $1.52/lb. A price premium of $0.20/lb. provides an extra $10,000/acre in the orchard[23].

Table 12.4 *Apple Prices by Variety at the Ontario Food Terminal February 2019*

Variety	Price/lb
Granny Smith	$1.52
Golden Delicious	$1.40
Fuji	$1.19
Honeycrisp	$1.19
Red Delicious	$1.05

Variety	Price/lb
Royal Gala	$0.98
Ambrosia	$0.95
Empire	$0.72
Cortland	$0.67

Source: InfoHort

Based on variety selection by apple growers, there is an opportunity to replace a much larger share of imported apples. Many apple varieties can be stored for at least 6 months in proper controlled atmosphere (CA) storage, where for example Fuji apples can be stored up to 10 months under ideal conditions and Gala apples up to 8 months[24]. This provides an opportunity to replace a number of imported apples in the November to June period.

The apple industry is well served by a few large apple packers that provide the necessary critical mass to supply large retail accounts. Apple growers can supply the apple packers to gain access to large volume apple markets. Apple packers are also large growers, and these packers can access imported apples in bulk to pack out for their retail customers when Ontario supply volumes are depleted.

There is an opportunity to increase acreage by at least 700 acres, which with high density production should result in additional production of 15,750 tonnes, based on 22.5 tonnes/acre (50,000 lbs./acre)[25]. This volume directed to the fresh market would replace 24% of annual imports (see second last row in Table 12.5) and increase the volume of fresh market apples by 10.8%.

23 The prices in Table 8.4 are not grower prices, with prices at the grower level determined by the wholesale price less a fixed marketing charge assessed by the apple marketer – the apple packer. When apples come out of storage not all apples are graded for the fresh market – some apples are graded out for processing and some apples are shipped out of province.

24 OMAFRA Factsheet: "Controlled Atmosphere Storage Guidelines and Recommendations for Apples"

25 High density apple orchards can have yields up to 27 tonnes/acre (60,000 lbs.).

Table 12.5 *Statistics Associated with a 5% Apple Acreage Expansion*

Item	Units	Values
Acreage increase	acres	700
Acreage increase	%	5%
Average yield on new acres	tonnes/acre	22.5
Additional production	tonnes	15,750
Additional production - % of all production volume	%	11.2%
Additional production - % of fresh consumption	%	10.8%
Additional production - % of all volume	%	6.5%
Additional production - % of annual fresh imports	%	24.0%
Wholesale value of additional production	$ million	$34.7

Note: the percentage change is based on the average of the last three crop years.

This 5% increase in acreage, which is a 11.2% increase in overall production (due to high density planting), results in a $34.7 million increase in the wholesale value of apples, based on $1.00/lb. in wholesale markets[26]. The farm level impact should be around $15 million to $20 million, depending on the chosen variety.

26 A report prepared by JRG Consulting Group for the Ontario Apple Growers and other tree fruit organizations entitled *Economic Impact of the Ontario Tree Fruits and Fresh Grapes* (October 2019) indicates that a $34.7 million expansion of sales by apple marketers results in $66 million of additional economic activity throughout the province, with GDP (value added) being $43 million, of which $32 million is employment income.

12.3 Expansion Constraints and Impediments

Competing with Apple Imports

Ontario apples must compete with imported apples, with competition occurring for every apple variety. The United States is one of the major suppliers of imported apples, with the average border price across all of Canada in 2018 being $0.60/lb. and $0.67/lb. in 2019 for US apples. Figure 12.4 shows the monthly pattern of US apple import prices, with seasonal lows in October.

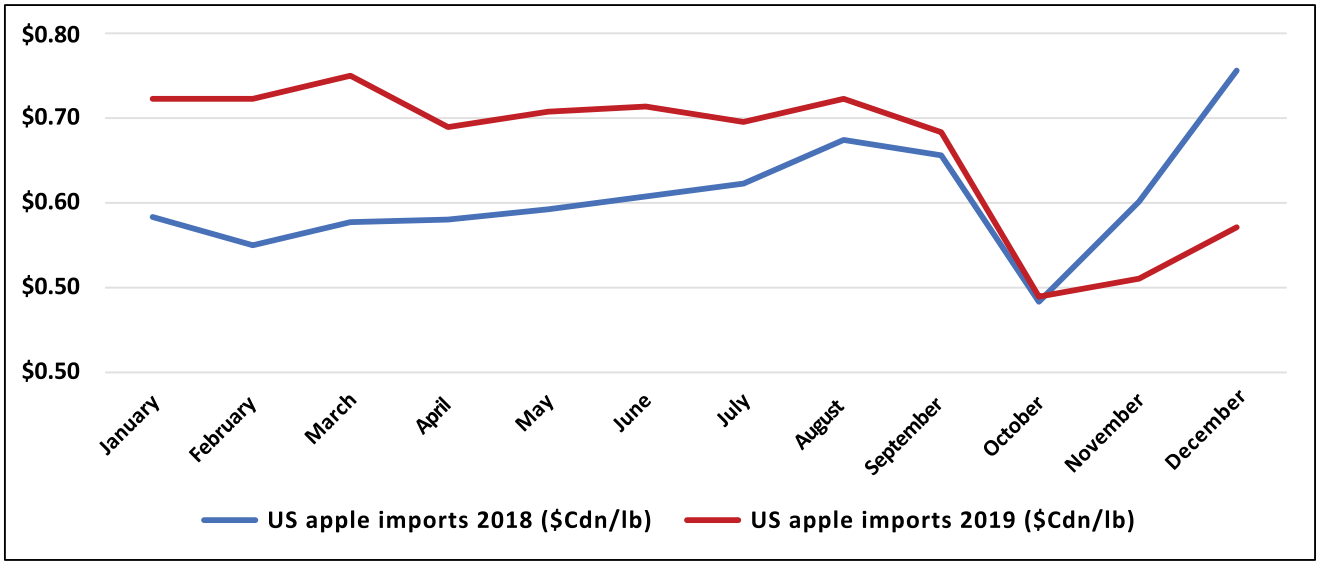

Figure 12.4 *US Apple Prices at the Canadian Border ($/lb.)*

Source: USDA GATS

At the Ontario border, the crop year average price for all imported apples (excluding organic apples) was $0.82/lb. in the 2018-19 crop year and $0.76/lb. in the next crop year, as shown in Table 12.6.

Table 12.6 *Border Prices for Apple Imports into Ontario, Crop year 2014/15 to 2019/20*

Item	2014-15	2015-16	2016-17	2017-18	2018-19	2019-20
Fresh apples (not organic) ($/lb)	$0.61	$0.80	$0.76	$0.78	$0.82	$0.76
Processing ($/lb	$0.06	$0.23	$0.19	$0.20	$0.15	$0.18

Source: Statistics Canada, CATSNET Analytics, Ontario imports of selected fruit by July/June crop year.

The lower value of apples used for processing is illustrated in Table 12.6, where the value of these imported processing apples is 20% to 25% of the value of a fresh market apple.

Import prices vary by variety, as shown in Table 12.7, which provides crop year average prices for a number of varieties tracked at the Ontario border. These prices are for apples from all countries that ship apples into Ontario, with the volume listing based on the three-year average tonnage of apples imported. Gala is the most prominent variety imported with almost 27,000 tonnes in a crop year, which is followed by a grouping of other fresh apples (the varieties not provided by Statistics Canada) and then Granny Smith apples.

Table 12.7 *Variety Specific Border Prices and Average Import Volume of Apple Imports, Crop Years 2017-18 to 2019-20*

Variety	2017-2018	2018-2019	2019-2020	Average tonnage
Gala	$0.75	$0.77	$0.70	26,946
Other fresh	$0.95	$0.97	$0.93	11,793
Granny Smith	$0.82	$0.83	$0.73	9,819
Red Delicious	$0.55	$0.63	$0.57	6,755
Golden Delicious	$0.84	$0.96	$0.78	3,238
Honeycrisp	$2.13	$1.74	$1.52	465
Ida Red	$0.31	$0.27	$0.25	234
McIntosh	$0.88	$0.50	$0.55	71

Source: Statistics Canada, CATSNET Analytics, Ontario imports and exports of selected fruit by August/July crop year.

The import data shows that Honeycrisp is the highest priced imported variety (at $1.52/kg in the 2019/20 crop year), with the combination of a number of varieties (other fresh) at $0.93/lb., Golden Delicious at $0.78/lb., Granny Smith at $0.73/lb. and then Gala at $0.70/lb.

These prices at the border are not the same as wholesale prices received by marketers in the Ontario marketplace. For example, while Gala prices at the border averaged between $0.77/lb. and $0.70/lb., the average price for Gala apples was $0.96/lb. at the Ontario Food Terminal for all of 2018, which increased slightly to $1.04/lb. in 2019. Figure 12.5 shows the pattern of monthly prices over the last two years for Gala apples.

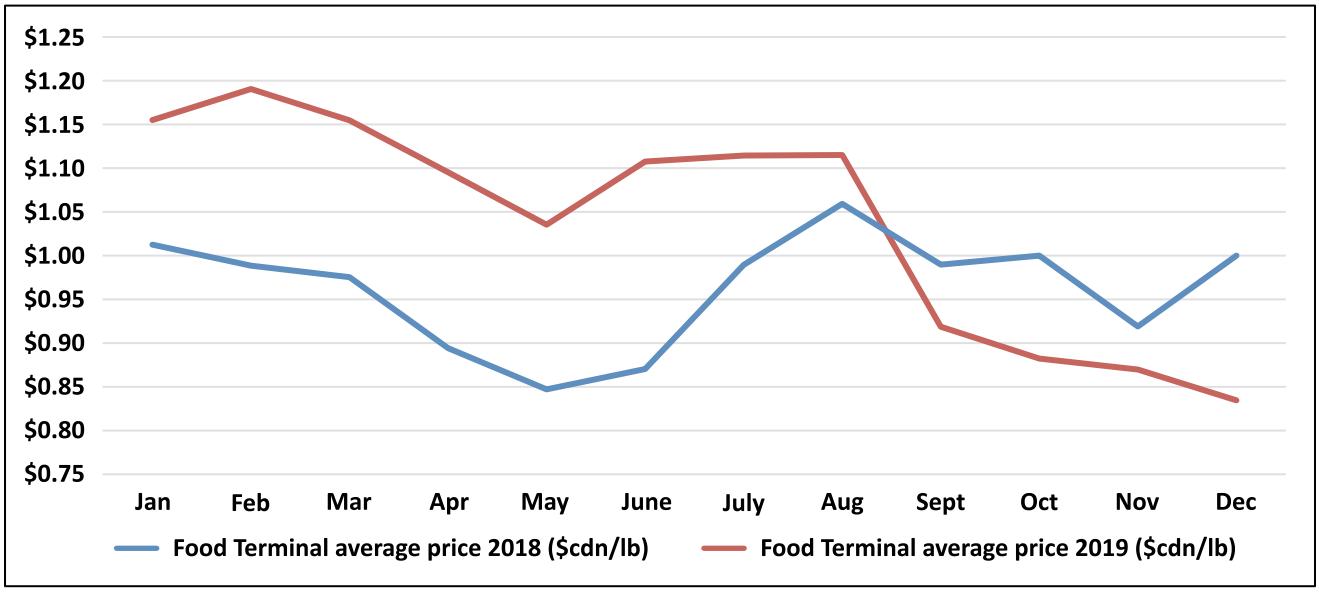

Figure 12.5 *Gala Apple Prices at the Ontario Food Terminal, Monthly, 2018 and 2019*

Source: InfoHort

Given that Ontario apples must be price competitive with imported apples, choosing higher valued varieties, such as Honeycrisp, Fuji, and Gala, is a key part of the expansion decision. Returns received by growers after accounting for storage and marketing costs are provided in Table 12.7 for the 2017-18 and 2018-19 crop years. The highest value variety was Honeycrisp at $0.69/lb. in 2018. At the orchard level, Gala apples returned $0.38/lb. for the 2017 crop (marked in the 2017-18 crop year) and $0.35/lb. with the 2018 crop.

Table 12.8 *Grower Returns by Apple Variety*

Variety	2018 Crop Fresh Grower Price ($/lb)	2017 Crop Fresh Grower Price ($/lb)
Honeycrisp	$0.693	$0.769
Other Varieties	$0.420	$0.581
Spartan	$0.357	$0.355
Early Varieties	$0.353	$0.347
Gala	$0.349	$0.381
Ambrosia	$0.335	$0.482
Golden Delicious	$0.311	$0.329
Red Delicious	$0.271	$0.289
Fuji	$0.271	$0.366
Northern Spy	$0.260	$0.213
McIntosh	$0.252	$0.297
Empire	$0.251	$0.323
Cortland	$0.248	$0.374
Idared	$0.225	$0.342
Crispin (Mutsu)	$0.206	$0.295

Source: Ontario Apple Growers. Note there are many varieties in the other variety category including Granny Smith, Red Prince, Cripps Pink, and Smitten. 2019-20 crop year apple prices were not available at time of writing.

Investing in the Right Apple Varieties

When a grower establishes a new orchard block, they must decide which apple variety to plant while considering the implications of that decision for the next 25 to 30 years, in addition to considering the variety's competitiveness with imports.

There were only 500 tonnes of Honeycrisp imported on average over the last 3 crop years, with an average price of $1.80/lb. at the border (Table 12.7), with grower returns in the orchard of $0.69/lb. (See Table 12.8 above). This suggests that Honeycrisp may be a variety for growers to invest in. Over the last 5 years, Honeycrisp was the most popular variety planted by apple growers, accounting for 27% of the new orchard plantings (see Table 12.9). A challenge with Honeycrisp is storage, specifically the appropriate protocols (e.g., cooling temperatures, oxygen levels, etc.) to have a quality product coming out of an extended storage period. Each apple variety requires specific temperatures over the first few weeks of storage, and then the appropriate gas mixtures for storage quality.

The second most popular variety planted by apple growers was Gala (at 26%) followed by Ambrosia (at 20%), as shown in Table 12.9. Wholesale values for these apples were just under $1.00/lb. in 2019 (see Table 12.5), and in the orchard these varieties' returns were around $0.35/lb. in 2018-19 and higher in the previous crop year (Table 12.8). Gala was the most popular variety imported into Ontario in the 2019-20 season with 26,946 tonnes becoming part of the Ontario supply, which represented 44% of all fresh apple imports into the province[27]. New Gala orchards would replace a good portion of imported Gala apples.

Table 12.9 *Apple Varieties Planted in the Last Five Years*

Variety	Acres planted 2015-2019	Values
Honeycrisp	753	27.3%
Gala	707	25.7%
Ambrosia	550	20.0%
Other	215	7.8%
Red Delicious	155	5.6%
McIntosh	120	4.4%
Fuji	77	2.8%
Cortland	45	1.6%
Crimson Crisp	39	1.4%
Paulared	31	1.1%
Ginger Gold	20	0.7%
Jonagold	15	0.6%
Empire	15	0.5%
Golden Delicious	14	0.5%
TOTAL	**2,757**	**100%**

Source: Ontario Apple Growers

High Capital Costs at Orchard Establishment

The cost to establish an orchard ranges between $80,000 and $85,000 per acre, which means to establish a 20 acre block of trees requires an upfront investment of at least $1.6 million. Growers receive no revenues for approximately 5 years while experiencing on-going operating expenses as the orchard is in its non-fruit bearing years. Once the orchard is fruit bearing, revenues need to cover on-going operating costs, fixed costs, and the establishment costs. Annual operating and fixed costs of $12,000 to $13,000/acre and amortization of the establishment costs over 25 years (at $3,200/acre) of fruit bearing years results in a cost structure of at least $15,000/acre[28] during the fruit bearing years. Assuming $0.40/lb. received by the grower at the orchard, the new orchard must yield at least 37,500 lbs. per acre each year to break even – higher yields are required to obtain a return on the capital investment.

27 Table 12.7 also indicates that there were just under 12,000 tonnes of unspecified varieties that had an average price of $0.95/lb.
28 Source: OMAFRA crop budgets for apples in a high density orchard.

In the case of Gala and Honeycrisp with prices in the orchard at $0.35 to $0.40/lb. range, breakeven volumes of 43,000 lbs./acre are required; much higher volumes are needed to generate a return on investment. OMAFRA crop budgets suggest an expected yield of 56,000 lbs. per acre, which at $0.35/lb. provides $19,600 in returns. Some growers achieve even higher yields such as 65,000 lbs./acre, which generates $22,750/acre at $0.35/lb. Higher prices at farm level translate into greater per acre returns.

Access to Capital

Many apple growers do not have the financial means of $1.6 million to expand their operation by 20 acres. Larger growers with an acreage base of over 500 acres have more overall profit margin to finance expansion, whether through equity, debt financing, or a combination of both. This is not always the case for growers with 100 acres or less. From a lender's perspective, the risk associated with planting a perennial crop that takes 5 years to establish before there is a revenue stream is a much greater risk than financing an annual crop, especially when the investment dollars per acre is significantly higher. Access to capital can be an issue for some growers that would like to expand.

Expansion can be on currently owned land, newly acquired acreage, or land on long-term leases. For a grower, the highest cost of expansion is when land must be purchased for expansion purposes – this increases the $85,000/acre capital cost by another $15,000 to $20,000/acre in a number of growing regions. Farmland investment companies have partnered with some apple growers where the grower has a long-term lease over the life of a productive orchard, which lowers the capital requirements for expansion when the apple grower needs to acquire additional land for expansion purposes.

Apples Are a High Risk Crop

Large upfront investments, the carrying costs for 5 years before revenues begin to flow, weather risks such as late spring frosts and hail, a shortened growing season that prevents proper finishing and colouring of the apple, and disease pressures such as apple scab are all risks faced by apple growers. These risks can be minimized through programs such as crop insurance, good orchard management, growing apples desired by the market, use of appropriate crop protection materials, having the necessary crop protection materials registered for use in Ontario, having access to top-notch agronomic advice, and a healthy balance sheet.

Transition to High Density Production

The economics of apple production in Ontario strongly suggest that new acreage be high density plantings; however, all apple acreage cannot automatically switch into high density production. Orchards planted 15 or 20 years ago have a remaining positive financial contribution, and early uprooting of these orchards would lower the overall financial return to the grower, assuming there are additional acres where higher density orchards can be established.

Access to Labour

The apple industry is experimenting with labour saving technologies; however, any expansion requires apple growers to have access to labour throughout the growing season and during the apple harvest season. Access to necessary labour can be a constraint for some growers that limits the expansion potential.

Storage Technologies to Maximize Apple Quality and Length of Storage

The apple industry uses controlled atmospheric storage, which allows many apple varieties to be stored for 8 months or more. Honeycrisp is a high value variety with some storage issues that require resolution. Research and development activities that finetune storage technologies and levels of gases such as oxygen can enable longer storage periods for Honeycrisp apples. The use of other technologies, such as SMART FRESH, an ethylene inhibitor that is sprayed on the apples in the orchard, can help with the quality of stored apples. Continued research and development activities to prolong the storage period of Ontario apples provides opportunity to displace the large volume of imported apples on a variety basis.

Additional Storage Capacity is Required, But it is Costly

Research indicates that each apple variety requires a unique storage protocol (or regime), which includes the (1) orchard heat cool-down temperature, (2) subsequent storage temperature, (3) longer-term storage temperature, (4) a unique gas composition regime, and (5) time after apples enter the controlled atmospheric storage room to adjust the gas regime.

Honeycrisp is an example of an apple variety that has a very unique storage protocol compared to, for example, Gala apples. These unique requirements result in apple packers and other storage facilities not being able to store different varieties in the same storage room. With a storage room holding 1,200 bins (1 million lbs.) of apples, an apple packer needs to have sufficient volume of each variety to properly store apples. If a storage facility has 8 to 10 storage rooms, then ideal storage is limited to the same number of varieties. With over 25 varieties of apples grown in Ontario, and more new varieties expected from Vineland's breeding programs, the apple industry needs additional storage capacity.

Building such additional capacity is costly, with just the equipment for storage costing over $2 million before adding the building costs. Assuming a total capital cost of just over $4 million[29] for 9,600 bins of storage capacity (8 million lbs. of apples), the upfront capital cost is just over $0.50/lb., or $0.025/lb. when amortized over 20 years before adjusting for a return on the investment. If smaller storage rooms are required to store the smaller volume varieties, then per unit costs increase. Only large-scale operations can likely afford to undertake such investments on behalf of the Ontario apple industry.

Minimizing Off-Grades to Maximize Revenues

An apple variety that returns $1.00/lb. at wholesale does not automatically result in a value of $0.60/lb. to the grower if marketing costs are $0.40/lb. As apples come out of controlled atmospheric storage they are graded and packed. Some of the apples will be graded out to go into a juice line due to lower quality, for example. In this processing apple segment the return is much lower, such as $0.15/lb. If 20% of the pack receives the lower price, the average return is not $0.60/lb., but rather $0.51/lb. On a 50,000 lb./acre harvest this is a $4,500 reduction in income.

There are a number of factors that can affect the grade-out, ranging from weather related damage, to insect damage, timeliness of apple harvesting, any mechanical damage that occurs between harvest and entry into storage, to storage shrink due to the quality of apples going into storage.

29 This is an assumption and has not been verified.

12.4 Factors That Will Enable Expansion

The following are factors that will enable the expansion of apple production in Ontario:

- Research and development in support of technologies that enable a longer storage season
- Investment in additional storage capacity to increase apple volumes stored in the post-harvest season
- Cultivar selection and/or a plant breeding program focused on differentiable attributes desired in the market and attributes desired by growers that reduce production risks
- Growers investing in high density apple orchards
- Access to land with long-term leases to reduce up-front capital requirements associated with expansion
- Programs that assist growers with accessing necessary labour as required through the growing and harvesting periods
- Retailer support for Ontario apples throughout the harvest and storage season
- On-going promotion by Foodland Ontario of Ontario apples throughout the harvest and storage season
- Access to crop protection materials used by US counterparts

13

Cabbage

Cabbage is one of the "cole crops" or brassicas. The cabbage traditionally grown in Ontario is part of the Brassica oleracea family and is closely related to broccoli, cauliflower, and Brussels sprouts.

Chinese cabbage, a leafy vegetable, is part of the Brassica rapa family and includes rapini. Chinese cabbage grows into an oblong shape, its leaves frilling out towards the edges. Chinese cabbage has two main cultivar groups of Chinese leaf vegetables that are used in Chinese cuisine: the Pekinensis group (e.g., napa cabbage) and the Chinensis group (e.g., bok choy). Napa cabbage is the most popular and is often referred to as "Chinese cabbage". It has become a widespread crop in Europe, the Americas and Australia. It has a light green colouring with yellow tints, and has a sweeter flavor than regular cabbage. Baby bok choy has smaller and more tender leaves, with a sweeter flavor than that of full sized bok choy and can be used in place of other greens in salads.

13.1 Supply and Disposition Overview

Regular cabbage accounts for 58% of the area planted in the province for both regular and Chinese cabbage, with regular cabbage accounting for 78% of the marketed production due to higher yields. Together, the farm value of cabbage ranged between $33 and $36 million (based on OMAFRA data). Table 13.1 provides supply and disposition data for regular cabbage.

Table 13.1 *Supply and Disposition of Regular Cabbage, Ontario, Crop Year 2014 to 2019*

Item	2014 Crop	2015 Crop	2016 Crop	2017 Crop	2018 Crop	2019 Crop
Ontario production (tonnes)	50,146	54,612	54,677	37,281	44,355	42,338
Imports at Ontario border points (tonnes)	10,047	14,521	15,704	17,573	23,211	17,922
Ontario supply (tonnes)	60,193	69,133	70,381	54,854	67,566	60,260
Ontario consumption (using national average) (tonnes)	60,036	59,601	59,549	56,033	60,811	65,179
Exports from Ontario border points (tonnes)	20,965	21,066	19,962	20,560	21,763	21,127
Additional Ontario consumption and inter-provincial shipments (tonnes)	-20,808	-11,534	-9,130	-21,738	-15,008	-26,046
Production to consumption ratio (%)	84%	92%	92%	67%	73%	65%

Source: Statistics Canada Table 32-10-0365-01 for production, Statistics Canada Table: 32-10-0054-01 (food available in Canada), and Statistics Canada, CATSNET Analytics, Ontario imports and exports of selected vegetables by July/June crop year. The export data does not separate out regular cabbage from Chinese cabbage, with an assumption made that 87.5% of exports were regular cabbage.

The table shows that production has been decreasing over the 2014 to 2019 period while imports into Ontario have increased. The combination of production and imports – the total Ontario supply of regular cabbage – was less than the estimated Ontario consumption for the 2019 crop (60,260 tonnes of supply versus 65,179 tonnes of consumption). In some other years, such as 2016 and 2018, the Ontario supply exceeded consumption. Approximately 16% of 2019 regular cabbage production, or 7,600 tonnes was processed into products such as coleslaw or used for cabbage rolls (as shown in the last row in Table 13.1).

Ontario production of regular cabbage ranged between 65% and 92% of provincial consumption, suggesting an opportunity for expansion (see the last row in Table 13.1). The lower production to consumption ratio occurs when production is low, such as in 2017 and 2019.

The data indicates that Ontario exports cabbage into the US market, and has cabbage from Quebec shipped into the province (see the values in the second last row in Table 13.1 where the negative value reflects an inflow into the province). This flow of product may provide an opportunity for an expansion of regular cabbage production. Ontario exports 22,000 to 25,000 tonnes of regular cabbage, which requires an inflow of cabbage from other provinces to meet provincial requirements. In the 2019 crop year, 26,000 tonnes of cabbage from other provinces were required to meet market needs. In all likelihood, most of this volume is shipped in from Quebec. Quebec's production of regular cabbage ranged between 62,000 and 78,000 tonnes over the last three years, which is at least 48% more than Ontario's production (and Quebec's population is less than 60% of Ontario's population).

Over the 2016 to 2019 period, Ontario's production of Chinese cabbage ranged between 40% and 60% of estimated consumption, as shown in the last row in Table 13.2. This contrasts with production exceeding consumption in 2014 and 2015. Imports of Chinese cabbage exceed production volumes, and the Ontario supply (production plus imports) exceeds market requirements, which means that either product is being shipped into other provinces, or consumption, on a per capita basis, in Ontario is much higher than the national average. Some Chinese cabbage is exported into a number of US states.

Table 13.2 *Supply and Disposition of Chinese Cabbage, Ontario, Crop Year 2014 to 2019*

Item	2014 Crop	2015 Crop	2016 Crop	2017 Crop	2018 Crop	2019 Crop
Ontario production (tonnes)	18,678	14,560	7,895	5,308	12,181	11,594
Imports at Ontario border points (tonnes)	20,329	18,905	18,767	18,576	22,537	20,529
Ontario supply (tonnes)	39,007	33,465	26,662	23,884	34,718	32,123
Ontario consumption (using national average) (tonnes)	13,854	13,807	13,264	13,168	23,071	24,478
Exports from Ontario border points (tonnes)	2,995	3,009	2,852	2,937	3,109	3,018
Additional Ontario consumption and inter-provincial shipments (tonnes)	22,157	16,649	10,547	7,780	8,538	4,627
Production to consumption ratio (%)	135%	105%	60%	40%	53%	47%

Source: Statistics Canada Table 32-10-0365-01 for production, Statistics Canada Table: 32-10-0054-01 (food available in Canada), and Statistics Canada, CATSNET Analytics, Ontario imports and exports of selected vegetables by July/June crop year. The export data does not separate out regular cabbage from Chinese cabbage, with an assumption made that 12.5% of exports were Chinese cabbage.

Given that Chinese cabbage can be stored for a number of months, it appears that there is an opportunity to expand production of Chinese cabbage.

13.2 Production Expansion Opportunity

Cabbage can be grown in many growing regions in Ontario with production areas illustrated in Figure 13.1. Production occurs east of Toronto, just south of Georgian Bay, in the Hamilton region, in Norfolk County, and in the southwestern region, such as Chatham Kent.

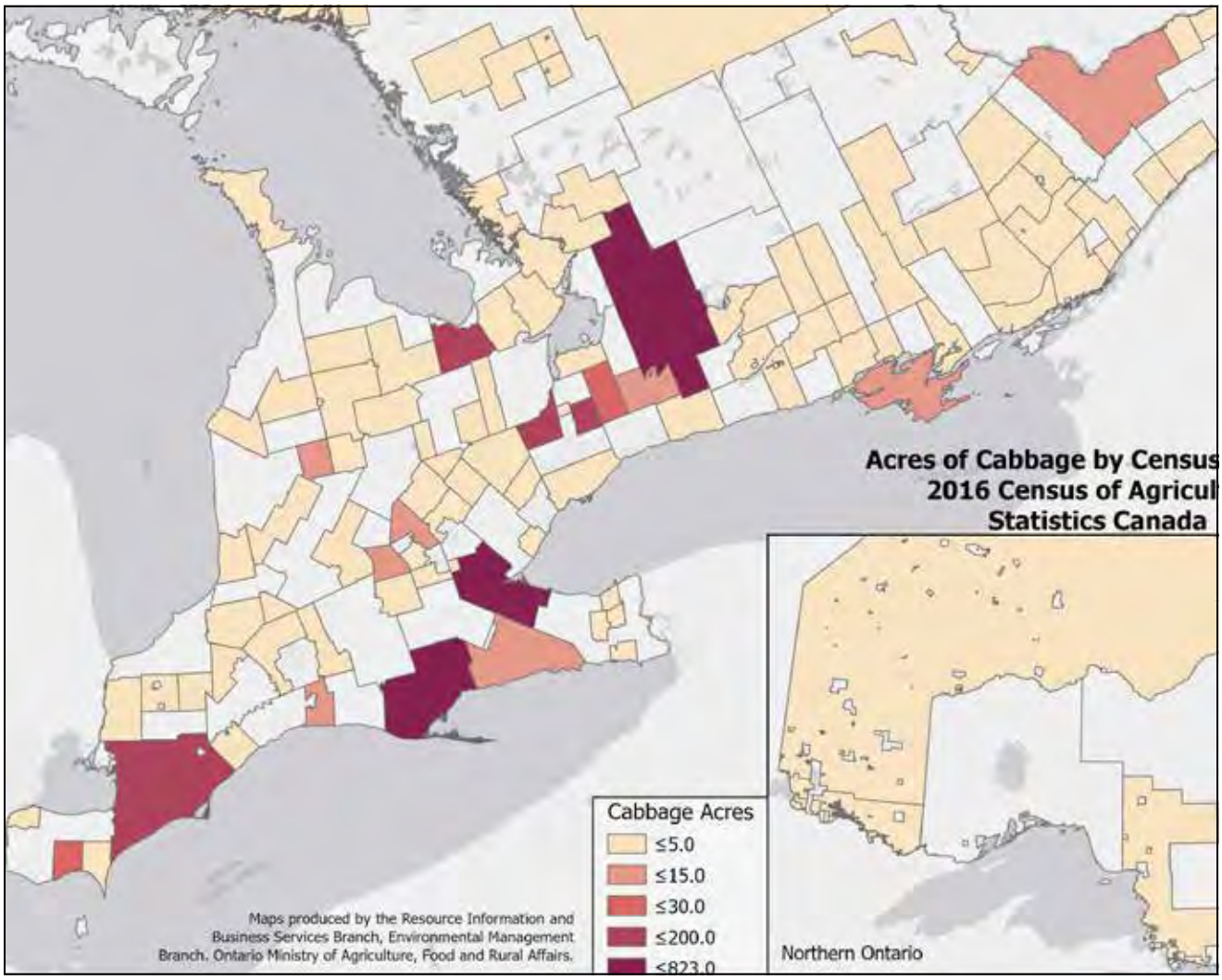

Figure 13.1 *Location of Cabbage Production in South Western Ontario*

Source: Statistics Canada – 2016 Census of Agriculture with maps provided by the OMAFRA

OMAFRA provides data on total cabbage production and yields, which shows a gradual increase in cabbage acreage over the that last 30 years, with some variability in yields, such as 9 to 12 tonnes per acre, or 20,000 lbs. to 26,000 lbs./acre (see Figure 13.2). Statistics Canada reported regular cabbage yields of 24,000 to 33,000 lbs./acre for regular cabbage between 2015 to 2017. Chinese cabbage yields are reported by Statistics Canada to be much less, at between 7,000 lbs. and 12,000 lbs. per acre in those years.

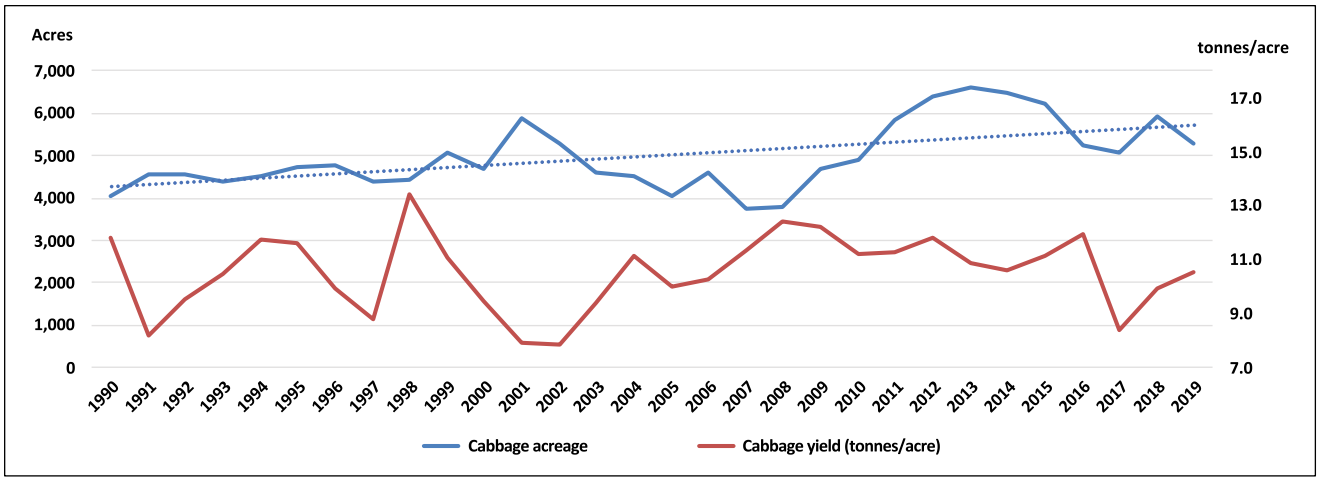

Figure 13.2 *Trend in All (Regular and Chinese) Cabbage Production and Yield, 2000 to 2019*

Source: OMAFRA

Given the supply and disposition as outlined in Tables 13.1 and 13.2 there is an opportunity to replace some imports of regular cabbage and Chinese cabbage.

Expansion Opportunities for Regular Cabbage

There are two opportunities for regular cabbage: one opportunity is to replace imports during the harvest period of June to November, as well as displacing some imports at other times of the year given the ability to store regular cabbage into April. Another opportunity is to replace some of the Quebec cabbage that flows into the Ontario marketplace and/or increase upon existing export volumes of cabbage.

Figure 9.3 shows monthly imports on a per capita basis. Imports are at least .05kgs/person over the July to November period when cabbage is harvested. This volume is 4,600 tonnes and 4,800 tonnes in the two crop years. With Ontario production replacing 90% of this volume, or 4,200 tonnes, this equals 10% of 2019 production, which, based on 2019-20 export prices, is worth $4.5 million.

Cabbage going into storage in October can be stored for nine months, which means stored cabbage can be available until the following June/July period. In the December to April period, Ontario imported 8,700 tonnes of cabbage in the 2019-20 crop year (more in the prior year). Ontario has an opportunity to replace another 2,175 tonnes of cabbage based on more stored cabbage replacing 25% of these imports through increased storage. This volume represents an additional 5% of production, which can be valued at $2.3 million.

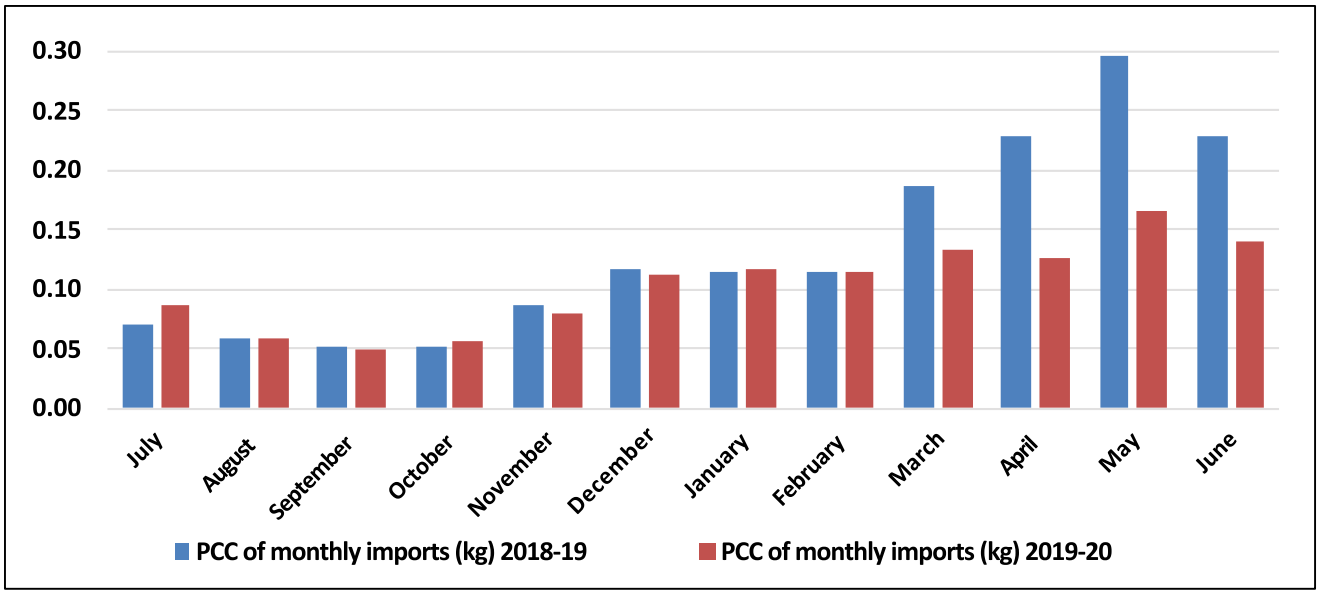

Figure 13.3 *Monthly Regular Cabbage Imports, on a Per Capita Basis (Kg/person), Crop Years 2018-19 and 2019-20*

Source: Statistics Canada, CATSNET Analytics, Ontario imports and exports of selected vegetables by July/June crop year

Table 13.1 indicates that Ontario receives between 9,000 to 26,000 tonnes of cabbage from adjacent provinces, mostly from Quebec, as well as exports around 21,000 tonnes of cabbage into export markets. Over 80% of the exports occur in the July to October period, at 20,800 tonnes for all cabbage in each of the last two years value at $23.5 million in export earnings. A 10% increase in exports or a 2,400 tonne decrease in product inflow from another province offers a $2.35 million increase in value within Ontario. If both the increase in exports and the comparable decrease in inflow occurred as a result of expansion, the value increase would be $4.7 million.

By comparison, Figure 13.4 shows Canada-wide monthly per capita imports from the US on a calendar year basis. The figure exhibits the same pattern of monthly imports as is shown for Ontario.

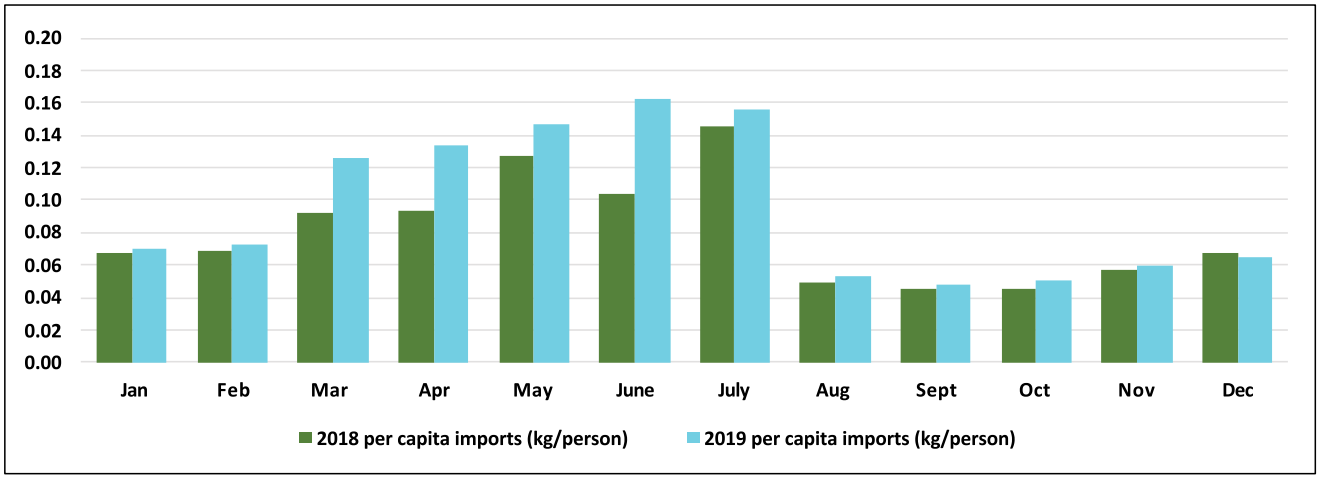

Figure 13.4 *Canadian Per Capita Consumption Imported US Cabbage, 2018 ad 2019*

Source: USDA, GATS

Expansion Opportunities for Chinese Cabbage

The opportunity for Chinese cabbage is to increase the Ontario production share from around 50% to potentially 65% through improved storage. Chinese cabbage can be stored from 2 to 6 months, depending on cultivar, at 0° to 2.5°C. If not properly stored, product degradation can include stem or seed stalk growth (bolting), root growth, internal breakdown, leaf abscission, discoloration, decay, and black speck.

Chinese cabbage can be harvested starting in June and into November in Ontario, with the Ontario Food Terminal (OFT) reporting prices for Canadian-grown Bok Choy from June through to November. Storing Chinese cabbage for 4 months into February and capturing 40% market share in those months suggests a possible production increase of 36%.

In the November to February period, Ontario imported 11,000 tonnes of Chinese cabbage (using the average of the last two crop years. Figure 13.5 illustrates these monthly imports on a per capita basis. With expanded production displacing 40% of this import volume through improved storage, the additional 4,400 tonnes is a 36% increase in production. This is valued at $5.8 million using $0.60/lb. ($1.32/kg)[30].

Chinese cabbage production has the opportunity to increase in the province. Such production should be with a distinct supply chain that serves the Asian market, including Asian-focused food retail operations. Consumers of Asian backgrounds are the largest market segment that consumes Chinese cabbage. There are supply chains that serve Ontario and US markets that can be used to expand production and replace reliance on imports.

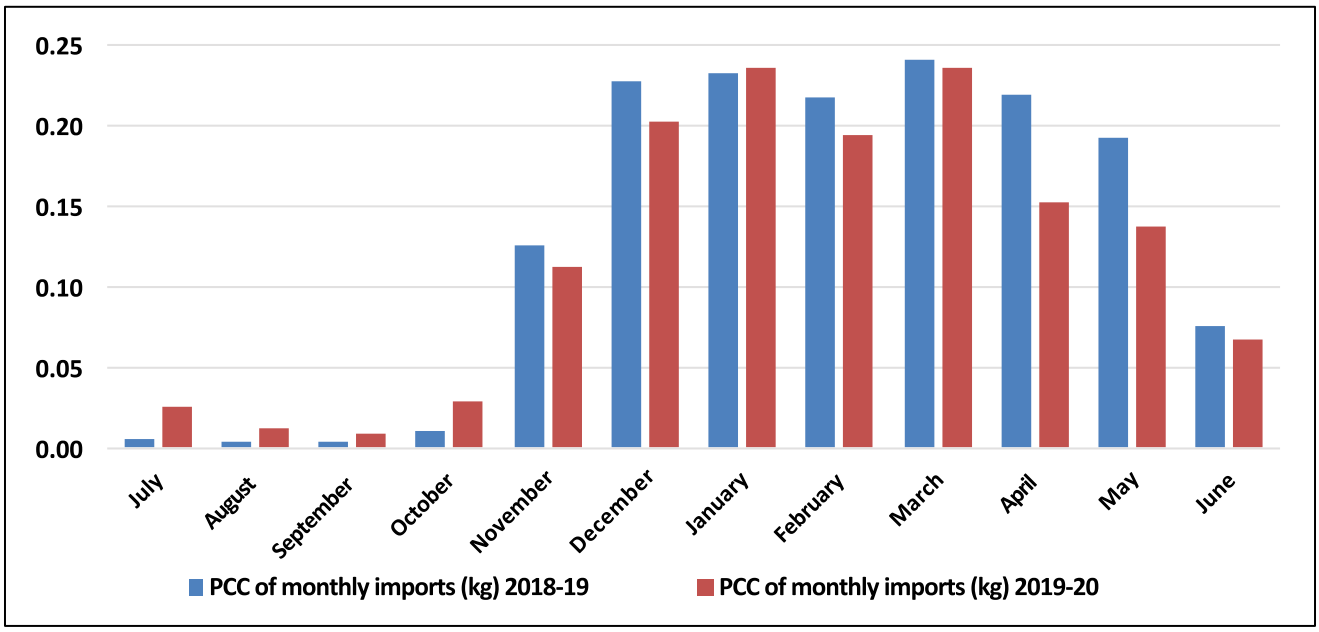

Figure 13.5 *Monthly Chinese Cabbage Imports, on a Per Capita Basis (Kg/person), Crop Years 2018-19 and 2019-20*

Source: Statistics Canada, CATSNET Analytics, Ontario imports and exports of selected vegetables by July/June crop year

30 Ontario Food Terminal has prices of over $1.00/lb. during this period.

13.3 Expansion Constraints and Impediments

Returns to Growers

Expanded production must provide an adequate return to the grower. The average farm price for all cabbage as reported by OMAFRA ranged from $0.23/lb. to $0.28/lb. (see the last row in Table 13.3). For the 2019 crop, OMAFRA reported an average farm price of $0.22/lb. for regular cabbage and $0.42/lb. for Chinese cabbage. These are farm values prior to accounting for packaging and marketing costs. The value of imported cabbage is much higher, as illustrated in the first two rows in Table 13.3.

Table 13.3 *Border Prices for Cabbage Imports into Ontario, and Farm Price Cabbage, Crop Year 2014/15 to 2019/20*

Item	2014-15	2015-16	2016-17	2017-18	2018-19	2019-20
Regular cabbage ($/lb)	$0.64	$0.75	$1.05	$1.17	$1.05	$1.22
Chinese cabbage ($/lb)	$0.48	$0.61	$0.51	$0.44	$0.52	$0.61
Farm price ($lb)	$0.28	$0.25	$0.23	$0.25	$0.28	$0.27

Source: Statistics Canada, CATSNET Analytics, Ontario imports and exports of selected vegetables by July/June crop year. Chinese cabbage is referred to as Chinese cabbage or Chinese lettuce with this data source. OMAFRA for farm price of all cabbage.

At the OFT, the average price received for regular cabbage between September and December 2019 was $0.30/lb. (see Figure 13.6). This value varies from the farm price due to marketing and packaging costs. The product container used for fresh market sales has a cost structure of approximately $0.06/lb. ($3.00 for a carton). Growers indicate that $0.30/lb. at the OFT provides some profit margin.

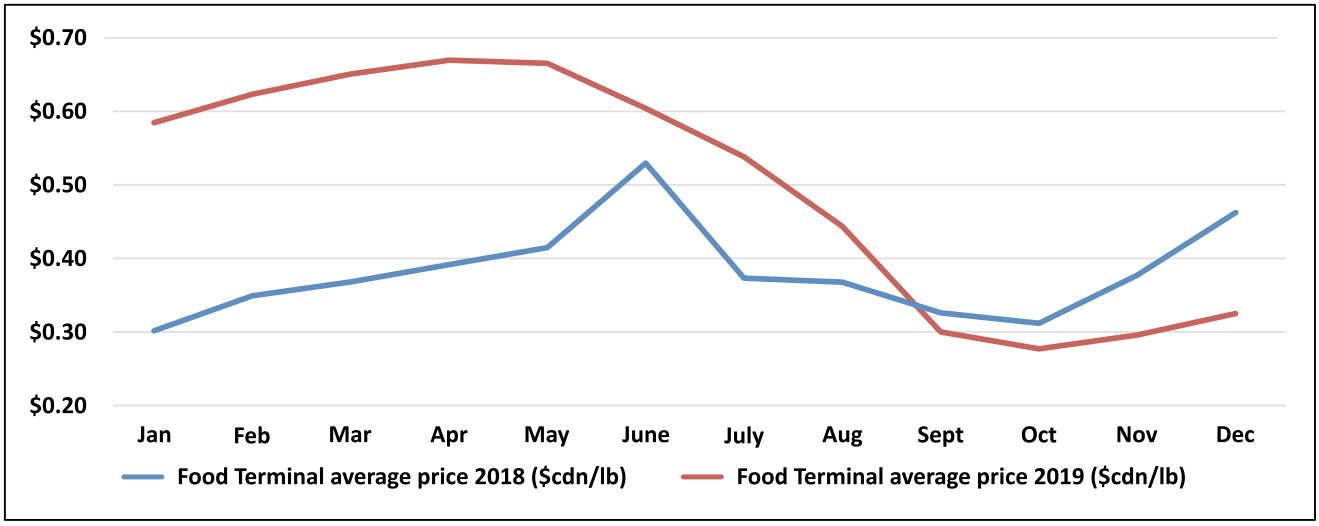

Figure 13.6 *Monthly Regular Cabbage Prices at the Ontario Food Terminal, 2018 and 2019*

Source: InfoHort

Going into the storage period – December to June – the price reported at the OFT indicates a return to storage[31], with prices above $0.50/lb. in the first 6 months of 2019. In the first 6 months of 2020, the price was lower, with an average of $0.41/lb. for green cabbage, and $0.58/lb. for red cabbage.

Figure 13.7 provides an illustration of market prices for Bok Choy over the last two years, with summertime prices in 2018 being just above $0.40/lb., and much stronger prices in 2019.

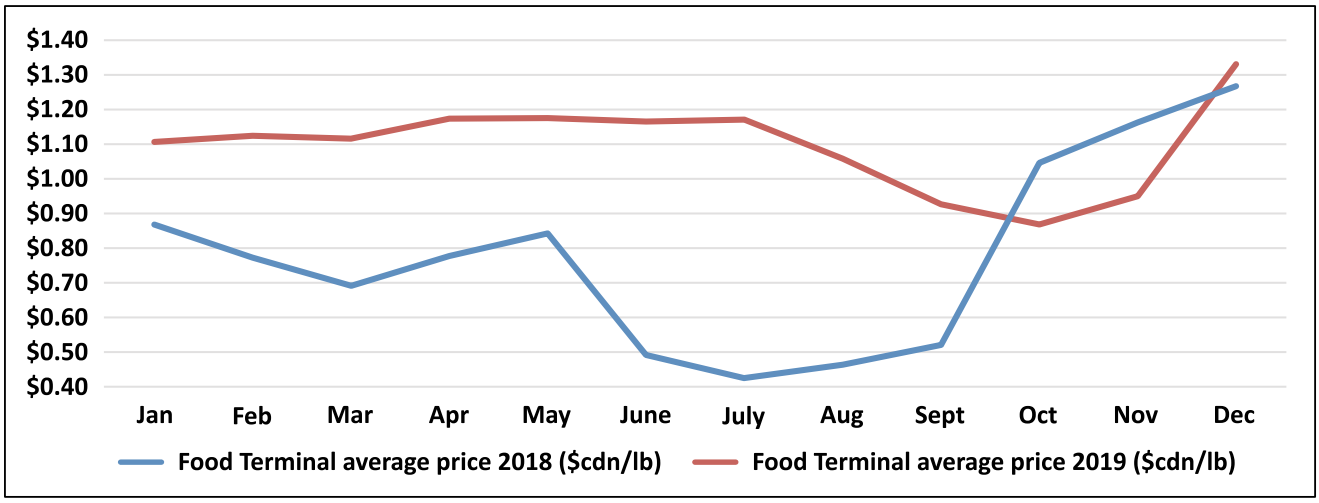

Figure 13.7 *Monthly Chinese Cabbage (Bok Choy) Prices at the Ontario Food Terminal, 2018 and 2019*

Source: InfoHort. InfoHort provides prices for Bok Choy and does not have a category for Chinese cabbage.

Another view of marketplace returns is the export value of Ontario's cabbage exports. For the 2019-20 crop year, the average export price was $0.50/lb, with monthly averages ranging from $0.28/lb to $0.80/lb[32]. The higher average export value in the July to October period can reflect a larger portion of the higher valued Chinese cabbage occurring in this time frame.

31 A return to storage implies that prices in the storage season are higher than at harvest and the price premium is greater than the cost of storage.

32 This export data is a combination of regular cabbage and Chinese cabbage export volumes, with the latter estimated to be around 12.5% of the total export volume.

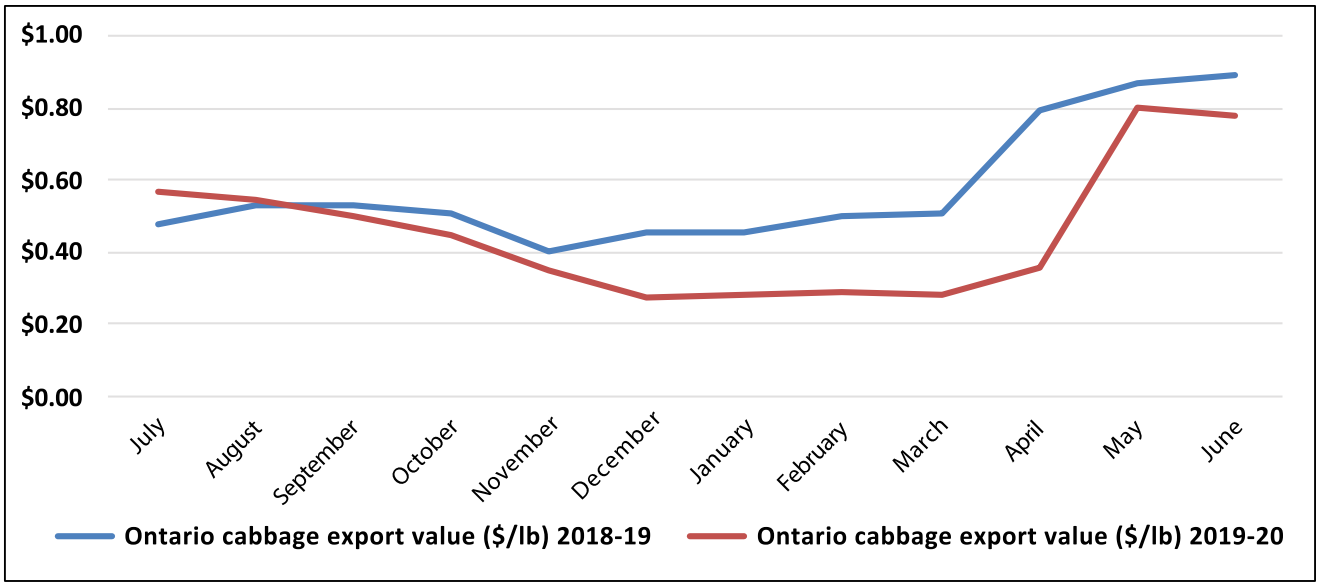

Figure 13.8 *Export Prices for Ontario Cabbage, Monthly Crop Year 2018-19 and 2019-20*

Source: Statistics Canada, CATSNET Analytics, Ontario imports and exports of selected vegetables by July/June crop year. This export data series does not separate out regular cabbage from Chinese cabbage.

Market data suggests that returns to growers are likely sufficient to support more cabbage acres. Cabbage prices are influenced by imports: Figure 13.9 shows that Chinese cabbage import values are in the $0.60 to $0.80/lb range. The import value for regular cabbage is over $1.00/lb, which is much higher than prices received for regular cabbage at the OFT; these import values likely reflect the type of cabbage imported. These higher prices are also exhibited in Figure 13.10, which reflect the average monthly price of all Canadian imports of US cabbage.

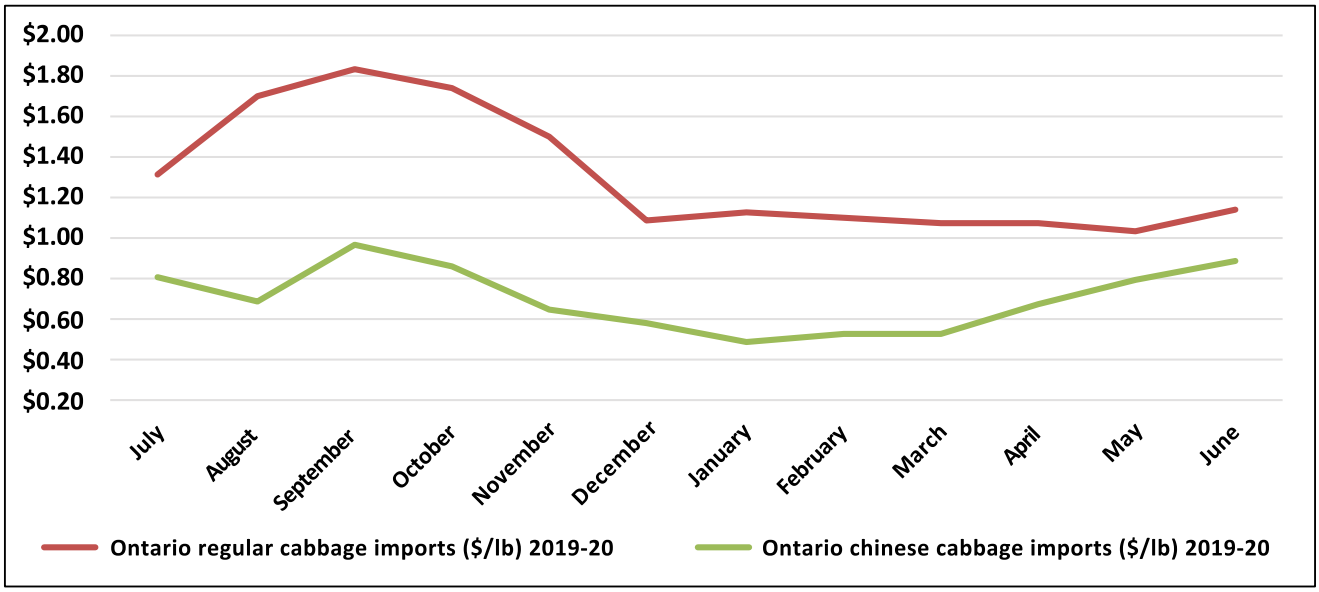

Figure 13.9 *Import Prices for Regular Cabbage and Chinese Cabbage, Ontario, Monthly, 2019-20 Crop Year*

Source: Statistics Canada, CATSNET Analytics, Ontario imports and exports of selected vegetables by July/June crop year

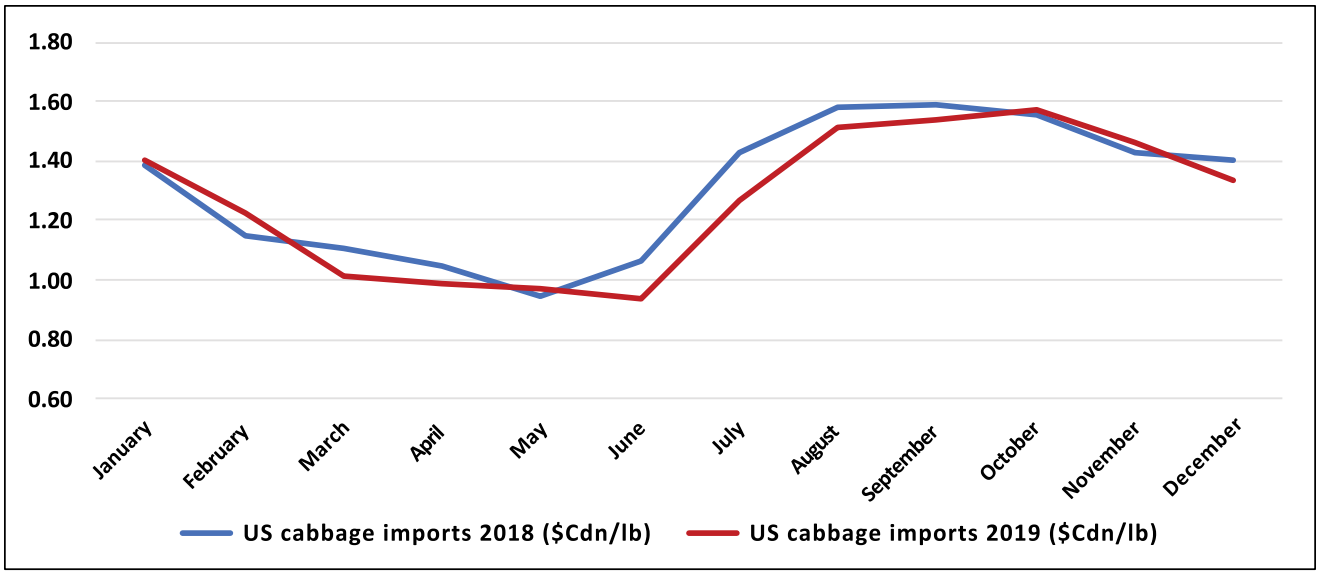

Figure 13.10 *US Cabbage Prices at the Canadian Border, Calendar Year 2018 and 2019 ($/lb.)*

Source: USDA GATS

Quebec's Cabbage Supply Chain

As noted above, Quebec grows 48% more cabbage than Ontario while its consumption base is 60% smaller. This additional production flows into Ontario, which Ontario growers must compete with. Growers indicate that Quebec cabbage can limit the price received through major channels such as the OFT and on direct retail distribution sales. Quebec has some advantage over Ontario in cabbage production due to lower minimum wage rates for labour, better financial support programs for growers, and a climate that is conducive to cabbage production. Ontario can be in a better position to compete with Quebec through scale economies at the grower level and by having established relationships with retail buyers.

Expansion Without Market Disruptions as Part of Existing Supply Chains

A key consideration for expansion is that additional production volumes does not disrupt the market and pricing. For example, additional production likely needs to be accompanied by additional storage to supply the market in the post-harvest season, unless the production is part of an existing supply chain that replaces cabbage traditionally shipped in from a US or Quebec supply source.

If the additional production is not part of an existing supply chain, the higher volumes can place downward pressure on the price received for cabbage for all growers. This strongly suggests that the supply chain leader (i.e. a major grower and/or a broker/marketer) supports more Ontario production based on either (1) an opportunity to expand sales whether in Ontario or in other supply regions, and (2) the displaced out of province production can be used to supply customers in other markets.

A number of larger growers in Ontario are part of North America-wide supply chains, with production in other regions such as the southern US. These supply chains supply Ontario retailers, the OFT, as well as retail accounts in US markets. These growers, through their supply chain network, are in the best position for such expansion – it is through such supply chains that expansion will have the smallest market price disruption, if any.

Critical Mass and Scale of Operations

Market garden operations with a few acres of cabbage that supply farmers markets and niche retail operations can always add more product. Such an increase will be modest at an overall provincial level. Larger growers have 200 to 400 acres in cabbage, or more, and these growers are the ones that are likely to be in a position to expand the production base and some have recently done so. The above expansion opportunity is approximately 23% of existing volumes for regular cabbage, which requires approximately another 700 acres of production.

The additional supply offering by individual growers needs to be based on a scale of operations that provides the profit margin to pay for overhead expenses, such as complying with stringent food safety protocols required by retailers and the CFIA. As well, the additional supply, whether on its own, or as part of an existing supply chain, needs to have the critical mass to consistently supply retail accounts. Furthermore, a necessary scale of operation is required to pay for storage facilities to supply customers with cabbage in the post-harvest season.

While some growers refer to cabbage as a thin margin business, cabbage production can be a viable vegetable operation with appropriate scale of operations and access to existing markets.

Hand Harvesting for Quality of Stored Product

There are machine cabbage harvesters, which reduces the cost of production for larger operations. However, machine harvesting typically causes some product damage, which in turn results in unacceptable product loss during the storage season. As a result, growers with a business model of supplying product coming out of storage do hand-harvest cabbage, which minimizes any mechanical damage and bruising of the cabbage. Hand harvesting results in a higher cost of production than machine harvesting, but machine harvesting results in a lower quality product.

Hand harvesting is also required for the processing cabbage (at 16% of regular cabbage volumes). Cabbage used for processing also comes out of storage for year-round production of products such as coleslaw and sauerkraut.

Access to Labour

Access to labour at harvest is a necessary pre-condition to successful expansion. Availability of labour can limit expansion plans.

Investment in Adequate Storage

Cabbage stored at 0°C and at 90 to 95 percent relative humidity (1°C for processing cabbages) will last for four to six months depending on the cultivar. Temperatures lower than 0°C cause freezing damage. Controlled-atmosphere (CA) storage allows cabbage to be stored for a longer period of time. Growers have indicated that they are able to store cabbage into the June/July period of the following year.

CA storage reduces oxygen levels and increases carbon dioxide levels in an airtight, refrigerated storage environment, which together suppresses metabolic activity in stored cabbage. Cabbage shrinks during extended storage, and outer leaves may shrivel. These leaves can be trimmed, which contribute to shrink (weight loss during storage). At harvest, a carton of cabbage can be well over 70 lbs, which due to shrink is closer to 50 lbs when coming out of storage after a number of months.

Expansion of production must be enabled by having necessary additional storage capacity. Without such capacity, substantial additional volumes into the market at harvest will likely result in a disruption of returns for all growers.

Retailer Support for Additional Local Production

Retailer support is required for more local production since retailers must choose to have more Ontario-grown cabbage on the retail shelf throughout the year. Figure 13.3 (for regular cabbage) and Figure 13.5 (for Chinese cabbage) indicates that there is significant import volume of cabbage in the growing season and the storage season that can be replaced by Ontario-grown cabbage.

Foodland Ontario promotion of year-round availability of Ontario cabbage can also assist in the expansion.

13.4 Factors That Will Enable Expansion

The following are factors that will enable the expansion of cabbage production in Ontario:

- Growers and/or marketers having a critical mass of Ontario-grown cabbage available to service major food retail accounts throughout the year
- Growers being part of North America supply chains that can supply retailers in Ontario and the US twelve months of the year
- Government financial support programs that provide for competitive production
- Programs that assist growers with accessing necessary labour as required through the growing and harvesting periods
- Retailer support for promoting Ontario-grown cabbage 12 months of the year
- On-going promotion by Foodland Ontario of Ontario-grown cabbage and availability throughout the year
- Investments into controlled atmospheric storage by growers to support a 12 month supply offering

14

Vertical Farming

Enclosed crop production such as greenhouses and vertical farms are examples of Controlled Environment Agriculture (CEA). These spaces are designed to control the growing environment and optimize the use of inputs such as water, nutrients, crop protection materials, and labour. Vertical farming is the most recent example of CEA that is already part of the Ontario agricultural scene and has promise to contribute to the expansion of fruit and vegetable production. In its simplest form, vertical farming is crop production that occurs on a number of vertical platforms in an enclosed space.

Globally, investments in vertical farms are estimated at $3.1 billion (US dollars in 2019) by GrandView Research with 32% of this occurring in North America

There are vertical operations in Canada (B.C., Alberta, Ontario, and Nova Scotia), the US, Mexico, U.K., Germany, France, China, India, Japan, Singapore, Brazil, the Middle East, and Africa. Crops grown in vertical farms include leafy vegetables, herbs, microgreens, nightshade plants (e.g., tomatoes and eggplants), and strawberries.

Canada has been an innovator in vertical farming, with technology exported to other countries.

14.1 Variations in Vertical Farms

There are two types of vertical farm structures – modules covering a few square feet in a ready-to-use vertical farm in a shipping container, and a building that is purpose built or retrofitted for a vertical production.

A differentiating factor with vertical farms is the growing medium. There are four basic types:

1. Hydroponics, as used in most greenhouse vegetable operations
2. A substrate growing medium, as used for micro-greens
3. Aeroponics where a mist provides all of the necessary nutrients
4. Aquaponics where there are nutrient synergies between the growing area and an aquaculture area

In an aquaponics system, water from an aquaculture system is fed to a hydroponic system where byproducts are broken down by bacteria into nitrites that are used by the plants as nutrients. Water is then recirculated back to the aquaculture system.

Lighting is a key feature of vertical farming and LED lights of various spectrums are used to promote efficient growth. Vertical farms in warm climates use natural light as well as artificial lighting. In more northern climates including Canada, vertical farming is mostly reliant on artificial lighting due to heat loss through glass.

Vertical farming is supported by technology and equipment suppliers for lighting, hydroponic and aeroponics growing systems, climate control systems, sensors, and suppliers of the vertical components and the associated mechanisms.

A complete vertical system can be supplied as a module or an enclosed container. Cubic Farm Systems in B.C. and Growcer in Ontario are two suppliers of complete vertical farms within a 40-foot container. A complete container has a capital cost that ranges between $150,000 and $200,000 with 320 square feet of footprint.

Some vertical farm technologies do not require any direct production labour during the seeding to harvest period. This type of system lowers per unit overall labour costs, and further enhances food safety since only the outside of the packaged produce is in contact by human hands at the retail store.

14.2 Produce Expansion Based on Advantage of Vertical Farms

Vertical farms provide a number of advantages such as:

- Facilitating fruits and vegetable growing in urban areas
- Minimizing transportation costs based on urban locations
- Providing for year-round production of produce
- Significantly reducing needs for water in fruit and vegetable production
- Shortening the growing time period (i.e., more crop cycles per year)
- Providing safe high quality produce that does not require any crop protection materials
- Lower carbon footprint associated with production and transportation

These advantages are driving the expansion of vertical farm production in Ontario for sprouts, microgreens, and leafy vegetables.

14.3 Status of Vertical Farming

There are at least four vertical farms operating in B.C, at least two in Alberta, six in Ontario, and one in Nova Scotia. The known Ontario operations include:

- Del Fresco Pure in Kingsville
- GoodLeaf Farms (a division of TruLeaf) in Guelph
- Molly's Vertical Farm in Guelph
- Ripple Farms Inc. in Toronto
- Living Earth Farm in Toronto
- WeTheRoots in Toronto

These operations are providing microgreens, leafy vegetables, and certain herbs. Production of fruiting vegetables such as tomato and fruits such as strawberries are not currently produced in vertical farms in Ontario. They require more light for fruiting and energy costs are much higher for lighting. The Del Fresco facility is a division of their much larger greenhouse vegetable business.

Greens and leafy vegetables are considered spring vegetables and require less intense lighting than fruiting crops. Future technological solutions may improve the efficiency of lighting systems, which could expand the scope of produce supplied by vertical farms. Current economics suggest that fruiting plants are more cost effective when grown in greenhouse operations within the province.

Some of Ontario's vertical farms use the container system (Del Fresco Pure) and others use a complete building structure purpose built for vertical farming (GoodLeaf Farms).

The output of vertical farms flow into a few distribution channels. Larger operations supply product to major retail operations while others directly supply food service operations at institutions such as universities, and some supply a few up-scale restaurants with fresh greens. Some growers are also using vertical farms to produce seedlings for future transplanting.

In 2019, there was an estimated total investment of $382 million (US funds) in vertical farm operations across Canada (GrandView Market Research) with estimated growth in overall investments to exceed 20% per year[33]. Figure 14.1 shows expenditure by type of technology required in a vertical farm, with lighting systems accounting for 40% of the total (in 2019).

Just over 55% of the investment dollars were in container type operations versus building based vertical farms, and about 50% of operations were based on hydroponics, followed by aquaponics and then some aeroponics. Assuming a five to 10 year period is required for the value of sales to equal the level of capital employed, the annual sales estimate is in the range of $50 to $100 million (Canadian dollars) across Canada.

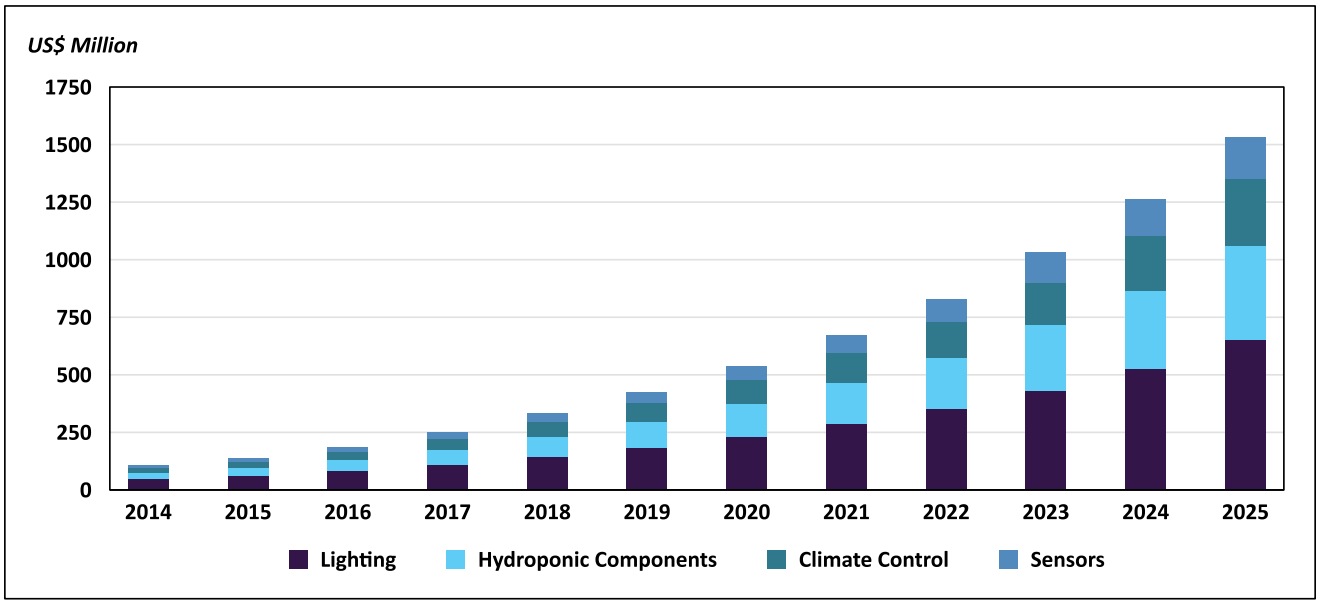

Figure 14.1 *Canada Vertical Farming Market Size, by offering, 2014-2025 (USD million)*

Source: www.grandviewresearch.com

14.4 Expansion Constraints and Impediments

Price Point at Retail and Minimal Promotion of Associated Attributes

A 50-gram package of microgreens retails for $3.99, or $36.23/lb. When on feature, the price can be reduced to $2.50 – close to the costs incurred at the vertical farm. Retailers suggest that vertically farmed microgreens are not illustrating much sales growth, which could be due to pricing and/or the lack of awareness by consumers of the positive attributes of vertically farmed microgreens and leafy vegetables. While product packaging displays some of the attributes, there is low product awareness by most consumers.

Signage at retail and advertising campaigns by growers can contribute to sales growth. The average consumer is not aware of the nutrient density of sprouts and microgreens, that no pesticides are used, and nor are there food safety issues for fully automated operations. From a positioning perspective, produce from a vertical farm has the attributes of organic production, as well as those unique to vertical farming.

33 In the US, the estimated investment to date was $742 million.

A branded sales campaign by growers will increase awareness and can result in a higher adoption rate by consumers. A limitation to company specific promotion is the spillover effect that benefits competitors that did not spend dollars on promotion. A solution could be industry-wide promotion through an umbrella grower organization, or a focused campaign through Foodland Ontario.

High Capital Costs

While capital costs on a square foot basis are much higher for vertical farms than for a greenhouse, a vertical farm can produce the equivalent of one acre of greenhouse space (43,560 square feet) on 2,000 square feet of floor space (using a container technology) based on the number of verticals used and the shorter production cycle for a crop.

An operation with 15 containers will incur upfront capital costs of more than $2.2 million and have the potential to ship approximately 175,000 lb. of leafy vegetables (depending on the crop grown) in a year. The capital cost per square foot of floor space is around $450/square foot. With five verticals in a container, the capital cost per square foot of growing space is $90/square foot.

A vertical farm proposed by the Staay Food Group in the Netherlands has a growing area of 30,000 square feet (in a building style operation) with a cost of approximately $(US) 8.0 million ($10.5 million in Canadian dollars) – equivalent to $350/square foot[34]. This suggest that capital costs, on a square foot basis, are higher with the more flexible multi-container style of operation.

Suppliers of container style vertical farms suggest that the payback period for a container can be less than five years, and just over two years based on the type of crop grown and the cost of electricity.

Capital costs are significantly higher than those associated with greenhouse operations (~ $40/square foot), however the annual volume per square foot of floor space is much higher with vertical farms due to use of verticals. A vertical farm also provides much more control over the growing environment to supply a consistent quality of product each day of the year. An estimate has been made that annual depreciation charges (per unit of output) for a vertical farm are more than double those of a greenhouse (using leafy vegetables as an example)[35].

Lighting and Associated Energy Costs

Vertical farms need 100% artificial lighting, making energy for lighting one of the largest operating cost items associated with vertical farms in Canada. In more southern areas, vertical farms use natural and artificial light for growing produce. The difference is due to the significant heat loss associated with glass roofs in more northern climates.

Lighting companies are supplying lighting solutions to the vertical farming sector with LED lights and with different light spectrums based on the type of crop grown. Lighting solutions are available with lower lighting operating costs in 2019, compared to a few years prior. The lighting system used in a vertical farm is estimated to account for 40% of overall capital costs.

34 Sanne Van Asselt, "*A SWOT Analysis of the Vertical Farm*", BSC Thesis, (2018) Wageningen University, Netherlands
35 Peter Tasgal, "*The Competitive Economics of Vertical and Greenhouse Farming*" (2019)

One of the reasons vertical farms in Canada are primarily focused on leafy vegetables (including microgreens) is the lighting requirements are much less than for fruiting crops. Springtime light conditions are all that is required for leafy vegetable production. Much more light intensity is required by a plant for the energy required to produce fruit, as well as a longer growing period. In more southern areas where natural light is also used, energy costs for fruiting vegetables and for berry crops are much less and the cost of production is not as high as in the more northern areas.

Despite the higher cost structure in Canada, vertical farms are used in remote northern communities where the cost of transportation outweighs the higher cost of energy to grow fruiting crops such as peppers.

Carbon Neutrality of a Vertical Farm and Energy Source of Electricity

Vertical farms and greenhouses use additional CO2 to promote faster growth and lower per unit costs – a positive attribute in an economy striving for a lower carbon footprint. The carbon footprint of a vertical farm depends on the energy source for lighting. If the energy source is not dependent on fossil fuels, then the resulting output will have a rather low carbon footprint. But if the energy source is from the power grid using natural gas facilities, then the carbon intensity of electricity may matter.

In Ontario, the carbon intensity of vertical farms ranges from 30 to 100 grams/Kwh of CO2 which is low compared to electricity based on only natural gas[36] with 322 grams/Kwh. To position vertical farming in a carbon economy, the industry may need to develop defensible data on the amount of electrical power required to produce a pound of production as well as the overall carbon footprint after considering transportation, etc., and compare that to alternative supply sources. This offensive strategy may be needed for vertical farming to be more than a niche market.

Operating Costs in Relation to the Next Best Alternative

Production costs for vertical farm crops are higher than costs in greenhouse and field production due to higher capital and operating costs. For significant growth – and to move vertical farming from more than a niche market – costs must be competitive with the costs for the next best alternative, whether greenhouse production or imported produce.

Given the cost differential, a promotion program is needed to highlight the positive attributes of vertical farm production, compared to the alternative. This information will help interested consumers make an informed choice based on their willingness to pay for the positive attributes of crops grown in a vertical farm.

Scale Matters

Vertical farming has scale economies. For example, capital costs per unit of output are much higher with a small vertical farm, such as one or two containers, versus a vertical farm based on 15 to 20 containers. There are some fixed costs that can be spread over more units when using a container style vertical farm. According to one supplier, capital costs can be up to 50% higher with a one to two-unit operation.

The size of operation also has a large impact on whether the operation can access retail outlets. Any retail outlet will want to ensure the output of a vertical farm meets minimal volume requirements before any commitment is made to carry the product line. Some retail operations are also investigating whether to operate their own vertical farm to support retail operations.

36 http://canadianenergyissues.com/ontario-power-stats/

An alignment with an organization that has distribution and networks with retailers can help a vertical farm operation access major market. For example, Del Fresco Pure supplies microgreens and lettuce from its vertical farm operation, and additional fruits and vegetables through its greenhouse operations.

Small-scale vertical farms should focus where less volume per day is required, such as supplying local restaurants or a university campus.

Investing in Technology and Scale Based on Market Needs

Evidence from the US suggests that investments in vertical farms needs to begin with the customer or market in mind. For example, FreshBox outside of Boston uses a number of shipping containers, allowing each container to specialize in a specific crop with its unique requirement for temperature, humidity and airflow[37]. This technology package has an advantage over a warehouse style of vertical farm where temperature and humidity can be the same across a number of growing crops.

The business model of Green Sense Farms in the US is to build a vertical farm to meet the needs of a single customer, such as a supermarket chain, a college/university, or a military base. The investment is scaled to the size of market in the local area.

Investments by Venture Capital and Potential Disruptive Technologies

Significant investment has been made into vertical farming by venture capital. These investments may result in disruptive technologies that affect the competitiveness of existing operations and drive a need to reinvest in upgraded technologies. Such upgrading has already occurred with lighting, where systems needed to be replaced at significant cost for some operations.

These are some of the investments being made outside Canada:

- Plenty (San Francisco based) received over $200 million from Softbank Vision Fund (includes Apple, Foxconn, Qualcomm, Sharp, and Public Investment Fund of the Kingdom of Saudi Arabia) prior to 2019 and raised another $175 million in 2019 to help realize its vision of a vertical farm in every city with a population of more than one million.
- AeroFarms (Newark, New Jersey) with 69,000 square feet of growing space, at an estimated $39 million of capital cost, with investors that include Dubai's Meraas Holdings, will use technology in Dubai where there is water shortage and most foods are imported. It has also been suggested that AeroFarms raised another $100 million in 2019.
- Green Sense Farms builds farms to suit individual customers with a complex in Las Vegas (its fourth) with a capital cost of $5 million.
- Oasis Biotech has a 40,000 square foot vertical farm in Las Vegas, Nevada. Its parent company is Sananbio, owned by Chinese LED chip manufacturer Sanan Group, and Sananbio sells lighting and other technologies to vertical farms and other horticulture applications.
- France's Agricool raised $28 million from an investor syndicate which includes Danone Venture.

37 Information provided from the following: Paul Adams "*Funder and proponents say vertical farming is the future. But consumer demand may change the nature of what it means to "grow"*" (October 24, 2017), Peter Tasgal, "*What is the Future of Vertical Farming*" (February 2019), Peter Tasgal, "*The Competitive Economics of Vertical and Greenhouse Farming*" (2019).

Potential for Bankruptcy

The high capital and operating costs of vertical farms and the need to be focused on the market and willingness to pay for the produce has resulted in a few bankruptcies.

- FarmedHere had a 90,000 square foot warehouse on the outskirts of Chicago that folded since the bottom line looked better by folding operations in 2016.
- PodPonics in Atlanta sold turnkey farm pods (containers) and sold its own produce but was unable to scale up fast enough to remain solvent in 2016.

Just like any other business, cost control and a focus on market needs is a business imperative for vertical farms.

Vertical Farming Needs Specialized Labour

Vertical farming uses a number of different technologies that are distinct from those in a greenhouse operation. Growing conditions are different and require a specialized skill set for efficient operation.

Access to specialized skills is a key success factor, as well as training staff for all aspects of growing a crop in a controlled atmospheric environment.

Can Vertical Farming be Classified as Farming

Many vertical farms operate in urban areas including industrial parks. These urban vertical farms pay municipal taxes based on industrial/commercial tax rates, which are higher than the farm tax rate that applies to greenhouse vegetables and field crops. For a farm to benefit from the farm tax rebate, the Municipal Property Assessment Corporation (MPAC) must assess the property as farmland, which will not likely happen in an urban or industrial/commercial area.

From a regulatory point of view, a vertical farm that does more than trimming, washing, and packaging produce will likely be classified as processing. A vertical farm that just trims, washes, and packages is classified as minimally processed. As a result, different regulatory oversight affects vertical farming compared to alternative supply sources.

14.5 Factors That Will Enable Expansion

These factors will help expand vertical farming operations in Ontario:

- An understanding of the number of reasons why vertical farm operations have failed
- Starting operations with the market segment focus and build the technology and scale that meets these needs
- An awareness building program of the various benefits and attributes of vertical farming
- Development of programs that encourages consumers to try (trial use) produce from vertical farms
- Promotion by Foodland Ontario
- A better understanding and/or development of the regulatory framework applicable to vertical farming

As the co-founder of FarmedHere vertical farm stated: "Vertical farming is a rather unique blend between highly efficient manufacturing and technological farming. Its success depends on the following: strong and smart capital, innovative sales and marketing, and a solid management team, working creatively with stakeholders from the local government, growers, technology providers, and customers"[38]. A focus on these success factors should enable expansion of vertical farming in Ontario.

38 Paul Hardej, Co-founder of FarmedHere, LLC., in an open letter to vertical farming colleagues (April 17, 2017)


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15

Expanding Fruit and Vegetable Production in Ontario

Assessing individual crops revealed that many crops have an opportunity to displace some imports without being disruptive and lowering prices to growers. For at least one crop, sweet potato, the expansion opportunity is limited given current market shares within the province and any additional production would likely be disruptive unless retailer buyers committed to taking additional Ontario production instead of from established import supply chains.

Universal findings across all of crops investigated include:

- The expanded production needs to be part of an existing supply chain that has a critical mass of supply offering
- Retailers support Ontario grown product as part of their marketplace positioning
- Local produce use Foodland Ontario support, and the product is well signed and displayed at point of consumer purchase
- A more competitive supply offering can occur with better access to crop protection materials that are used by US growers
- Cultivar selection programs and/or plant breeding program for Ontario growing conditions and designed to deliver on specific product attributes

Ontario's ***fresh grape*** production supplies 0.9% to 1.6% of Ontario's fresh grape consumption and the opportunity exists for at least an eight-fold increase in supply. Additional grape production will need to be outside of the Niagara region and along the north shore of Lake Erie in the Essex County area. Plant breeding programs and/or cultivar selection needs to deliver a longer harvest period and larger seedless berries with crisper skin that are red or green in colour.

Pears are a storable crop, with a storage season that is shorter than most apple varieties, and Ontario's current production supplies just 10% to 12% of annual market requirements in the province. Based on the ability to store the pear crop, annual pear production can more than double to a 25% market share – a conservative increase if monthly consumption of pears is higher in the first five months after harvest.

Expansion can occur in a number of areas outside the traditional pear growing region of Niagara. Growers expanding pear production will need to invest in high density planted orchards for better profit margins. Growers and marketers will need to invest in controlled atmospheric storage to have an extended marketing season. Attention to cultivar selection and handling practices is needed to improve the presentation and appearance of pears on the retail shelf, compared to imported pears.

Ontario's field-grown ***strawberries*** supply 14% to 16% of Ontario's consumption each year, with an opportunity to increase market share to 37.5% by expanding production of day-neutral (or ever-bearing) strawberries that are harvested into October. This expansion by 150% is conservative since most strawberry consumption occurs between May and December. A critical mass of supply by growers/marketers that is priced competitive to California strawberries (which have a longer growing season) will support expansion of field-grown strawberries.

Ontario-grown ***apples*** account for approximately 48% to 66% of the overall consumption of apples and apple products in the province. For the fresh apple market, Ontario growers supply a larger portion of the Ontario market; however, there is a large opportunity to replace imported apples of the same variety and as well increase the share of apples consumed in neighbouring regions. The farm level value of expansion is estimated to be $20 million with production increasing by at least 10%. Acreage expansion requires a large up-front investment with growers selecting a variety that will have market appeal for at least 20 years. The apple industry is well-supported by apple packer/marketers that can access the market with necessary critical mass.

Ontario growers supply 8% to 11% of Ontario's ***garlic*** consumption. There is an opportunity to double the supply to 20%, despite low-priced Chinese garlic in most food stores. Cloves from a garlic bulb are the seed supply, with seed supply an expansion limitation that can be addressed by some growers focusing on providing high-quality disease-free seed to commercial growers. The industry needs to develop a critical mass of supply to expand sales into major food retail channels, and investments are need into controlled atmospheric storage to extend the marketing season.

Differentiation of Ontario-grown garlic from competing supply sources can also assist in the expansion opportunity.

Field-grown ***eggplant*** production represents 16% of estimated annual consumption within Ontario, with an opportunity to expand output by 25% to account for 20% of provincial requirements. As with other crops, eggplant must compete with the price of imported eggplant, and growers expanding output need to be part of a marketing group that offers necessary critical mass to major retail buyers.

Sweet potato production in Ontario represents just over 50% of Ontario's estimated consumption, after accounting for exports of Ontario sweet potatoes. Ontario growers must have a product offering that can compete with lower cost suppliers operating out of North Carolina, which needs export markets given its 50% increase in production over the last decade. North Carolina also has a climatic advantage given that sweet potatoes are a sub-tropical crop. A concern with any sweet potato production expansion is that additional production should be part of an existing supply chain serving retail channels, and that Ontario buyers are willing and committed to merchandizing more Ontario production. If these conditions are not in place, additional supply can be very disruptive to the current supply base and the current market share of Ontario grown sweet potatoes.

Fresh market ***snap bean*** production supplies 45% of Ontario fresh market requirements. The expansion opportunity is to replace imports that occur during the July to October harvest season. Such expansion should be part of the existing supply chain to enable the production to access the large chain retail market. Positioning of local Ontario snap beans in major retail by both retailers and Foodland Ontario supports the expansion opportunity. As well, by having such critical mass, the supply chain has the opportunity to supply accounts in neighbouring regions south of the border.

For ***regular cabbage***, Ontario production accounts for 65% of Ontario's market needs. Given the ability to store cabbage for almost a year, there is a significant opportunity to expand production to supply a much larger share of Ontario's market. This expansion can add another $6.8 million of farm value. Chinese cabbage production can also expand to increase its share of consumption within the province and in shipments to nearby markets, with expansion of at least $5.8 million. Expansion should be part of supply chains with critical mass and supported downstream by retailers and Foodland Ontario.

There are ***vertical farms*** in Ontario that supply leafy vegetables and microgreens to restaurants and food retailers, and vertical farming offers an opportunity to expand produce production. Vertical farms provide a number of advantages, notably facilitating fruits and vegetable growing in urban areas, minimizing transportation costs based on urban locations, providing for year-round production of produce, significantly reducing needs for water in fruit and vegetable production, shortening the growing time period (i.e., more crop cycles per year), providing safe high quality produce that does not require any crop protection materials, and a lower carbon footprint associated with production and transportation. Further expansion by vertical farms will be based on operating efficiency, lowering energy costs and the resulting cost structure, and development of programs that increase consumer awareness of the attributes of produce grown in vertical farms. As with other horticultural businesses, any investment in a high capital vertical farm should only occur after a market need has been identified and associated commitment made by a customer to sell the produce.

Table 15.1 *Summary of Expansion Opportunities by Crop*

Crop	Current Production as a Share of Ontario Consumption	Expansion Opportunity (multiples increase)	Expanded Production as a Share of Ontario Consumption[39]	Farm Gate Expanded Revenue Potential (incremental millions)
Strawberries[40]	14.0%–16.0%	2.5 X	37.5%	$45.5
Apples (fresh)	62.0%–87.0%	1.11 X	83.0%	$20.0
Fresh Grapes	0.9%–1.6%	8 X	8.3%	$26.4
Garlic	6.0%–11.0%	2 X	20.0%	$10.0-$15.0
Pears	12.0%	2 X	25.0%	$10.8
Cabbage (regular)	65.0%–92.0%	1.15 X	90.0%	$6.8
Cabbage (Chinese)	40.0%–60.0%	1.36 X	68.0%	$5.8
Sweet Potatoes	51.0%	1.5 X	79.0%	$2.0
Snap Beans (fresh)	45.0%	1.09 X	49.0%	$1.8
Eggplant	16.0%	1.25 X	18.8%	$0.7

The following actions can turn opportunities into reality, and address the constraints identified for a number of fruit and vegetable crops. These actions are primarily focused on field-grown fruits and vegetables, despite the opportunities for Ontario-grown produce in enclosed structures such as greenhouses and vertical farms. The following are perspectives provided by JRG Consulting Group and do not necessarily reflect the view of the Greenbelt Foundation or any organization that provided advice to the Greenbelt Foundation during the conduct of this project.

Actions by Food Retail and Food Service

There are actions that can be taken by Ontario's food retailers and food service companies that support expansion of Ontario's fruit and vegetable production base.

In-Store Signage and Promotion of Ontario-Grown Produce

At comparable price points, consumers prefer Ontario-grown produce. But display signage does not always let shoppers know there is an Ontario-grown choice. Ontario produce is not always stocked close to the Ontario-grown signage. And foodservice operations typically do not use their own or Foodland signage.

A fruit or vegetable in a package can use "Ontario-grown", "local" or "Foodland Ontario" for easy identification by shoppers. However, this is not the case for many bulk items where a product code sticker is not practical or easily falls off. These situations require signage that displays Ontario-grown or Foodland Ontario. A focus on in-store signage and promotion can help expand locally grown fruits and vegetables.

39 Note: The higher production, as a percent of consumption, for some crops is based on the mid-point of the current production to consumption ratio (as shown in the first row).

40 This expansion opportunity focused on field-grown strawberries, using mostly the day-neutral type of strawberry. Greenhouse-grown strawberries in the province can supply a portion of the market through October to mid-June. This indoor production complements field-grown strawberries. Year-round greenhouse strawberry production allows for an expansion that exceeds the 37.5 per cent of consumption to well over 50 per cent of all consumption.

Action: *Collaboration between retailers and Foodland Ontario to enhance the display of Ontario-grown produce including in-store protocols that focus on placement of Ontario produce. Foodservice operations should also collaborate with Foodland Ontario to develop/enhance Ontario-grown signage.*

Demand Pull and Commitment from Retailers and Foodservice

Any additional fruit and vegetable production should be based on demand pull by a buyer willing to commit to merchandizing the additional production. Buyer commitment is critical since buyers typically have agreements with a few suppliers in each product category, and the buyer uses these supplier networks to source required supply. Buyers can only schedule in more Ontario production based on engaging in discussion with an established seller of Ontario produce – where they already have a relationship – and are willing to commit to more Ontario production. If this approach is not taken, any additional supply can be disruptive to established relationships and pricing.

Action: *There must be a commitment and demand from retailer and foodservice buyers, given the nature and structure of produce markets.*

Actions by Growers

Expansion of production can only occur based on investments made by Ontario fruit and vegetable growers. There are some actions growers can take to align with supply chains that sell produce to major buyers of fresh market fruits and vegetables.

Critical Mass of the Supply Offering is Critical

Retailers require a supply offering from a larger grower or marketer that provides sufficient volume to stock shelves on one of their store banners. Retailers typically do not want to be involved with a multitude of suppliers for one product line. That means any individual grower who is expanding production must have the scale to supply a banner with the necessary volume – or a set of growers collaborating as a common marketing organization to supply the marketplace.

Action: *A marketing approach with a critical mass to supply individual retail accounts is required. Smaller growers must aggregate with others to reach the necessary critical mass.*

Merchandizing Produce is Based on Relationships with Buyers

Fruits and vegetables are distinct crops compared to corn, soybeans, and wheat. A major difference is the storability, fungibility, and existence of active liquid markets for globally traded grain crops that have a futures market. It is common for these crops to be sold throughout the year to a local buyer with a network into global markets. The exchange of goods can be very transactional – not the case with fruits and vegetables where the interface with the market is through personal contact with a buyer and one-on-one networks. A grower cannot bring a truckload of produce to a retail distribution centre and expect to sell at a market price that is comparable to a load supplied by a preferred supplier or comparable to the price received at a competitor's distribution centre. The retail trade does not buy in this manner. The exchange of fruits and vegetables is based on a commitment made between the buyer and the seller through previously arranged terms and conditions.

The Ontario Food Terminal (OFT) is an important outlet where sellers merchandize products with prices affected by daily supply and demand at the terminal. Growing conditions may mean that a grower may have more production than required to fulfill direct contracts, so marketing through both the OFT and direct contracts with buyers is a wise strategy. The OFT also provides an opportunity to meet and build relationships with buyers.

Action: *Expansion should occur through supply chains where the seller – a grower or wholesaler – has a relationship with major buyers.*

Ensure that Expansion in a Specific Crop is Non-disruptive

On the surface, expansion of local production simply replaces imports. But this is not the case for most fruit and vegetable crops. In the harvest/marketing period of perishable produce – when local production fulfills most market requirements – any additional production is shipped out of the province at a lower net price, or the local price falls to move the additional supply. This type of expansion is disruptive to the existing supply base. For some fruits and vegetables, this situation does not apply because of storage options or where the Ontario-grown market share is low during the marketing season. Some of the crops investigated in this report illustrate that expansion is possible without being disruptive.

Action: *Individual growers should determine if they have a market for their additional production to ensure the added volume will not disrupt the local balance of supply and demand, and lower crop prices.*

Loyalty is a Two-Way Street

Ontario retailers support local production and some retailers use local Ontario produce as part of their differentiation strategy in the competitive food retail market. To deliver on these positioning, retailers must have relationships with local grower/marketers and be loyal even when events occur such as less than ideal growing conditions or when open market prices are well below agreed upon pricing terms in the pre-harvest season. Growers must also be loyal to retailers when there are short-term marketplace opportunities for growers to market some supplies into higher priced markets, such as the US northeast when currency fluctuations and/or regional shortages occur.

Action: *To successfully market more Ontario fruits and vegetables, business relationships in the supply chain must be based on loyalty and an expectation that commitments will be followed through on.*

Actions by Industry Associations

Industry associations, including grower organizations, can assist in the expansion of Ontario-grown fruits and vegetables through their activities and programs. Here are suggested actions for associations, based on our findings.

Facilitate Collaboration within the Production Sector

Critical mass of the supply offering is needed to support major expansion of fruit and vegetable crops that have a market-based opportunity for expansion. In many cases, individual growers will need to collaborate on marketing initiatives to ensure sufficient supply. Some commodities, such as tender fruit, have organizations that market produce on behalf of growers and/or grower members.

Action: *Select grower associations and/or the Ontario government could offer workshops to highlight the types of grower organizations and partnerships between growers that can be used to market produce in major market channels within Ontario.*

Recognize Diverse Pool of Next Generation Growers

One of the challenges to expansion is the declining number of fruit and vegetables growers. In addition to family farm members, there is a pool of knowledgeable other individuals who can successfully grow fruits and vegetables—consulting agronomists, field managers for large growing operations, and some crop supply input personnel. A program that highlights and connects this talent pool to businesses wanting to invest in the sector can help ensure its capacity to grow.

Action: *Grower organizations should continue to develop young grower programs so the industry can learn about the talent pool for continued field grown fruit and vegetable production in Ontario.*

Investment by Growing Operations within Established Supply Chains

Major produce buyers are served by organizations with access to supplies in a number of growing regions across North America, providing a continuous supply offering. Some of these supply chains are Ontario-owned and operated, while others are US-based operations. Expanding fruit and vegetable production within Ontario by these grower/marketer organizations automatically results in a market for the expanded Ontario production since these organizations plan operations to supply their various North American accounts out of their geographically diverse production base.

Action: *The Ontario government and/or selected grower organizations could provide information to multi-jurisdictional grower/marketer organizations on the benefits of expanding their continental supply with Ontario-based growing operations.*

Encourage Strategic Investments for Farmland Investors

Investors in farmland have the opportunity to acquire fruit and vegetable operations where the current owner/operator is retiring with no family member, other grower, or other qualified person interested in taking over the operation. A business model where farmland investors team up with individuals and organizations that have expertise in growing and marketing produce is a way to facilitate expansion. This model means the grower does not need to own the majority of the land they use for production but has planning certainty through long-term lease arrangements. Keeping productive farmland in fruit and vegetable production provides an opportunity for farmland investors to acquire farms and find qualified agronomists and professional managers to continue supplying fruits and vegetables.

Action: *Grower groups and municipalities could link growers looking to leave the business with farmland investors interesting in expanding fruit and vegetable production in Ontario.*

Actions by Research and Development Organizations

Ongoing research and development focused on fruit and vegetable production can support a competitive position in the marketplace.

Extending the Length of the Marketing Period

The local market can absorb more local production when the harvest season can be lengthened, and when storage technologies and programs can lengthen the storage season and offer high quality stored products. Focusing on cultivar selection and/or plant breeding programs will extend the harvest period and storability attributes for storable crops. Storage technologies can also be used to extend storage season of some crops.

Action: *Research and development in Ontario should include a focus on cultivar selection, plant breeding programs, and storage technologies to lengthen the marketing season for a number of Ontario grown fruits and vegetables.*

Provide Varieties that Provide Beneficial Attributes for Growers and Consumers

Cultivar selection programs and/or breeding programs can result in varieties with disease tolerance for crops – where a specific disease is an issue – improving the competitive position of Ontario growers in the marketplace. Varieties that offer attributes that benefit consumers (or marketers/retailers) also improve the competitive position of Ontario growers. Some of the crops that were investigated in this report could benefit from more active cultivar selection activities and/or Ontario-based breeding programs.

Action: *Research and development in Ontario should focus on cultivar selection and plant breeding programs that deliver product attributes that growers, produce buyers, and consumers want.*

Actions by Government on the Policy and Information Fronts

Government programs and policies have an overarching effect on the fruit and vegetable production and marketing sector. This study identified a few areas where government action would be beneficial.

A More Even Playing Field on Crop Protection Materials

Ontario's fruit and vegetable growers are at a competitive disadvantage relative to import suppliers for crop protection tools that can be used in Canada. Certain crop protection products are available to US growers are not registered in Canada, resulting in a higher cost structure and/or lower yields in Ontario. This discrepancy can occur when the product manufacturer sees the market opportunity in Canada as too small to justify costs of registration in Canada. The PMRA's "Minor Use Program" is an approach to overcome disadvantages of using crop protection materials on relatively small crop acreages.

Action: *The Ontario government should continue to support of the Minor Use Pesticides Program (MUPP) with the presence of a Provincial Minor Use Coordinator position based in OMAFRA. The federal government should ensure sufficient resources are available within the Pest Management Regulatory Agency, Agriculture and Agri-Food Canada and other relevant departments to ensure a high capacity of the MUPP. Support is also needed for robust science-based regulatory decisions on crop protection products with a priority on access to crop protection materials used on individual crops in the US that are not available in Canada.*

Encourage Retailers to Merchandise Ontario-Grown Produce

Retailers are in the business to make a profit so may choose not to promote Ontario products in part due to the lower cost of imported versus local produce. Given the economic benefits of more local fruit and vegetable production, the Ontario government has an interest in ensuring retailers stock more Ontario-grown produce. The Province could consider creating incentives for achieving certain targets of Ontario-grown produce sales, such as a preferential provincial corporate tax rate associated with specific incremental increases in the sales volume (or value) of Ontario produce. A more intrusive alternative is a mandated minimal volume share by specific crop.

Action: *OMAFRA could investigate the use of incentives or regulations to increase the amount of Ontario produce sold in retail and food service outlets. This could include examining if the economic impact of additional Ontario-grown produce and the associated provincial tax revenues could offset possible tax allowances granted to Ontario-based food retail and food service operations.*

Provide Information to the Grower Community on Suitable Growing Regions

In the past, OMAFRA supplied a map highlighting where certain fruit crops could be grown in Ontario. This information could be revised to show areas of the province suitable for growing vegetable crops to assist with expanding vegetable production in different areas of the province.

Action: *OMAFRA could update the map showing where certain fruit crops can be grown throughout Ontario and develop a comparable map to show suitable growing areas for field-grown vegetable crops.*

Provide Information to the Grower Community on Cost of Production for all Crops

OMAFRA, with the support of grower organizations, develops and provides cost of production estimates/ crop budgets for some tree fruits. This information assists growers wanting to expand or assists established growers diversifying into other fruit crops. OMAFRA should expand this activity to include all fruit crops and to many field-grown vegetable crops. This information would assist growers wanting to enter into fruit and vegetable production and provides guidelines for existing growers on their internal operations and where improvements could be made.

Action: *OMAFRA could develop cost of production estimates and/or crop budgets for a broader set of field-grown fruit and vegetable crops.*

Provide Information on Wholesale Prices for Fruit and Vegetable Crops

Infohort provides price information based on select wholesale markets, such as at the OFT. This price reporting service does not cover all fruits and vegetables merchandized through the Food Terminal and there are some coverage gaps within a crop. An expanded price reporting service for Ontario-grown produce would provide useful information to Ontario growers on wholesale prices throughout the harvest and storage season – information that could support a grower's decision to expand production or others deciding to start producing a specific crop.

Action: *Encourage OMAFRA to collaborate with Infohort to provide price information on an expanded list of fruit and vegetable crops grown in Ontario.*

Actions by Landowners

Land is essential for field-grown fruit and vegetables, and suitable farmland has an associated high capital cost. There are business models where growers do not need to own all of their production base, with landowners entering into long-term lease operations with fruit and vegetable growers.

Offsetting the High Capital Cost of Land through Lease Arrangements

For many growers, fruit and vegetable expansion requires access to more land. Land suitable for fruit and vegetable production can cost more than $20,000/acre. For a 100-acre farm, the land cost can be at least $2 million before any necessary land improvement or additional machinery required for expansion – an annual cost of $1,450/acre (based on 20 years of payback and 4% mortgage interest). An alternative is a long-term lease arrangement with a farmland investment company that leases farms to enable growers to free up capital for operating the farm. Assuming a 3% of market value lease rate, the annual cash flow on the $20,000/acre farmland becomes $600/year, versus $1,450 – a 55% reduction (an $80,000 annual cash savings on 100 acres).
Action: *Working with grower organizations, farmland investment companies could identify the benefits of long-term leases as a way for individual growers to consider expanding their operation with lower capital cost.*

Pickering Airport Lands can be Part of Fruit and Vegetable Production Expansion

The Federal government has approximately 6,500 acres of farmland in cash crop operations at the proposed Pickering Airport site, supervised by Transport Canada. This farmland can be a land base for expansion of certain fruits and vegetables suitable for the climatic and agronomic conditions to the northeast of Toronto. Long-term leases of at least 30 years are required for tree fruits. Lease arrangements of 10 to 20 years provide a planning horizon for vegetables and some fruit crops.

Action: *The federal government should consider providing 20 to 30-year leases on the proposed Pickering Airport lands. Select commodity organizations could identify the benefits of fruit and vegetable production on suitable acreage on these lands with established growers.*

Productive Idle Land can be Part of Fruit and Vegetable Production Expansion

Idle land on the north shore of Lake Ontario – that was once in fruit and vegetable production – is an expansion opportunity for crops suitable to be grown in the region. Bringing this land back into production requires a concerted effort by local municipalities to identify and incentivize landowners to return land to fruit and vegetable production, possibly through farmland investor groups (which in turn identify growers to produce applicable fruit and vegetable crops on these lands).

Action: *Selected municipalities could support expansion opportunities by identifying idle land and developing action plans that link current owners and farmland investors.*

Annex 1 – Strengths, Weaknesses, Opportunities, and Threats Analysis

A high level SWOT analysis is provided to highlight strengths and opportunities that can be leveraged for expansion, and possible barriers to expansion that would need to be addressed, minimized or mitigated.

Strengths

Ontario's fruit and vegetable sector has a number of strengths that can be leveraged for expanding production:

- Proximity of production to the major population centres in Ontario (the GGH)
- Local products are fresher than imports due to proximity to the market
- An adequate supply availability for the market in some crops (e.g., root crops)
- Consumers are loyal to local products and trust local products
- Some retailers support local growers and local programs
- The Ontario Food Terminal brings together local supply with local buyers
- Foodland Ontario promotion and support
- Proximity to US regional markets (e.g., Chicago, eastern seaboard) for produce exports
- Some large-scale growers supplying excellent quality produce
- Wholesalers/shippers that have excellent relations with buyers (e.g., retailers) and with growers supplying product
- Climate and soils suitable for production of many vegetable crops
- Research facilities including Vineland Research and Innovation Centre, and the University of Guelph with its research stations (e.g., Muck Crops Station and the Simcoe Station)

These strengths can be leveraged on crop expansion initiatives.

Weaknesses

Some of the weakness, internal to the Ontario industry, include:

- Short growing season for some crops
- Variability in weather throughout the growing season and in the harvest season for field crops
- Inability of shippers/wholesalers to supply most local produce on a year-round basis, with minor exceptions (e.g., some root crops, apples)
- Yields in relation to competing regions
- Fruit production cannot expand in the Niagara region without displacing other fruit crops
- Some Ontario-based marketers with US growing operations expand production in US locations, versus at Ontario locations (where owned or through contract growers)
- Level of government financial support compared to levels received Quebec growers and impact on ability to compete, where government payments averaged out to 3.7% of revenues in Quebec versus 2.6% in Ontario for field vegetable growers
- Growers do not always have access to the same crop protection materials as the US
- Succession issues on the farm, resulting in an exodus of expertise and land
- High cost of labour compared to other production regions
- Availability of a local labour supply
- Reliance on off-shore workers and associated government programs for off-shore workers for a number of fruit and vegetable crops
- High capital costs and operating costs compared to field crops such as corn and soybeans

- Lack of scale in many horticulture crops, means supporting activities such as research and development, development of varieties for local conditions (e.g., pears), fine-tuning of production processes and techniques for local conditions, are not conducted to the extent that they should, resulting in a competitive disadvantage relative to areas with critical mass in production
- For some crops there is minimal supporting infrastructure such as agronomic research and genetic improvement capacity (e.g., pears)
- Concentrated retail sector in Ontario results in more marketplace power at the retail level, versus the grower shipper level, which can affect the terms of trade and returns to growers

Opportunities

Opportunities that support expansion include:

- Consumers wanting local fruits and vegetables and resulting demand for local food
- Changing demographics and impact on produce desired by the average Ontarian
- Shelf life extending technologies to supply the market over longer time periods for some crops
- Variety development that allows for a longer harvest period and/or longer product shelf life
- Technologies that substitute for labour, including machine harvesting of some crops
- Production in enclosed structures that reduce weather risks and allow for longer growing seasons, such as greenhouses, hoop houses, vertical farms, etc.
- Have grower linkages with wholesaler/shipper that supplies a crop kind year-round
- Develop markets for off-grade products to increase returns per acre to growers

Threats

Threats to the Ontario sector include:

- Low cost imports and the impact on profit margins to growers
- More favourable cost structure and grower yields in longer production season growing areas of North America
- Imports from economies with low wage rates and cost structures, such as China and Mexico
- Canadian product is prevented from being shipped into the US due to the increased ability of science to detect trace levels of MRLs of crop protection materials deregistered in the US (with zero tolerance of the deregistered product as a residue) since Canadian growers do not have access to the newer registered crop protection materials
- Loyalty of the retail buyer to local product, with procurement decisions centralized and/or moved out of province
- US industry uses Canada as a market to move surpluses at lower prices when necessary to keep their markets in equilibrium
- Major buyers want suppliers to have year-round supply, which can be satisfied by major wholesalers with access to import supplies
- Branding of produce by larger suppliers that substitute for "grown in Ontario" branding