Measuring the Impact of the Organic Agriculture Industry on Prince Edward Island Using Economic, Environmental and Social Indicators

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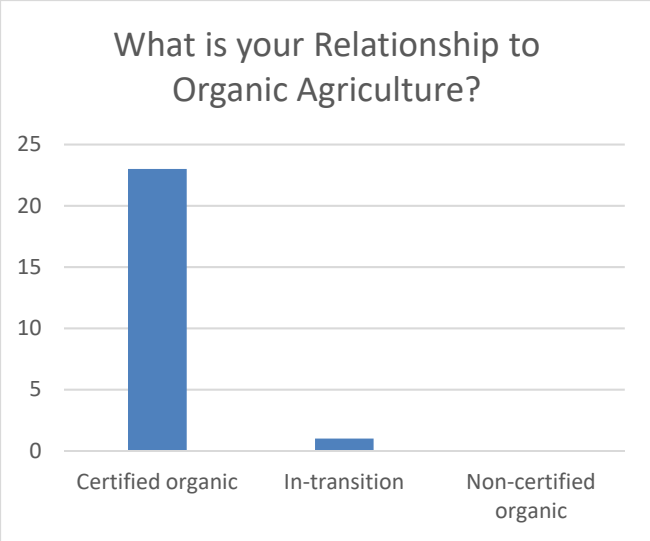
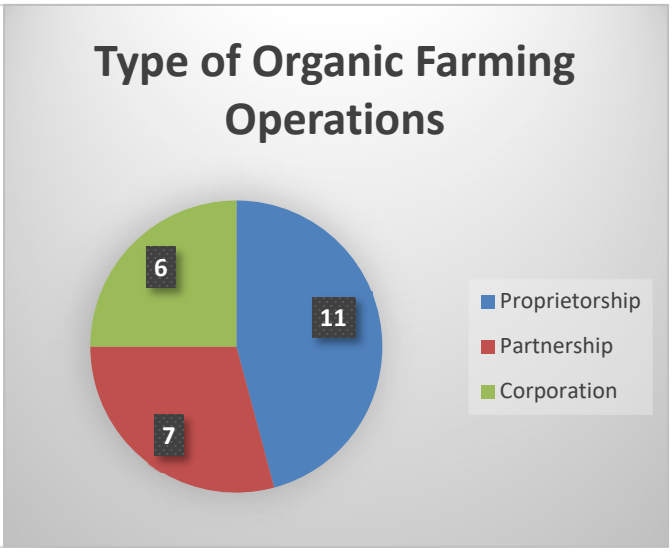
EXECUTIVE SUMMARY

Prince Edward Island Certified Organic Producers Cooperative (PEICOPC) is actively involved in representing 50 of the Island's organic producers, consisting of approximately 10,000 acres of certified organic farmland. The organization was established in 2002, and has been a part of the rapidly growing organic industry since inception. PEICOPC works closely with its members and the public to provide quality healthy food for Islanders, encourage and stimulate economic growth in rural areas, ensure fair pricing and income for the Island's organic farmers as well as promoting safe farming practices to protect and enhance the surrounding environment. The organization has taken a number of steps to improve the organic industry on the Island, including coordinating relevant and accurate research, creating networking events and educational opportunities, and by serving as a voice for its 50 certified organic producers and 31 associate members to the industry organizations and government bodies.

PEICOPC completed its first industry profile survey in 2003, with additional surveys being completed in 2008 and 2011. During this period, the industry experienced significant growth. The number of certified organic producers increased from 23 in 2003 to 50 in 2010, growth of 118%. The number of certified acres also increased from 1,615 acres in 2003 to 5,733 in 2010, an increase of 255%, not including the 397 acres in transition at the time the survey was completed. The trend has continued to increase, with certified organic acres reaching approximately 10,000 in 2017, although the number of certified organic farms has remained stable. This indicates that the average size of organic farms on the Island have increased. With a shift towards more commercialized organic farming operations, it is no surprise that the producer survey saw an increase in the average farm size, as well as an increase in gross revenue and net profits.

To get an updated overview of the industry from some producers prospective, a 36-question survey was prepared and submitted to all 50 members of the PEI Certified Organic Producers Co-operative. Survey responses were received from 24 of the 50 members, for a response rate of 48%. All producers that completed the survey are currently certified organic, except for 1 producer that is in transition. Proprietorships were the most common type of farm (46%), followed by partnerships (29%) and corporations (25%). 79% of farmers that participated in the survey were older than 30 years of age, with the largest group of farmers being within the range of 56 to 69 years of age, at 40% of surveyed farmers. However, it was reassuring to see that 30% of operators were between 31 and 45 years of age, indicating a balanced demographic.





Based on the responses from the producer survey, oats and grains were the most locally produced commodity, followed by vegetables and potatoes. Organic acreage ranged from 1 acre to over 1,000, with the most common acreage being between 100-500 acres (33% of respondents). Soybeans had the highest average acreage at 242 acres, followed by oats and grains at 158 acres and forages at 60 acres.

A majority of the producers have been farming for 20 years or more (46%), followed by 25% that have been farming between 5 to 10 years. It was not surprising to see that 22 out of the 24 producers began their certified organic farming operation between 2001 and 2016. The Island's organic industry experienced significant growth during this period, as indicated in the Prince Edward Island industry overview.

One of the notable characteristics of the organic agriculture sector on Prince Edward Island is the diversity of the production which provides residents and tourists with a vast range of quality, organic food options. Organic production ranges from potatoes and soybeans to strawberries and livestock. This development of local organic food systems has become a growing area of interest, and can be viewed as a logical strategy to improve economic, environmental, and social vitality.

Results from public survey, as compiled to determine the social impact of the Island's organic industry, showed that the Island's population generally have a positive view of the organic agriculture industry. Survey participants were located Island-wide, receiving responses from residents from Tignish to Souris. A significant number of respondents indicated that they believed organic farming had positive environmental effects, created additional employment

opportunities in rural and urban areas, they also believed that organic products are healthier compared to conventional products. However, although 79% of survey participants were willing to pay some sort of organic premium, price was the main reason mentioned as to why respondents don't purchase organically on a regular basis. Another factor limiting the number of organic products being purchased was the fact that a large portion of respondents had their own garden, leaving them with no need to purchase produce from other farmers.

PURPOSE OF REPORT

The purpose of this report is to provide PEICOPC with a comprehensive analysis of the organic agriculture industry on Prince Edward Island, specifically an analysis of the economic, environmental and social impacts, and how they benefit the organization, its members, and the public. The impact study is being undertaken to clearly document and define the role that the organic agriculture industry has on Prince Edward Island. In completing the report, PEICOPC hopes to demonstrate the value and importance the organic agriculture industry has on the community, customers, investors, government bodies, and industry peers.

Each of the three-aforementioned metrics of the impact study were thoroughly analyzed with the goal to provide a clear understanding of the role the industry has on the Island, and provide PEICOPC with recommendations to take into consideration moving forward.

To gather the information required to complete the impact study, different approaches were taken in addition to online research. First, a 36-question survey was prepared and submitted to 50 local organic farms. The information collected from survey results was used to compare with previously completed surveys of the Island's organic producers to determine progress within the industry. The survey questions touched on a number of important issues, and provided insight into the Island's organic producers perception of the industry.

Second, to gain information regarding the public image of the Island's organic industry, members of the public were contacted and asked to complete a brief survey surrounding their personal views of the organic farming industry, and their opinion of the social impacts. This information was used to quantify the opinions and expressions of the public, while remaining representative of the Island's population.

Third, a phone interview was conducted with the Produce Manager at the Stellarton, Nova Scotia Sobeys to gain an opinion of the organic industry from a retailer's perspective. The information gathered includes the challenges the retailers are facing, the direction they see the industry heading, and how they believe the industry can improve.

By taking the above approaches to gather the required information for the impact study, Fitzpatrick & Company was able to address the opinions, concerns, and interpretations of the Island's organic industry from the producer, consumer, and retailer perspective.

By identifying the risks and challenges that Prince Edward Island Certified Organic Producers Co-operative faces, recommendations were made to help guide PEICOPC moving forward. For PEICOPC to determine future plans and goals, a sound understanding of the uncertainties that are preventing optimal growth must be addressed. These issues are laid out in the Risks and Challenges section below, with guidance provided in the Recommendations section.

One of the major challenges that Fitzpatrick & Company faces in completing the report was to accurately measure the social impact that organic farming has on Islanders. Considering the metric is difficult to quantify, a different approach had to be taken to measure the social impact in a way that was both relevant and useful. By conducting the public survey, we were able to quantify the opinions and expressions of Islanders in respect to the organic market, while being representative of the Island's population.

INDUSTRY OVERVIEW

Canada

Across Canada, the organic agriculture industry has been growing rapidly for over a decade. As of 2015, Canada has the 5th largest organic market in the world, valued at $4.7B (CAD) annually, up from $3.7B in 2013, for 27% growth in just two years (*1*). The organic industry consists of 5,605 producers, handlers and manufacturers who have obtained their organic certification in Canada. Organic acreage in Canada reached 2,430,000 acres in 2015, up over 70,000 acres from 2014. Organic acreage now makes up roughly 1.5% of all agricultural land across Canada (*2*). Nationally, farms producing certified organic products accounted for 2.2% of the total farms in 2016 (*3*). Quebec led all of Canada in the number of organic farming operations with 1,268 in 2016, as well as the percentage of farming operations producing organic products. Figure 3 (*4*) shows that Prince Edward Island ranks third among all Canadian provinces in the percentage of operations reporting organic production. According to a report completed in 2015 by Canadian Organic Growers, 56% of Canadians stated they buy organic products weekly, while 86% of Canadians have bought organic products in the last year.

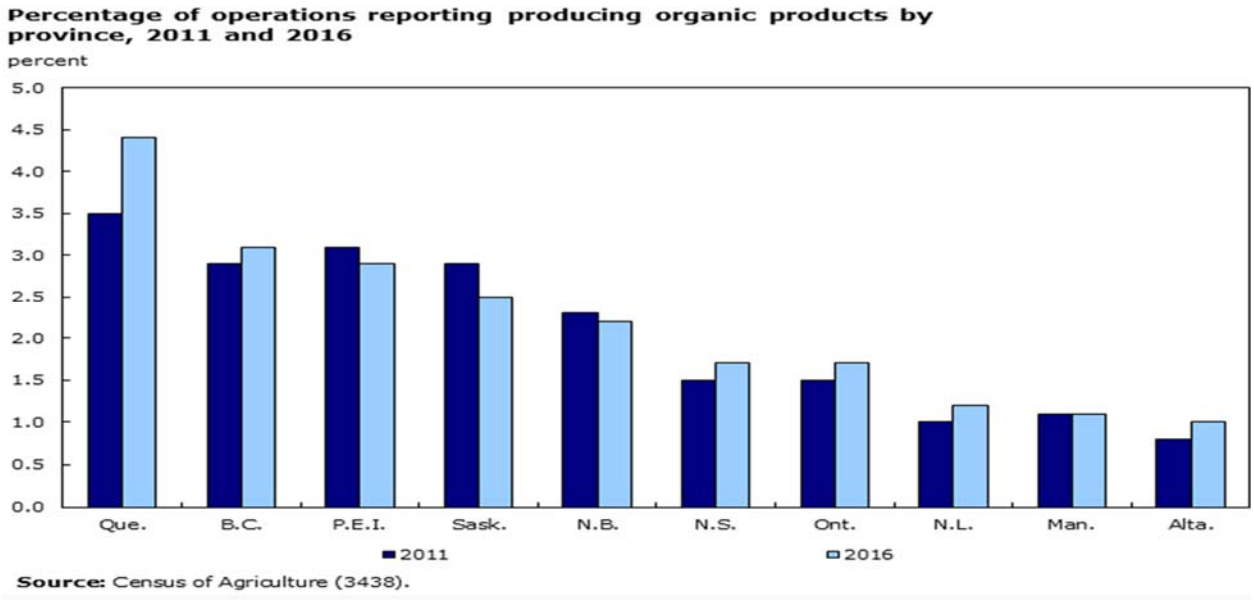
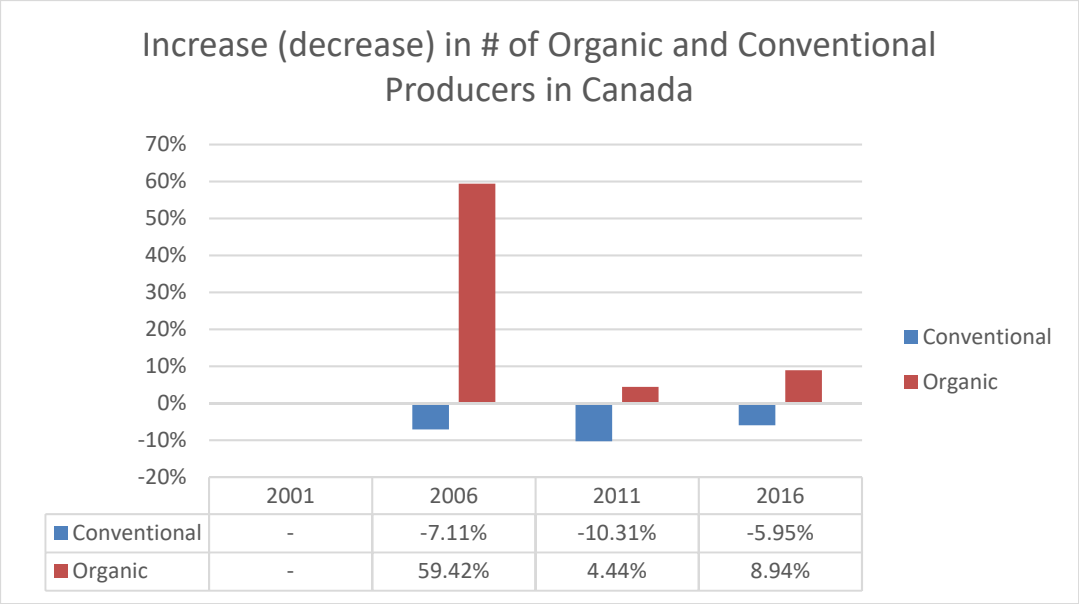


Figure 3 – Percentage of organic production by Province (Statistics Canada, 2017)

To compare the growth of Canadian's organic agriculture industry with the conventional agriculture industry, we analyzed the change in the number of producers for the period of 2006 to 2016, using 2001 as a starting point. In 2001, Canada had 2,230 organic producers only, increasing to 4,045 by 2016. As for conventional operations, there were 246,923 in 2001, decreasing to 193,492 by 2016. Figure 4 on the next page demonstrates the growth of the organic industry while the conventional farming industry has been steadily declining.



	2001	2006	2011	2016
Conventional	-	-7.11%	-10.31%	-5.95%
Organic	-	59.42%	4.44%	8.94%

Figure 4 – Comparison of change in producers for organic and conventional operations

According to Statistics Canada, in 2016, Canada imported a total of $794.5 million worth of organic products from 127 countries, that is up from $760 million in 2015. This represents an increase of 4.5%, with tomatoes having the highest import value. Tomatoes accounted for $194.5 million in imports in 2016, up from $134.9 in 2015. The next most imported organic vegetable in 2016 were organic spinach at $31.6 million, and organic lettuce at $28.6 million. Granny Smith apples at $46.7 million, strawberries at $33 million, and red delicious apples at $32.2 million were the three highest valued organic fruit imports for 2016. All of the above products saw an increase in the import value between 2015 and 2016, except for organic spinach, which saw import values decrease by $5 million. Besides the typical organic products, Canada still relies heavily on importing for value-added products. Canadian value added organic food processors are relying on imports and have difficulty finding reliable and consistent sources of ingredients (*1*). Although Canada has the 10th largest area of organic land, we rely heavily on importing value-added organic products, commodities, and produce. Canada's trade deficit relating to organic products is estimated at $1.5 billion CAD annually in an organic market valued at $4.7 billion. Due to this large deficit, there are significant opportunities for domestic organic producers, processors, handlers and manufacturers to fill this domestic gap and increase exports to the international market (*1*).

For comparative purposes, we can compare the top three imported organic vegetable products with the same three conventional products using information provided by Statistics Canada. The top imported organic product in 2016 was fresh tomatoes, those tomatoes had an import

value of $194.5 million. Import information has not been made available for 2016 conventional tomatoes as of yet. However, we can compare the import of fresh tomatoes using the data from the 2015 year. In 2015, there were $173.1 million in fresh organic tomatoes, compared to $399.4 million in conventional fresh tomatoes. As for the second most imported organic vegetable, spinach, the gap between organic imports and conventional imports are less considerable. Organic spinach imports were valued at $31.6 million in 2016, compared to $40.9 million in conventional spinach imports for the same period. This being said the variance between organic and conventional lettuce imports demonstrates that there is a major gap between the two markets. Organic lettuce imports were valued at $28.6 million in 2016, compared to the massive conventional lettuce imports of $262.3 million. As can be seen, there are still some significant gaps between the amount of conventional and organic products being imported into Canada.

The Canadian export market has experienced rapid growth since 2012. In 2012, Canadian organic exports were $458 million, compared to $1.362 billion in 2016. This growth represents a 197% increase in Canadian organic exports since just 2012. However, there was a decline of 16.84% from $1.637 billion in 2015 to the $1.362 billion in 2016. According to Statistics Canada, soya beans were the top exported organic product in 2016, with $719.8 million, down slightly from $726.7 million in 2015. The major decline in exported organic products between 2015 and 2016 was due to the decrease in wheat being exported. In 2015, Canada exported a total of $713.3 million in wheat, declining to $423.4 million in 2016.

Global

As of 2015, there were 125,776,600 acres of organic farmland, including areas in conversion at the time. The next figure represented a 17,791,600 acre increase over 2014. There were 2,300,000 producers reported, with more than three quarters coming from developing countries. India led the pace with approximately 585,000 producers. The countries with the largest share of organic agricultural land of its total farmland are the Falkland Islands (36.3%), followed by Liechtenstein (31%) and Austria (19.5%). The number of countries participating in organic agriculture has also risen significantly. From the period 1999-2015, the number of countries with data on organic agriculture increased from 77 to 179, for an increase of 133%. During the same period, acreage increased from 11 million hectares (27,181,500 acres) in 1999 to 50.9 million hectares (125,776,600 acres) in 2015, as depicted in the graph below (*3*).

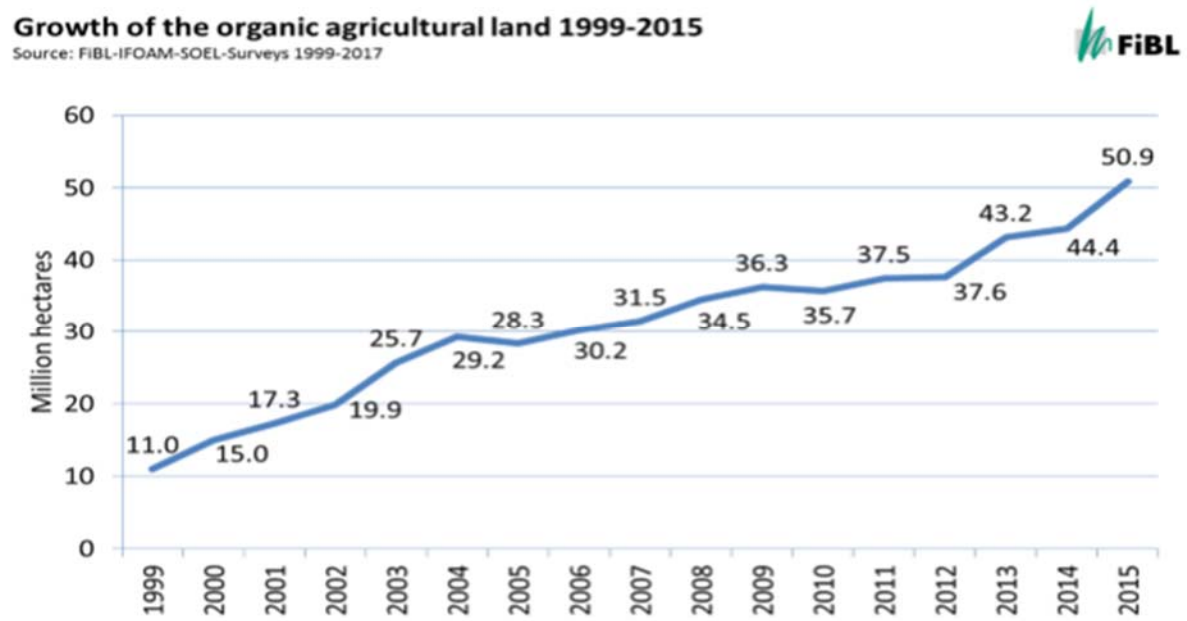


Figure 5 – Growth in global organic acreage between 1999 and 2015 (FIBL, 2017)

For the remainder of this section, all values have been converted to Canadian dollars based on the annual average exchange rate in the given year, unless otherwise stated as US dollars (USD).

The global market reached an all-time high in 2015, with market value reaching over $105 billion. The United States remained the leading market with $67.3 billion, followed by Germany at $16.1 billion, and France at $10.2 billion (*3*). Most of the world's major markets saw double digit growth rates in 2015, with the trend expected to continue. The global market has experienced rapid growth, from just $26.6 billion in 2000 to $105 billion in 2015. This represents a 356% growth rate in just 15 years. The United States alone reached total sales of $55.4 billion in 2015, up 11% over the previous year's record levels, and outperforming the overall food market's growth rate of 3%. Growth in organic sales in the United States for the period of 2006-2015 can be seen in figure 6 below (*6*).

Figure 6 – Organic Sales growth in the United States (USD) (Organic Trade Association, 2016)

According to a report completed by Accuray Research LLP, the global organic food and beverage market is poised to grow at a compound annual growth rate of approximately 16.6% over the next decade, and will reach a market value of roughly $456 billion (USD) by 2025 (*7*). The study focused on market trends, leading producers, supply chain trends, technological innovations, key developments, and future strategies to analyze the expected level of growth.

In the United States, the USDA values organic export products at $725.3 million in 2016, compared to $7.98 billion in non-organic exports for the same 31 products. The share of organic exports relative to total exports has increased from 7.1% in 2011 to 8.3% in 2016. The top five organic export products in 2016 were apples, lettuce, grapes, strawberries, and spinach, representing 55% of the value of organic exports (*8*). Of the $725.3 million in organic exports by the United States in 2016, approximately 49% were destined for Canada, with average annual exports into Canada totaling $327.7 million. On the other hand, of the $2.3 billion in organic products imported into the United States in 2016, Canada accounted for approximately 5% of the total imports, with average annual imports of $77.8 million. The country with the largest value of organic products imported into the United States is Mexico, totaling average annual imports of $156.8 million. Soybeans were the largest imports into the United States in 2016, reaching total imports of $331.7 million, up from $41.3 million in 2011. The soybean import market is projected to grow at a rate of 40.63% per year, leaving a large export market for Canadian soybeans.

Prince Edward Island

The Prince Edward Island Certified Organic Producers Co-operative is still a relatively new organization, being formally organized in 2002, even though organic agriculture has been practiced on the Island for decades. However, it is only over the past decade that the industry has seen considerable growth. The sector has steadily grown in the number of certified producers, land base, and diversity of organic products being offered. From 2003 to 2010, the number of certified producers increased from 23 to 50, and the amount of certified organic acres increased from 1,615 to 5,733, not including the 397 acres in transition at the time. This represents an increase of 118% in the number of certified producers, and 255% in the number of certified acres over a seven-year period. As of 2017, there are still 50 certified organic producers with total organic acreage of 10,000. The increase in the average acreage per farm from 114.6 acres per farm in 2010 to 200 acres per farm in 2017 can be attributed to the commercialization of the agriculture industry on the Island. The 2012 Agriculture and Agri-Food Canada census determined there were approximately 50 certified producers, with a market value of $6 million (*9*). Certified organic farms account for approximately 3% of the Island's farms, with acreage representing roughly 1.6% of total farmed acres in the province.

Prince Edward Island is home to a diverse organic industry, with production including but not limited to fruits, oats, potatoes, soybeans, grains, hay, herbs, and livestock. One of the faster growing organic sectors on the Island, over the past decade, has been grains and oilseeds. The increase in production can be attributed to strong prices for organic soybeans, canola and milling wheat, and the ability to successfully grow the crops organically on PEI (*10*). As of 2010, the Island's grains and oilseed crops represent up to 5% of its respective crops grown on PEI. Organic soybeans represented 1,600 acres in 2010, up from just 82 in 2003 (*11*). Organic soybeans had the highest average acreage among the local producers that responded to the survey, coming in at an average of 242 acres per farm. Oats and grains had the second highest average acreage per farm at 158 acres. Refer to graph 7 below for the average acreage for each product.

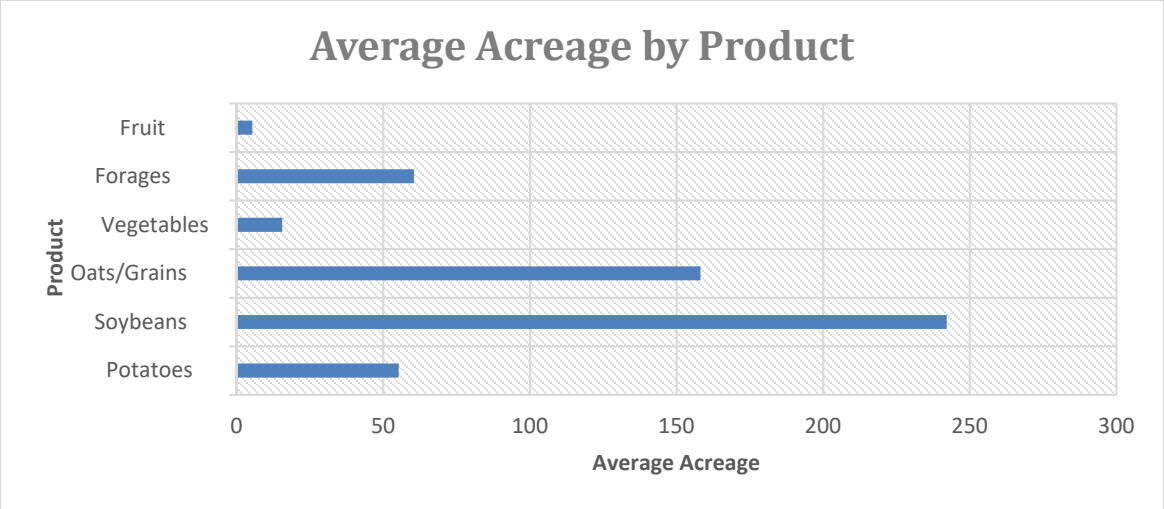


Figure 7 – Average acreage by product for local producers

During the producer survey, we asked local organic producers about the commodities that they produce. Oats and grains were the most popular product to grow, being planted on 12 of the 24 farms (50%) surveyed, followed by vegetables excluding potatoes (42% of farms) and potatoes (30% of farms). As can be seen in the chart below, local farmers produced several different agricultural commodities.

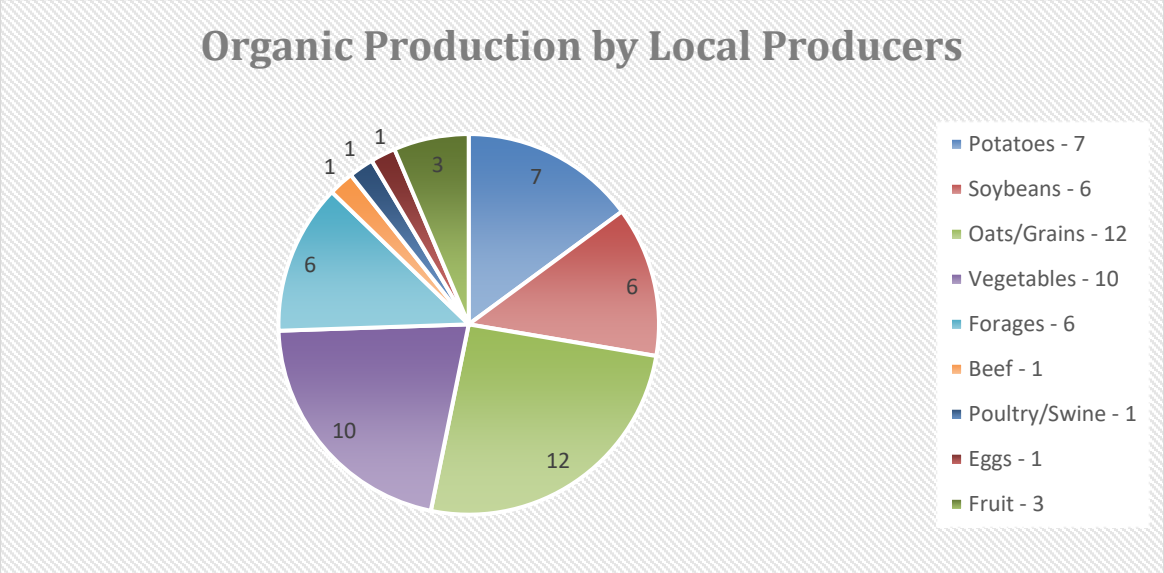


Figure 8 – Organic production based on survey results

The export information for the Island's organic industry is lacking. However, we asked local producers during the survey whether they were exporting their products, and if so, which products they were exporting. Out of the 24 respondents, 11 were currently exporting organic products. Soybeans, oats and grains, potatoes and other vegetables are the products that are being exported by the survey respondents. Soybeans lead the exported products, being exported by six producers, followed by oats and grains, which were exported by four producers (see Appendix 1, question 34a for results).

An analysis of the State of Organics across Canada was recently published by the Canada Organic Trade Association, which highlighted four specific areas of interest: Regulation and enforcement, productions supports, market supports, and data collection. Prince Edward Island's organic industry received mixed reviews in the four areas. The Island was given three out of five stars in both production and market supports, but received just one star for regulation and enforcement, and data collection. Each of the Atlantic Provinces received poor results for data collection, however, only Prince Edward Island and Newfoundland received one star for regulation and enforcement. Regulations provide the structure for the organic industry by enforcing a set of rules that promote efficiency and fairness. PEI has yet to adopt provincial organic regulations, leaving the Island's organic industry vulnerable to fraudulent product claims. For products being sold inter-provincially, the organic standards are regulated by the Canadian Food Inspection Agency, protecting the organic brand nationally. However, there is little enforcement on products sold on Prince Edward Island. The enforcement mechanism on PEI has limited ability to prevent producers from claiming that their products are organic, whether they are certified or not. Although PEI was given low marks for organic regulation, the province received praise for having strong government programming for organic production. The Island's Future Farmer program offers support for transition, extension services, and research for new farmers, while the Organic Industry Development Program offers financial support for organic-specific activities, including purchasing technology or equipment, coaching and technical advisory services, funding for organic transition, building relationships along the value-chain, and implementing strategic initiatives to advance the sector (*12*).

MARKET TRENDS

The Island's organic farming industry has seen significant advancements over the past decade, with consistent growth year by year. The number of certified farms and certified acres has continued to see an increase, while product diversity continues to expand. The most drastic increase the Island has seen is the growth of the organic acreage. Figure 9 shows the growth of

the Island's organic acreage for the period of 2003-2017. The number of certified organic acres on the Island has increased by 519%, an impressive growth for the given period. As the industry continues to develop and grow, PEI Certified Organic Producers Co-operative is projecting 100 certified organic farms and 25,000 acres by 2026, assuming the industry maintains the same growth pattern. If the Island achieves this goal, it will represent a market value of approximately $25 million.

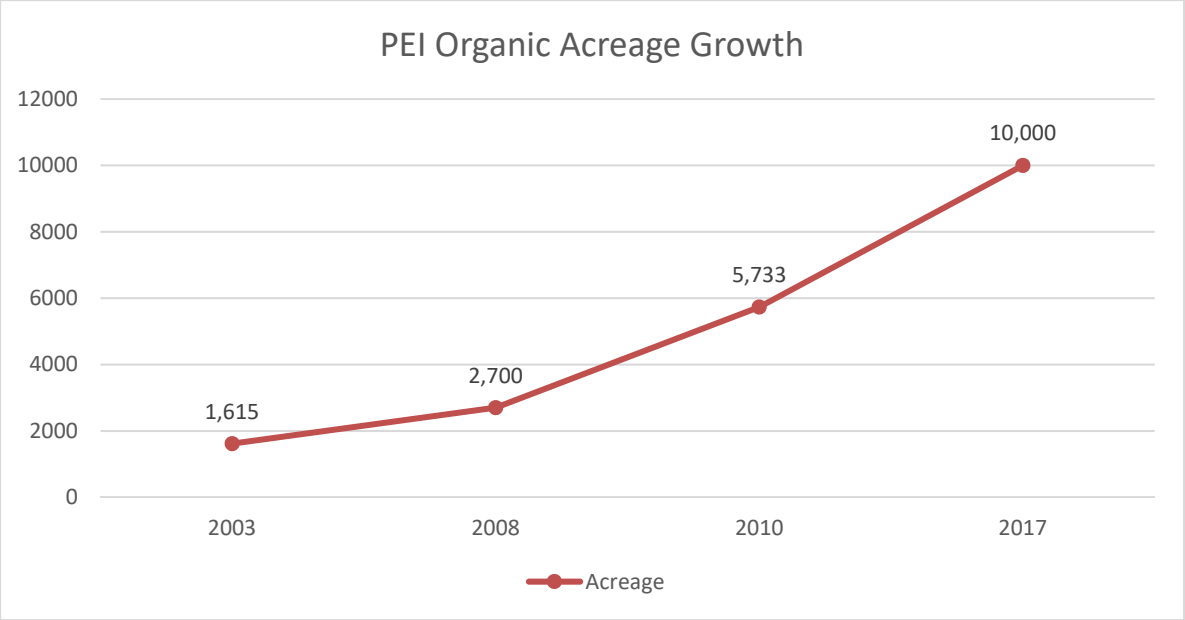


Figure 9 – Increase in Certified Organic Acreage

With the growing concern over safe environmental practices, more nutritious food options, ecological sustainability, and the fear of genetically modified foods, the trend towards purchasing organic is evident. Other factors driving the growth of the industry include consumer education levels, availability of organic products, economies of scale, and competition (which creates increased accessibility). With increased effort by government, established organizations, and producers, the organic industry in Prince Edward Island, and globally has great potential for continued growth.

During our producer surveys, we asked local organic producers what they believed was the most likely scenario for where the organic industry was going within the next decade. 50% of producers responded with an increase in demand, with the second most answered being an increase in organic acreage (29%). Only 4% of respondents believed there would be a decrease in organic farmers, while 8% believed the industry would remain the same. In addition, 63% of

respondents said they were likely to increase production within the next decade, while 29% stated they intended to remain at their current level of production. Only 8% indicated they were considering decreasing from their current production levels. Both data sets can be seen below. This indicates that, in general, local producers are confident that the organic industry continuing to grow on the Island.

What is the most likely scenario in your opinion on where the organic industry is going in the next 10 years? (Please only choose one)

	Responses	% of Responses
Increased demand	**12**	50%
Increase in new participants	**2**	8%
Increase in organic acreage	**7**	29%
Remain the same	**2**	8%
Decreased demand	**0**	0%
Decrease in organic farmers	**1**	4%
Decrease in organic acreage	**0**	0%

Figure 10 – Local producer's expectations for the Island's organic industry

Of the options listed below, please indicate the most likely scenario for your farm in the next 10 years?

	Responses	% of Responses
Increase production	**15**	63%
Remain the same	**7**	29%
Decrease production	**2**	8%

Figure 11 – Anticipated change in local production

To gather information regarding the potential market growth, we conducted a phone interview with the Produce Manager at the Stellarton, Nova Scotia Sobeys to determine the opinion of the organic industry from a retail perspective. We chose the Sobeys in Stellarton, Nova Scotia as a contact since it is the main receiving area for Atlantic Canada. The majority of organic products flow through the Stellarton Sobeys before being shipped elsewhere in the Maritimes. The results of the conducted interview determined that the Stellarton Sobeys was struggling to keep up with the demand due to the inconsistent timing of receiving their organic products. In other words, the production and shipment of organic products is not servicing the demand they are receiving for their organic products. This is a good indication that the market is moving in a strong direction. The price premiums associated with organic products, which were once considered to have a major impact on the growth of the organic industry, have begun to have

little effect on the quantity of products being sold, as noted by the Stellarton Sobeys Produce Manager. The Stellarton Sobeys has seen a significant increase in the demand for organic strawberries, in which they have begun expanding inventory for. However, without an adequate supply of organic products made available, the demand may stall.

During the public survey, respondents were asked what premium they were willing to pay for organic products. Results showed that a majority (79%) were willing to pay a premium, with 48% saying they were willing to pay up to 10%, and 25% of respondents saying they would pay up to 25%. Consumers willing to pay a price premium is vital to the growth of the organic industry, as producers require this premium to make up for potentially lower yields.

In recent years, the market for value-added organic products has been rising dramatically, and demand for raw and value-added organics far exceeds the domestic supply of such organic products. Value-added refers to changing a raw material in some way to enhance the economic value and/or customer appeal of the product. Consumers are shifting their focus of natural, environmentally friendly products from only food to other by-products, creating additional opportunities for producers. Value-adding can be an effective way to use all of a farms' products and eliminate unnecessary waste, while increasing revenues and value of the farming operation. Value-added products and services can range from freezing and drying services to the production of jams, cheese, and flour. Farms can also add value to their products by using unique direct marketing methods. Some common direct marketing methods include farm gate sales, stands, kiosks, farmer's markets, community supported agriculture (CSA) programs, and U-pick services. The use of direct marketing and value added methods allows smaller farms to tap into niche markets, and increase product exposure.

A survey completed by MRSB Consulting Services Inc for the PEICOPC in 2010 was directed at obtaining information about value-added producers located on the Island. The survey received 24 responses in total, with 21 out of the 24 (88%) producers participating in some form of value-added production. Out of the survey participants, 83% were interested in expanding their value-added production within the next three years (*13*). However, the 2016 census of agriculture had different results compared to the 2010 MRSB survey results. The census showed that there were only five organic producers selling value-added products directly to consumers. Prince Edward Island producers have an opportunity to tap into the organic value-added market.

Figure 12 (*14*) shows the increase in retail sales for a number of different organic value-added products in the United States from 2007 to 2017. Although this information is taken from the US market, it indicates that the market for value added products has been continuously

growing along with the organic sector. There may be an opportunity for Island producers to team up with local processors to create value added products, which would increase the value of their farm and create additional exposure of their operations.

Retail sales of organic packaged food in the United States from 2007 to 2017, by product category (in million U.S. dollars)					
	2007	2012	2013*	2017*	
Organic packaged food (total)	9,558.5	11,302.9	11,954.1	14,985.3	157%
Organic dairy	2,581.9	2,547.1	2,704.1	3,450.3	134%
Organic bakery products	1,704.6	2,039.2	2,139	2,639.2	155%
Organic ready meals	1,517.3	1,782.8	1,857.7	2,215.3	146%
Organic sweet and savory	619.3	794.3	841.6	1,066.2	172%
Organic baby food	369.4	553.9	595	783.9	212%
Organic sauces, dressings and condiments	400.8	544.4	589	804.8	201%
Organic soup	373.4	462.9	479.5	561.7	150%
Organic canned/preserved food excluding ready meals, soup and pasta	347.2	425.5	452.2	549.5	158%
Organic oils and fats	214.1	316.1	330.5	415.3	194%
Organic confectionery	139.2	199.1	216.3	324.8	233%
Organic pasta	149	191.1	206.8	262.1	176%
Organic spreads	104.7	165.3	175.7	215.9	206%
Organic snack bars	134.7	156.1	165	203.1	151%
Organic chilled processed meats, fish/seafood and lunch kits	102.4	141.9	158.9	213.6	209%
Organic rice	38.6	51.4	54.4	63	163%
Organic noodles	33.3	48.9	54.2	71	213%
Organic ice cream	29.6	45.8	49	62.2	210%
Organic dessert mixes	12.5	22.1	24.6	34.4	275%

Figure 12 – retail sales of organic value added products in the United States (Statista, 2017)

In Prince Edward Island, funding is available for local producers, processors, and other agri-businesses for the development of new products and to expand their market base. The Product and Market Development Program, which is part of the Growing Forward 2 program, focuses on increasing competitiveness for Island farmers looking to expand their operations into newly emerging agricultural sectors. Activities such as process development, brand development, recipe development, and purchasing of equipment to process, package and label new products are considered eligible for funding assistance, which is 50% of eligible expenses up to $30,000 per farmer.

There is a potential opportunity for Island farmers to expand their operations to include organic seed production. The organic seed supply in Canada is growing, with more than 50% of grain growers reported using organic seed in 2011, and 64% having increased their use of organic seed in the previous three years (*15*). Of the producers listed on PEICOPC's producer directory, only six are actively involved in the production of organic seeds. According to the Canadian Organic Trade Association (*16*), Canada's organic and ecological seed market in 2012 was value at $78 million, with $28.4 million coming from organic vegetable seed, saved organic field crop seed, and purchased organic field crop seed. Of the $28.4 million worth of organic seed sold during 2012, only about $1.3 million to $1.6 million were sold by Canadian suppliers (*17*). This

leaves a major opportunity for Canadian organic producers to gain a portion of the increasing seed market.

Social Impact

For agriculture to be sustainable, it must be both ecologically and socially viable. The social impact of organic farming is meant to measure the effect that the organic industry has on the consumers, residents, organic producers and processors in a given area. This section will address the potential impact that the industry has on human health, local organic farmers, rural development, and on consumer confidence. Although social impact is commonly measured as a qualitative impact, we will convert information to a quantitative basis where applicable.

Human Health

A proper diet can have an enormous impact on the quality of life, and overall health of consumers. Having a diet rich in whole grains, vegetables, fruit, dairy, and nuts can not only prevent disease, but also promote weight loss. Finding an appropriate balance of vital nutrients, such as protein, fats, carbohydrates, vitamins, and minerals will increase the likelihood of a healthy lifestyle, and can help prevent complications associated with poor dietary nutrition. Common diseases associated with poor nutrition include obesity, diabetes, osteoporosis and a decrease in bone density, cardiovascular disease, dental disease, and cancer. The steps towards healthier choices at the individual level lies in the major social and environmental changes that will help to promote and support these healthier alternatives. Healthier choices should include consuming less high-calorie foods, be physically active, prefer unsaturated fat, use less salt, and consume fruits, vegetables and legumes, and select foods of plant and marine origin. This consumption pattern is not only healthier but more favorable to the environment and sustainable development (*18*). Organic agriculture encompasses some of the necessary changes at the social and environmental level to help promote health of the world's population.

There are a number of socioeconomic factors that can lead to the deterioration of an individual's health. A recent report issued by the PEI Chief Public Health Officer stated that Islanders have higher rates of obesity, diabetes, hypertension, heart disease, prostate cancer and chronic conditions than other Canadian provinces (*19*). In addition, Islanders' average consumption of fruit and vegetables, and physical activity are lower than the Canadian average, and higher for daily smoking, which all lead to the development of chronic diseases. The report states that Islanders with the lowest household income have lower than PEI average rates of fruit and vegetable consumption, physical activity, dental visits, and higher rates of daily

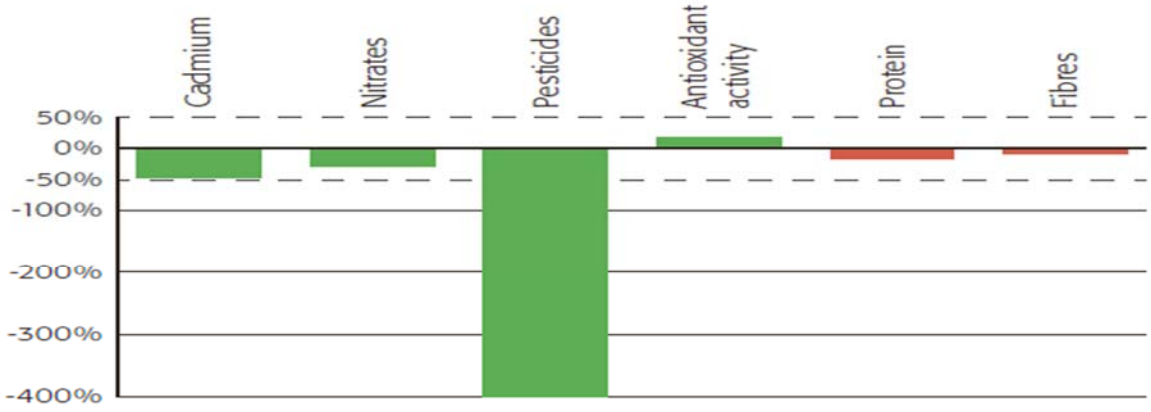
smoking, while the highest income groups show the opposite. For Islanders, there are four risk factors associated with chronic illness; poor diet, lack of physical activity, tobacco use, and excessive alcohol consumption. These four factors can lead to the development of cardiovascular disease, diabetes, cancer and chronic pulmonary disease, which account for 80% of deaths caused by chronic disease (*19*). One way for Islanders to limit the impact of chronic disease is to incorporate healthy foods into their diets. This would include whole foods, fruits and vegetables, healthy fats, high protein, low sugar food options, which are all associated with organic products.

By making organic products widely available at reasonable prices across the Island, a number of low income residents would benefit greatly. Local, organic products can be purchased through a variety of different channels Island wide, including farmer's markets, farmgate purchases, retail outlets, and community supported agriculture (CSA) programs. Results of the public survey indicated that over 77% Islanders prefer to purchase organic products via farmer's markets and retail outlets. On the producer's part, the most used method of selling organic products is through the wholesale market, followed by farmgate sales, farmer's markets, and retail outlets. Refer to figure 13 below for the breakdown of where producers are selling their organic products.

Figure 13 – Sales methods for local organic producers

The main questions surrounding organic products is whether they are a healthier alternative to conventionally grown products. In respect to nutrition, the results are not conclusive. A meta-

analysis completed by the Research Institute of Organic Agriculture (*20*), compared the quality of ingredients such as minerals, proteins, vitamins, phytochemicals, healthy fatty acids, nitrates, pesticide residues, and heavy metals for vegetables, fruits, cereals, milk products and meat. Results leaned heavily in favour of organic products for phytochemicals, healthy fatty acids, nitrates, pesticide residues, and heavy metals. While minerals and vitamins were viewed as mostly equal, and proteins being higher for organic dairy products, but were lower for organic wheats. Another meta-analysis completed by Baranski et al (*20*) compared over 300 studies, with results showing an increase of up to 69% in certain antioxidants like polyphenols, four times less pesticide residue and lower levels of the toxic heavy metal cadmium. The analysis also confirmed that wheat was lower in protein due to the decreased nitrogen supply, and that organic grains contained less dietary fiber. The study results can be seen in figure 14 below (*21*). However, there are issues with the context of each study. Considering each assessment is based on individual criteria, there are a number of other factors that could have an effect on results. Results tend to be generalized, leaving holes in the scientific conclusions.



The picture shows six selected differences between organic and conventional cereals, fruits and vegetables from the Baranski study. The green bars represent positive results from the viewpoint of organic farming, the red bars the negative results. The antioxidant activity summarises the effect of all antioxidants together.

Figure 14 – Comparison of selected contents between organic and conventional foods (British Journal of Nutrition, 2014)

Most consumers buy organically to avoid contamination from chemical residues, also because organic food is often associated with higher nutritional value. It has long been discussed the detrimental effects that exposure to pesticides have on human and animal welfare. Many of the herbicides, insecticides and fungicides used commonly on conventional farms are toxic, and have become nearly inescapable in our water, food, and air we breathe. According to the Rodale Institute, there are more than 17,000 pesticide products for agricultural and non-

agricultural use on the market, which have been linked to brain/central nervous system disruption, breast, colon, lung, ovarian, pancreatic, kidney, testicular, stomach, and other cancers (*22*). Certain environmental chemicals, including pesticides are known to elicit their hazardous effects by mimicking or antagonizing natural hormones in the body, and long-term, low-dose exposure has been linked to the detrimental human health effects mentioned above (*22*). According to Agriculture and Agri-Food Canada (*23*), Prince Edward Island is one of the few provinces in Canada that is considered to be very high risk in regard to water contamination and other environmental effects from the excessive use of chemical pesticides, herbicides, and fertilizers. With Prince Edward Island suffering from the excessive use of agrochemicals, it is vitally important to address the issue to reduce the risk of adverse effects for the Island's population. By adopting the natural input approach of organic farming, the Island's population and environment will likely benefit greatly from the improved practices.

The health effects of organic consumption have provided largely mixed results, mainly due to the context in which the studies were performed. The only absolute benefit of organic foods is the reduced contamination from pesticides, while other studies have suggested that organic foods have higher amounts of secondary metabolites, vitamins, and mineral micronutrients and macronutrients (*30*). Given that a majority of the studies surrounding nutritional benefits lack a holistic approach, many generalized conclusions have been made. These generalizations make it difficult to confidently determine whether organic products are indeed nutritionally superior to their conventional counterparts.

Effects on Local Farmers

For a beginning or current farmer looking to transition from conventional to organic farming to take on the additional labour and meticulous practices of organic farming, the personal benefits need to be apparent. This requires determining the economic, health and lifestyle benefits that are associated with organic farming. Studies have determined that organic farming is more profitable than conventional farming due to the price premiums obtained by organic farmers. Total managements costs are similar between the two, with organic farming having higher labour costs, but lower input costs, such as chemicals and fertilizers. Figure 15 (*22*) shows a direct comparison of the income, expenses and returns between organic and conventional farming systems. The study completed by Rodale Institute determined that the organic systems were nearly three times more profitable than their counterpart. In addition, organic farms tend

to be a diverse mix of farming systems, which can reduce the risk of economic dependence of a single crop.

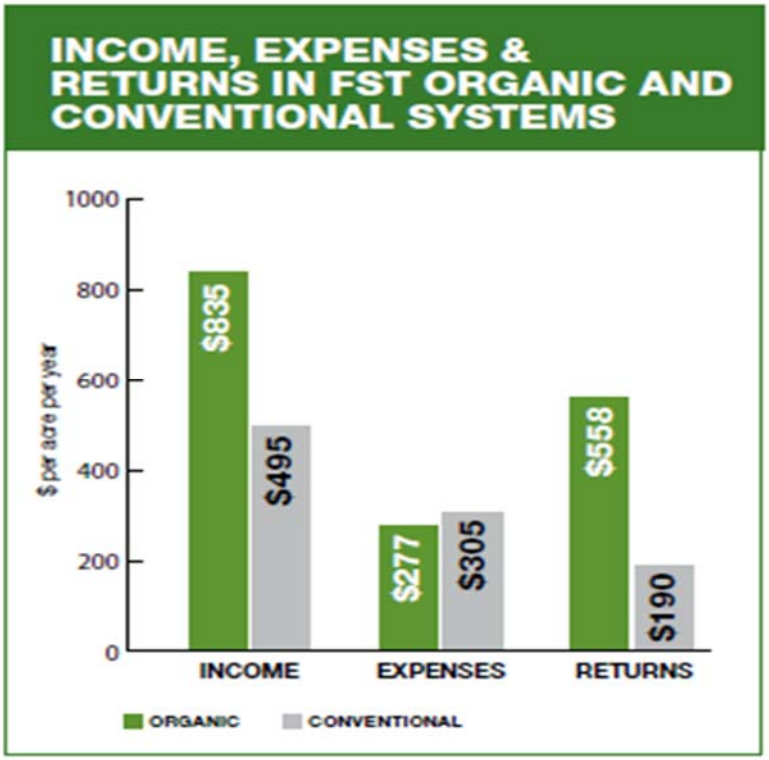


Figure 15 – Profit comparison between organic and conventional systems (Rodale Institute, 2011)

The profitability of organic agriculture for small farmers is dependent on yields, the cost of organic production, and the size of price premiums received, all of which can vary from year to year. Organic producers often receive higher and more stable prices, with inputs being cheaper and production costs being lower even though local organic farmers face high entry costs including additional labor expenses, increased education and training, as well as certification costs.

Based on the results of our local organic producer surveys, the number of hours worked throughout the week ranged from 1 to 50+ hours, as can be seen in the table provided in figure 16, 50% of survey respondents are working 50+ hours, while 14 producers (58%) have an additional source of income other than organic farming. Of the 14 producers that earn income outside of organic farming, 57% of outside income was a result of non-farming employment, 29% from conventional farming, and 14% derived from farm custom work.

How many hours a week do you as a producer spend on organic farming?

Hours Worked	% of responses
1-10	13%
11-20	13%
21-30	0%
31-40	4%
41-50	21%
50+	50%

Figure 16 – Hours spend on organic farming by local producers

Farmers considering transitioning from conventional farming to organic farming face some major capital requirements before making the shift. Canadian organic standards require the potential organic land to be managed according to organic standards for a minimum of 36 months prior to the harvest of the first organic crop. This transition period can be costly for producers, as crop yields tend to decrease during the transition and farmers are not yet receiving the organic premium to make up the difference. The transition effect can be attributed to the time necessary for changes in the chemical, physical and biological properties of soil. These changes enhance nutrient cycling, enrich soil life and restore the soils organic matter and water holding capacity (*25*). This transition period can have a major effect on the transitioning farmer, as the farmer faces high managerial requirements such as the adoption of additional paperwork and bookkeeping, while facing the risks of shifting into a new industry, all while having limited access to information and knowledge.

As part of the Organic Industry Development Program in place on Prince Edward Island, transitioning farmers are eligible to receive up to $10,000 per farm during the first year of transition from conventional to organic farming. It is vitally important for the transitioning farmer to consider different approaches to building soil health, pest management, crop selection, planting material, labour requirements, and harvest and storage requirements prior to beginning the transition. Knowledge of how each approach will affect the farm for the upcoming years is crucial to a successful transition. Although the transition period is extensive and requires a significant amount of time and capital, the benefits of transitioning are apparent. Out of the producers who responded to our survey, 15 had previously transitioned from conventional to organic farming. Of the 15 who transitioned, 10 (67%) indicated that their

revenues per acre had increased, while 4 (27%) saw revenues per acre remain the same. Only 1 out of the 15 producers saw a decrease in revenue per acre.

However, the effects on local farmers goes beyond the economic benefits. As mentioned in the Human Health section above, there are major health effects relating to conventional farming that do not exist in organic farming systems. The lack of toxic chemicals and fertilizers significantly reduces the negative health effects relating to exposure, which could be one of the most important advantages of farming organically. It is estimated that as many as 25 million agricultural workers worldwide experience unintentional pesticide poisonings each year (*24*). By eliminating the use of artificial chemicals and fertilizers, organic management can effectively reduce the health risks associated with pesticide exposure for workers and the surrounding communities.

Access to educational and training services can have a major impact on the success and longevity of organic farmers. By obtaining knowledge, skills and techniques to improve organic farming methods, local farmers can increase yields, farm safety, productivity, improve farm practices, and increase net earnings. Out of the 24 producers that completed the survey, 15 (62.5%) were co-operating with other certified organic farmers, and knowledge was the most common resource being shared (40% of responses). Without proper knowledge relating to crop cycling, mulching and composting, soil nutrition, best labor practices, and the use of efficient inputs the prosperity of organic farmers may become compromised.

Island organic farmers are limited in the opportunities to develop business risk management tools, as those offered by the Growing Forward 2 Program are more applicable towards conventional farmers. The Growing Forward 2 Program offers AgriInsurance, AgriStability, AgriInvest, and AgriRecovery programs that help to mitigate the risk of financial loss. The issues that organic farmers face is that these programs being offered are designed to help with large fluctuations in income. The Island's organic farms, which tend to have a diversified production model, are not generally reliant on a single crop. Therefore, income fluctuations are less extreme, excluding them from being eligible for government support. In addition, AgriInsurance needs to be expanded to include a greater variety of horticulture and livestock products. Since the insurance offered for organic producers is limited, many farmers go without crop insurance and assume 100 percent of the financial risk of organic and transitional production (*1*). In order to address the current situation, PEICOPC should work closely with Agriculture and Agri-Food Canada to expand the next Growing Forward Program to be more inclusive of the needs of organic producers and processors.

Rural Development

The development of rural areas in Prince Edward Island is a vitally important task, as the Island is often considered to be Canada's most rural province. Rural PEI is dominated by the Island's agricultural landscape that is appealing to tourists, Islanders and plays a vital role in attracting newcomers to PEI. It is understood that 'rural' PEI refers to everything outside the municipal boundaries of Charlottetown, Summerside, Stratford, and Cornwall. Rural areas of the Island are highly dependent on seasonal employment opportunities, including farming, fishing and tourism. Farming in rural PEI is one of the most dominant sectors, employing approximately 5% of the labor force compared to only 1.7% for the rest of Canada (*27*). According to the 2016 PEI census, of the 142,907 Islanders, 65,977 lived in the four main municipalities, meaning 53.8% of Islanders are living within what is classified as rural PEI (*28*).

Rural development aims to improve the quality of life in rural communities by improving their socio-economic status by creating jobs, strengthening the local economy, focusing on alternative food sources, and improving the surrounding environment. Organic agriculture can play a major role in the development of rural areas. One of the considerable aspects of organic farming is the utilization of manual labour rather than artificially produced fertilizers and chemicals. The use of human labour allows organic farms to provide approximately 30% more jobs per hectare of farmland compared to conventional farm operations (*22*). The increase in labour demands can help to improve the viability of rural areas and reduce the migration to more urban regions. By offering additional jobs in areas lacking employment opportunities, organic farming can promote economic stability through the redistribution of resources.

The demographics of local producers that completed the survey showed promising results towards rural development. 51% of organic farm operators were between the ages of 21 and 45, which indicates a shift towards a more equivalent balance in the age of operators. To help develop rural communities, the industry needs to continue attracting young farmers.

Land values in Prince Edward Island have been steadily increasing, seeing a 13.4% increase in 2016, following gains of 8.5% and 9.3% in 2015 and 2014, respectively (*29*). The 13.4% increase in 2016 was the largest increase in the country and was the second-highest annual increase on record for PEI. The increased land values can be attributed to competition among farming enterprises to acquire additional acres to supplement crop rotation cycles and for additional feed production (*29*). Because of this increased competition among buyers, increases were seen in marginal or outlying areas, as well as parcels with inferior soil type. Although the prices for farmland on the Island have been on the incline, the influx of farmers from other provinces indicate that the land prices were still relatively low compared to the rest of Canada. In 2016,

PEI farmland average $2,910 per acre, while all of Canada average $2,871. Ontario led all of Canada with value per acre of $10,588, followed by British Columbia at $5,806 per acre. Results of each province, collected by Statistics Canada, can be seen in figure 17 below (*30*).

Farm land and buildings = Value per acre

Geography	2012	2013	2014	2015	2016
Canada	1,924	2,227	2,460	2,683	2,871
Newfoundland and Labrador	2,811	2,811	2,862	2,970	3,139
Prince Edward Island	2,287	2,431	2,545	2,703	2,910
Nova Scotia	1,792	1,904	1,958	2,039	2,131
New Brunswick	1,690	1,737	1,833	1,876	1,895
Quebec	3,398	4,231	4,718	5,169	5,501
Ontario	7,155	8,417	9,243	10,063	10,588
Manitoba	1,137	1,388	1,583	1,749	1,894
Saskatchewan	724	881	1,043	1,159	1,243
Alberta	1,725	1,934	2,092	2,282	2,485
British Columbia	4,984	5,060	5,217	5,450	5,806

Figure 17 – Value per acre of farm land and buildings, at July 1, 2016 (Statistics Canada, 2017)

Prince Edward Island is known for their lucrative agriculture industry, which has a major impact on the Island's economy. Due to the image of being an agricultural hotspot, the Island is viewed as an attractive place for new entrants. The low-up front capital requirements, and reasonable land values help promote the Island as being a viable option for farmers. Of the 24 producers that responded to the survey, 11 (46%) were born outside of PEI. If the Island can continue to attract new entrants from outside of PEI, the organic industry, rural areas, and local producers/processors will benefit greatly. The increase in new entrants' present opportunities to increase processing and storage capacity in rural areas, as well as provide local consumers with greater food options.

An increase in the number of certified organic processors could also play a major role in rural development. Currently, the Island is lacking processing capacity and is in need for additional facilities. Local producers also expressed their concern about the processing capacity available. When asked what additional services or assistance was needed, 43% of survey respondents stated that additional processing was required. In addition, the lack of processing capacity was ranked as the third greatest challenge faced by local organic producers. Without proper

processing capacity, production could become limited, causing negative effects on the Island's organic industry.

One factor to note regarding the contribution to rural development from organic farming on PEI is that virtually all new farms will be located outside of the four main municipalities given the amount of viable land needed to start a new farming operation. With expectations of reaching 100 organic farms by 2026, rural areas of Prince Edward Island are destined to benefit from the expansion of the industry.

Consumer Confidence

Consumers are purchasing organic products predominantly because of health concerns to avoid contamination from chemical residues, and due to the image that organic products are associated with higher nutritional value and environmentally safe practices. Organic products are positioned to gather the public's trust, mainly due to the rigorous standards that organic producers must meet to be certified organic, as well as the increased consumer demand for sustainable agricultural commodities and practices.

Local organic producers view consumer confidence as the greatest social impact related to farming organically, as determined by the producer surveys. Out of six separate social impact metrics, consumer confidence was ranked well above the alternative options, as can be seen in the table below.

What would you consider to be the greatest social impact of organic farming?
Please rank the following (1 being most important through to 6 being least important):

Social Impact	Rank	Avg. Rank
Customer confidence	1	**2.09**
Rural development	2	**3.14**
Lifestyle	3	**3.27**
Increased job opportunities	4	**3.68**
Youth retention	5	**4.00**
Increase in tourism	6	**4.73**

Figure 18 – Social impact of organic farming

By completing the public phone surveys, we could determine the public's image, whether positive or negative, surrounding the organic agriculture industry. A total of 113 responses from residents Island wide were completed. When asked whether they believed organic products were healthier compared to conventional products, 70% of respondents believed organics were the healthier option, 17% believed organic products were not healthier than conventional products, while the remaining 13% remained neutral. In addition, 68% of survey respondents stated they had more confidence buying organic products over conventional products.

The public had positive views of the environmental and economic effects that the organic agricultural industry has on the Island as well. 82% of survey respondents believed organic farming has a positive impact on the environment, while the remaining 19% took a neutral position on the matter. The fact that 0 of the 113 respondents believed organic farming had a negative impact on the environment is indicative of the positive view of organic agriculture. As for the economic effects, 64% of participants believed organic farming creates additional employment opportunities, while 24% were neutral and only 12% disagreed. The price premium that the public are willing to pay for organic products was a point of focus for the public survey. Results were mixed, ranging from not willing to pay any premiums to greater than 100% above conventional pricing. The results can be seen in figure 9 below. Although 79% of participants were willing to pay premiums for organic products, price was still a factor some consumers not buying organic products regularly. Of the 113 survey participants, 74 answered the question as to why they did not buy organic products regularly. 40 of the 74 (54%) participants mentioned that price was a factor for not buying organic products regularly.

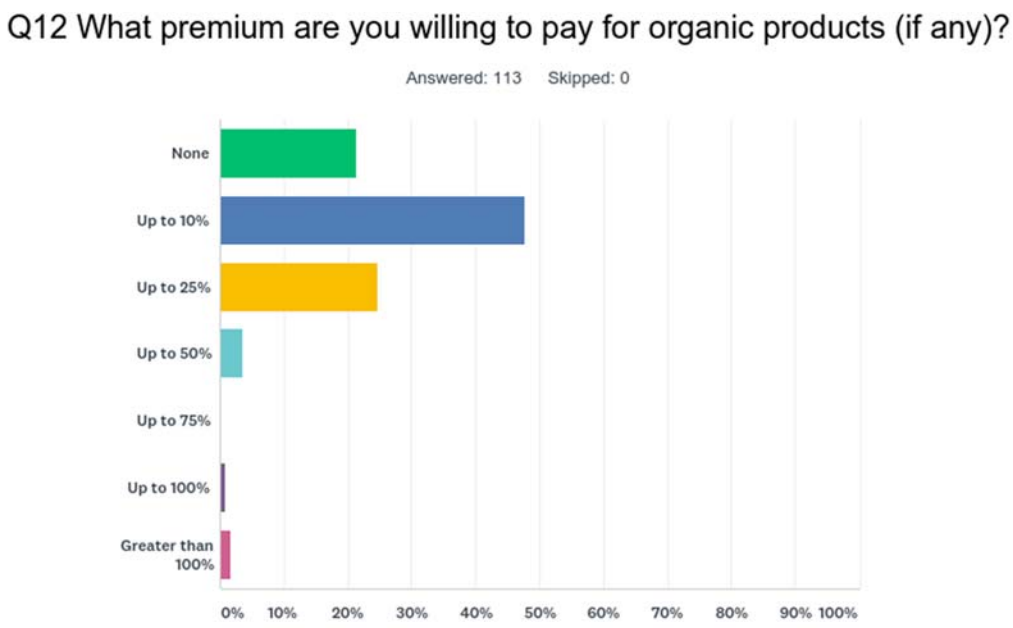


Figure 19 – Organic price premiums

However, despite the positive remarks gathered from the public, consumer confidence has been negatively affected nationwide due to the disparities between the provinces when it comes to the organic standard. Without uniform standards being adopted nationwide, the general public will continue to be confused by unverified organic claims, which could potentially hinder industry growth. During the public survey, participants were asked if they were aware of the certified organic standard and whether they looked for the certified organic logo. Surprisingly, only 55% of respondents were aware of the standards, and 56% either overlooked the certified organic logo or did not know about it. In addition, 76 of the 113 participants (67%) believed it was important that the products they were purchasing were certified organic. It is also worth noting here that a majority of respondents (73%) felt that is was more important that the products they were purchasing were locally produced rather than just being organic. This proves that the Island has adopted a "buy local" mindset that Island farmers can take advantage of.

Prince Edward Island has still yet to adopt any national regulations, leaving the organic market exposed to lack of enforcement. This allows non-certified organic producers to market their products as "organic" without any consequence, negatively effecting the view of the organic industry. Without proper regulations and enforcement, consumers will be left wondering whether the products they are buying are truly organically produced. This lack of enforcement and regulations was evident when completing the public survey, as a significant number of

respondents were not aware of the organic standards, and did not take the certified organic logo into account when purchasing produce. In order to maintain the confidence of consumers, Prince Edward Island needs to implement safeguards to ensure that consumers are getting the quality organic products that they are paying the premiums for.

ENVIRONMENTAL IMPACT

The current timeliness of focus on improvements in environmental performance in agriculture is significant given the realities of a growing global population and an increasingly urgent need for sustainable food sources. Environmentally friendly farming practices must be adopted to mitigate the detrimental effects that conventional farming can have on the ecosystem. In PEI, which has agriculture as one of its primary economic generators, measures need to be taken to preserve agricultural land to foster the preservation and development of farming activities. It has been largely documented that organic farming is the more environmentally friendly form of farming compared to conventional farming. However, research in Canada is quite limited, with a bulk of information surrounding the environmental effects being produced in Europe. Over the years, research has surrounded the effects on soil fertility, energy use, climate change, water source protection, and biodiversity and habitat creation. To capture the full picture of the effects that organic farming has on the environment, this section will provide in-depth discussions for each area of focus.

Soil Fertility

Soil is one of agriculture's fundamental assets and supports resources such as supplying a foundation for the production of food to managing carbon and contributing to climate change mitigation. Soil degradation and soil erosion, which affect large areas of land due to intensive use of croplands and rangelands, threaten current and future food production and are a key sustainability challenge for all agricultural practices (*31*). The formation of soil and soil nutrient cycling are significant supporting services for food production contributing to the health and sustainability of any farming operation. Without healthy, nutrient rich soil, the long-term effects of farming, both organically and conventionally, will negatively affect food production.

Healthy soil can be defined as soil that allows plants to grow to its maximum productivity without disease, fertility, or pest problems limiting its production, all without the need for unnatural supplements, chemicals, and fertilizers. For soil to reach the required level of health and fertility, farmers must optimize the amount of organic matter and microbes to create a

stable environment for plants to flourish. One distinct feature of healthy organic soil is the high levels of soil organic carbon(SOC). According to a 30-year study performed by Rodale Institute, carbon performs many crucial functions such as acting as a reservoir of plant nutrients, binding soil particles together, maintaining soil temperatures, providing a food source for microbes, binding heavy metals and pesticides influencing water holding capacity and aeration (*22*). In order to maximize the amount of carbon that soil retains, sustainable farming practices such as cover crops, residue mulching, composting and crop rotation must be used.

One major difference between organic and conventional systems is that soil health in the organic system tends to increase over time due to proper nutrient cycling. Conventional systems remain relatively unchanged in terms of soil health. While organically managed soil stores nutrients and water efficiently, conventional systems lose nutrients applied in synthetic forms more quickly than nutrients derived from manures, composts, or cover crops (*22*). Synthetic nutrients leach or pass through soil more quickly, and do not remain available to the plants, resulting in negative impacts on crops. Figure 20 (*22*) shows a comparison between organic soil (left) and conventional soil (right). The organic soil has a much darker and full-bodied appearance compared to the conventional soil due to the increased organic matter.

Figure 20 –Organic soil (Left) vs Conventional soil (Right) appearance (Rodale Institute, 2011)

The impact of maintaining a healthy level of organic matter in agricultural soil is not only beneficial to the environment, but can also have positive economic benefits for farmers. Soil that is high in organic matter is less prone to erosion, which can have a significant impact on crop yields. Eroded soils can be responsible for 15-30% lower crop yields compared to uneroded soils, and the cost of inaction to protect soil is estimated to be over $55 billion per year in Europe alone (*32*). It is vitally important to take all measures to improve the health of

agricultural soil. The effects of not doing so could be the difference between a successful farming operation, and a failed farming operation.

Local producers indicated that soil fertility was one of the greatest environmental impacts of organic farming. When asked to rank environmental impacts such as soil fertility, biodiversity, reduction in chemical use, reduction in greenhouse gases, climate change mitigation, and water source protection, respondents ranked soil fertility as the second greatest environmental impact, closely trailing reduction in the use of chemicals. Results from the producer survey for the ranking of the environmental impact of organic farming can be seen in the table below.

What would you consider to be the greatest environmental impact of organic farming? (1 being greatest impact through to 6 being least impact):

Environmental Impact	Rank
Reduction in use of chemicals	1
Soil fertility	2
Biodiversity and habitat creation	3
Water source protection	4
Reduction in greenhouse gases	5
Climate change mitigation	6

Figure 21 – Environmental impact of organic farming

Prince Edward Island's economy has been dependent on the agricultural industry for a number of years. With approximately 594,000 acres cleared for agricultural use, the need to protect and maintain the quality and fertility of the Island's soil is vital to the continued growth for Island agriculture. Not only does maintaining the soil effect the roughly 1,500 farms on the Island, it also effects the consumers. A long-term study conducted by the PEI Department of Agriculture and Fisheries monitored the changes in soil organic matter levels across the Island from 1998-2015. During this period, the levels of organic matter have declined Island wide, with some areas being more affected than others. Figure 22 (*33*) shows the change in the soil organic matter on PEI over the period of 1998-2015. Total areas on PEI in the range above 4% and between 3-4% soil organic matter has decreased, while areas in the range between 2-3%

soil organic matter has increased. This decrease in areas with high organic matter levels indicates that the Island's soil quality is declining, which can negatively affect the industry.

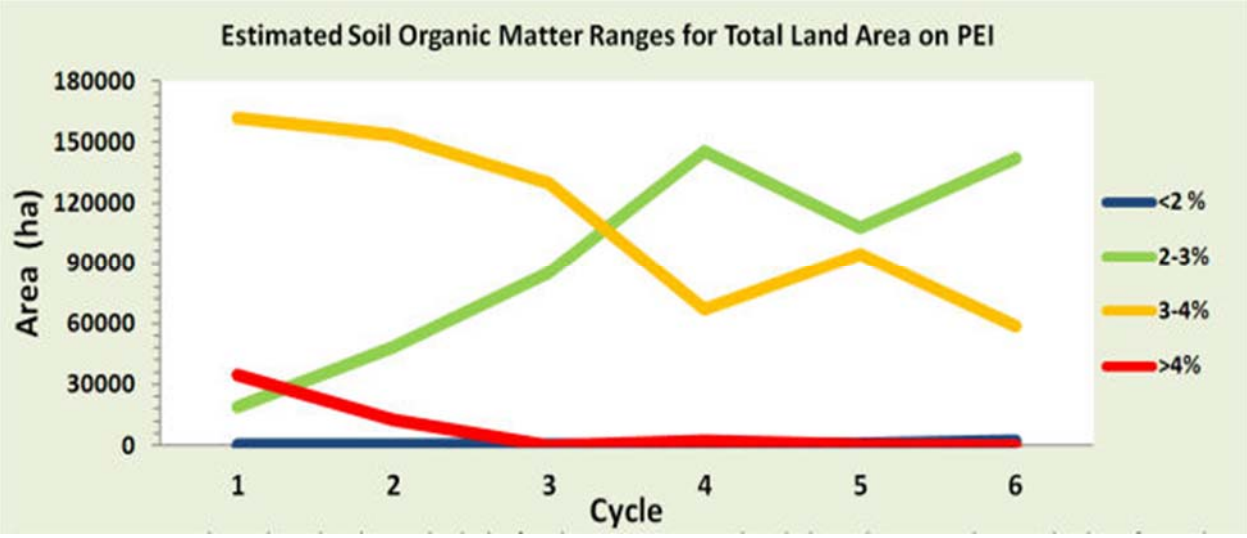


Figure 22 – Soil Organic Matter change in Prince Edward Island (PEI Department of Agriculture and Fisheries, 2017)

If Island farmers do not implement strategies to address the issue of declining soil quality, the economically important agricultural industry will be negatively affected. It is crucial that high organic matter levels are maintained in order to ensure that the Island's soils will be able to hold nutrients and water for crops.

There is a body of evidence emerging that links crop yield and quality improvements with increases in soil organic matter. Not only does this translate into overall improvements in environmental performance, but also positive economic impact on organic farms in rural communities.

Climate Change Mitigation

Climate change and global warming have become a global epidemic, with a major knowledge barrier preventing any long-term solutions. Conventional farming systems emit nearly 40% more greenhouse gasses (GHG) per pound of crop produced compared to the organic farming systems. The biggest GHG emissions from the direct inputs in the conventional system come from fertilizer production and on-farm fuel use, while in the organic system, the biggest emissions are from fuel use and seeds (*22*). In Canada, 10.3% of GHG emissions are linked directly to industrial agriculture as a result of practices that rely heavily on nitrogen-fertilizers,

fossil fuel combustion, and synthetic pesticides (*1*). However, on the global scale, agriculture emissions, feed, fertilizer and pesticide manufacturing, processing, transportation, refrigeration and waste disposal account for more than 30% of global greenhouse gas emissions (*34*). Figure 23 (*22*) shows a direct comparison between organic farming systems and conventional farming systems, with data being collected over a 30-year period. As can be seen, the organic farming system displaying significantly less GHG than the counterpart.

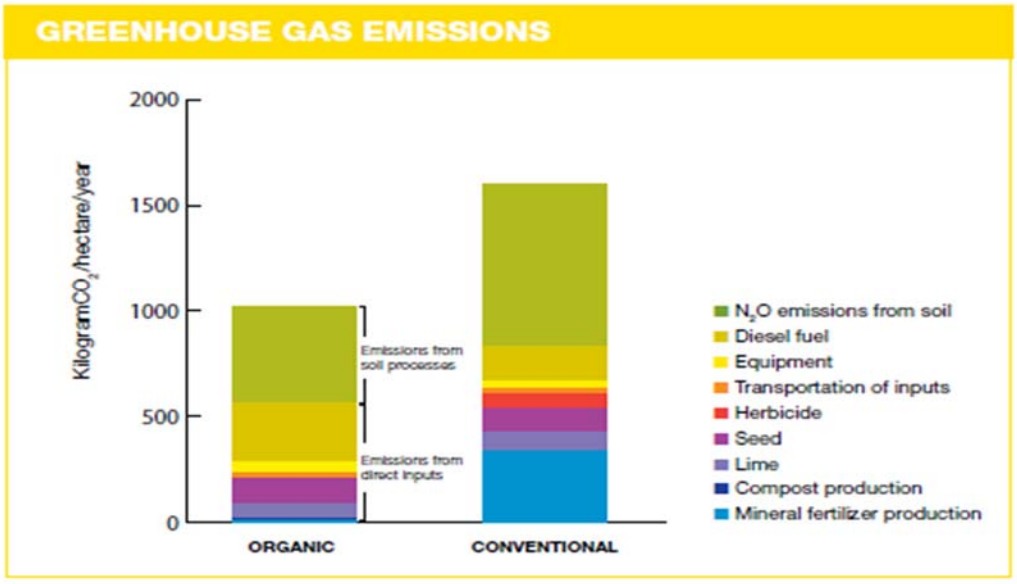


Figure 23- GHG emissions in organic and conventional farming systems. (Rodale Institute, 2011)

In order to mitigate the amount of greenhouse gases being released by agricultural land, farmers can adopt inexpensive organic management techniques that can help increase soil organic carbon, decrease greenhouse gas emissions, maintain yields, improve water retention, and improve farm profitability. Regenerative organic agriculture uses practices such as cover crops, residue mulching, composting and crop rotation to maximize carbon sequestration. These practices minimize biota disturbance and erosion losses, while integrating carbon rich amendments and retaining the biomass of roots and shoots, all of which contribute to carbon sequestration by photosynthetic removal and retention of atmospheric carbon dioxide in soil organic matter (*34*). Carbon sequestration means maximizing the carbon dioxide pulled from the atmosphere during plant growth, and minimizing the amount of carbon loss once it has been stored in the soil (*34*).

Organic practices such as conservation tillage, composting and cover crops can have significant long-term effects on carbon sequestration. Conservation tillage has been shown to increase soil organic carbon by 9% after two years and 21% after a six-year period. Composting with organic materials such as plants, animals or manure has been shown to sequester more than two metric tons of carbon per hectare of land per year over a ten-year period when coupled with a crop rotation (*34*). When compared to conventional farms over the same period, the conventional farming system actually lost carbon. Cover crops, which can be planted temporarily between cash crops, can increase soil carbon, reduce nitrogen leaching, discourage soil erosion, decrease water runoff, improve soil structure and water infiltration. Not only can cover crops actively help mitigate climate change, they can have positive effects on environmental and economic impacts.

Prince Edward Island generates roughly 2,000 kilotonnes of greenhouse gases each year, which is less than one percent of Canada's greenhouse gas emissions. Of the approximate 2,000 kilotonnes of GHGs generated annually on PEI, 23% of which derives directly from agriculture, trailing only transportation (42%). Although PEI has not set any provincial GHG emission reduction targets, the Island supports regional targets established by the New England Governor's and Eastern Canadian Premiers, which are 10% below 1990 levels by 2020, and 35-45% below 1990 levels by 2030 (*35*). Islanders generate roughly 12 tonnes of GHG per person annually, which is lower than the Canadian average. Prince Edward Island has taken actions to improve energy efficiency by increasing production of renewable energy (wind, solar, and biomass), as well as adopting approaches as set out in PEI's 2008 climate change strategy.

To reduce the effects of global warming and greenhouse gas emissions, organic farming systems must take a holistic approach to regenerative management techniques, rather than only adopting certain approaches. Solving climate change would mean completely eliminating fossil fuels entirely, which appears to be an unrealistic goal. In order to successfully reduce the long-term impact of climate change, a world-wide shift to environmentally friendly farming practices must occur.

Energy Use

Currently, the world is suffering from an energy crisis that must be mitigated before irreversible damages continue to occur. It is crucial to compare organic and conventional farming systems to determine the inefficiencies of the different farming systems, and the potential to reduce energy consumption and mitigate environmental impacts. Organic farming practices use upwards of 45% less energy than the conventional farming systems. A major factor for the reduction in energy use is the lack of nitrogen fertilizer. According to the Rodale Institute (*22*),

nitrogen fertilizer is the greatest energy input in conventional farming, representing 41% of the total energy consumption. Not only is nitrogen fertilizer produced from raw materials of fossil fuels, the conversion process to usable fertilizer is energy intensive, as the production of one tonne of nitrogen fertilizer uses between 1 and 1.5 tonnes of petrol (*36*). However, it is not only these nitrogen-based fertilizers that use a great deal of energy. Agrichemicals such as pesticides, herbicides, fungicides, and insecticides also create an energy burden for conventional farming systems. The manufacturing, transport, and use of these chemicals is the most significant reason why conventional operations use decidedly more energy.

Commonly, energy inputs are categorized into two types, direct and indirect. All energy from fossil fuels, electricity use, gas use, etc. that have a direct impact on farm processes are classified as direct energy, while fertilizers and pesticides, field machinery use, and intermediate inputs (chemically-treated seeds and feeds) are treated as indirect inputs (*32*). The differences between direct energy inputs for organic and conventional farming are minimal, but for indirect energy inputs, organic farming takes a clear advantage. As can be seen in figure 24 below, the use of fertilizers and herbicides in conventional farming make up almost the entire energy use in organic systems alone.

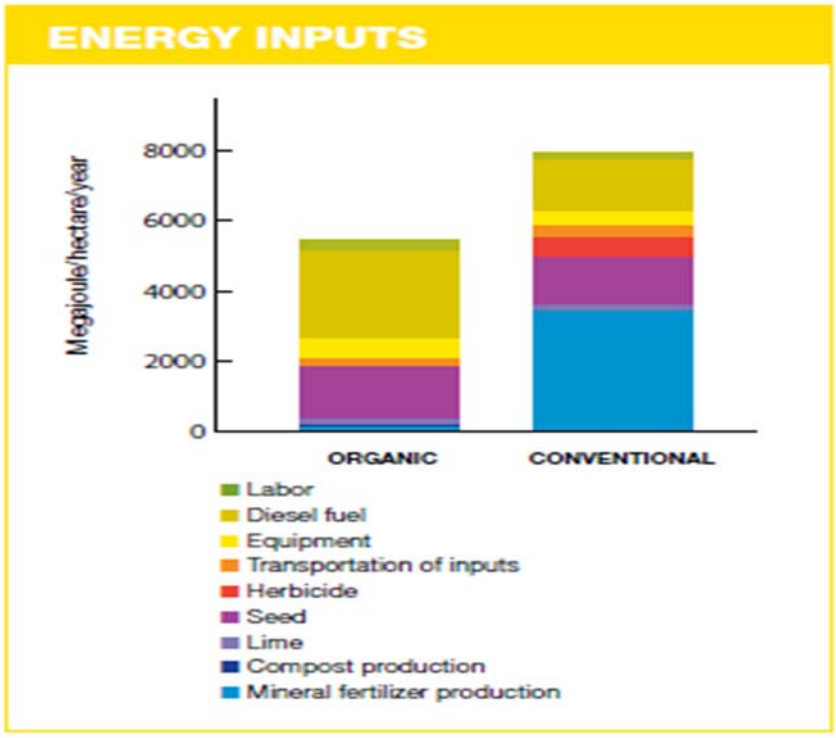


Figure 24 – Energy Inputs (Rodale Institute, 2011)

Lower energy consumption on organic farms is generally attributed to lower concentrate feeding, lower stocking rates, and the absence of synthetic fertilizers and pesticides (*32*). Organic farmers tend to rely on more energy efficient sources of nitrogen such as manure and legumes, while conventional operators use high energy-intensive chemical nitrogen fertilizers.

Another noteworthy difference between organic and conventional farming is the extensive use of human labour in organic farming systems. Since organic farms tend to rely more on human labour than machinery for tasks such as weeding, cultivating, plant and animal maintenance, manure spreading, and planting, organic farms often have a better input to output energy efficiency. Although this relates to higher labour costs for organic farms, the environmental and economic benefits far outweigh the increased costs.

Prince Edward Island has developed a ten-year energy reduction strategy to try and mitigate the negative effects of excessive energy use, which includes over 70 action plans to address the energy crisis. Studies indicate that an increase in energy efficiency can lead to a higher GDP, increased employment, greater competitiveness, which can benefit all sectors in PEI. Already on 20% of organic farms on PEI, renewable energy sources are in place, such as solar panels and wind turbines (*37*). The potential to produce sufficient energy for on-farm use and to create additional revenue opportunities is currently limited on PEI by existing net-metering policies. The use of renewable energy sources can have a long-lasting positive effect on the environment and energy use, this potentially presents an opportunity for agriculture producers to create value-added products. If the Island was able to replace even a small fraction of gasoline and diesel consumption with alternative energy sources, the economic and environmental opportunities would be significant.

Water Source Protection

Agriculture is the single biggest user of fresh water, with water shortages and water quality posing significant risks to future food production. Water quality affects both human water security and freshwater biodiversity. Improving irrigation efficiency and crop water management thus represent key strategies for moving toward sustainable food productions (*30*). With between 2,000 and 5,000 litres of water needed to produce the daily food requirements of one person, the consequence of a growing population serve to highlight the necessity of addressing depleting water sources and water quality protection (*32*).

Organic soils are better equipped to handle water runoff, this ultimately preserves water due to higher organic content. This, in turn, means that organic plants have the water they need “in storage” and can better access those stores. Water volumes filtering through soil were 15-20%

higher in organic systems than the conventional systems, meaning that organic soil takes in rainwater to recharge groundwater reserves, rather than running off the surface and taking soil with it like conventional systems (*22*). This is part of the reason why organic operations will typically outperform conventional operations during times of drought. For example, organic corn yields were 31% higher than conventional yields in years of drought (*22*). Having soil that is better equipped to properly use the resources made available and prevent runoff is a major factor affecting the world's water source problems.

Water quality in areas surrounding agricultural land can be directly linked to the amount of nitrogen and phosphorus contained in soil. Lower levels of nitrogen from organic systems are typically associated with lower nitrogen inputs (*30*), while conventional farms tend to expose a high amount of nitrogen to surrounding water sources due to the significant amount of nitrogen based chemicals being used. Many pesticides used in conventional agriculture have negative impacts on aquatic organisms and can compromise the drinking quality of surface and groundwater supplies (*30*). Only about 50% of applied conventional fertilizers are taken up by crops, with approximately 30-40% being leached into ground and surface waters and the rest being lost in the atmosphere (*6*). Both nitrogen and phosphorus stimulate algal growth and contribute to hypoxia when they pollute downstream bodies of water. Organically managed soils often have higher organic matter content, which leads to a higher amount of nitrogen being held within the soil.

On Prince Edward Island, there are only 10,000 acres of organic farmland, compared to the 594,000 acres cleared for farming activities. This major gap leaves the Island's soil exposed to water runoff issues, as organic soils are better equipped to maintain water volumes, and prevent runoff. Considering how widespread farming is on the Island coupled with the vast amount of water surrounding Island farms, it is vital that measures are taken to protect water sources, and prevent the runoff of harmful chemicals to surrounding bodies of water.

Prince Edward Island is the first province to implement a provincially-supported Alternative Land Use Services (ALUS) program, which is designed to allow farmers to develop conservation projects that go above and beyond the Island's existing environmental regulations. The goals of the ALUS program are to reduce soil erosion and siltation of watercourses and wetlands, improve water quality, improve and increase wildlife habitat, and reduce the impacts of climate change. The program works by offering an annual payment for conservation projects equal to local land-rental rates on a per acre basis. The program proved to be quite beneficial to Island farmers, attracting 415 clients with approximately 10,000 acres, and making annual payments in 2015-2016 totaling $735,000. PEICOPC should encourage organic practices as part of the

ALUS suite of ecological services to all members of the association. This would provide opportunities for organic producers for additional funding, and enhance ALUS in regards to its established performance indicators.

Biodiversity and Habitat Creation

Biodiversity encompasses all aspects of life, including diversity of species, genetic diversity, diversity of habitats, as well as ecosystems. Biodiversity caters for the cleansing of air, water and soil; supports numerous soil functions such as nutrient recycling; provides pollination services helping crops grow and helping plants disperse (*36*). Ecologically-oriented farming methods, such as those often demonstrated in organic farming, is a major contributor to the preservation and conservation of biodiversity and natural resources. Biodiversity loss and the degradation of ecosystems can have a detrimental effect on the environment, proves costly to society as a whole. The World Trade Organization notes a crop variety loss of 75% over the past 100 years, while only 17% of species and habitats assessed under the Habitats Directive have been deemed to be in good status (*36*). With an increasing human population, the need for increased food production and safe farming practices has never been more important.

Conventional farming, and the use of hazardous chemicals, results in soil contamination and acidification, groundwater pollution, and elevated greenhouse gas emissions. The aggressive use of synthetic pesticides and herbicides has not achieved the ideal goal of long-lasting control of harmful insects and weeds but resulted in some decrease of the natural enemies of the harmful insects (*34*). However, organic farming methods have shown clear benefits for biodiversity of wildlife on farmlands, and positive effects for the surrounding environments. Organic fields are systems that are less dependent on external inputs to restore and rejuvenate the environment, resulting in higher biodiversity that promotes higher sustainability (*36*). The use of crop rotations, carbon sequestration, organic manure, and water source protection can lead to a significant increase in biodiversity. Figure 25 (*36*) demonstrates the effect that organic farming has on the biodiversity of various plant and animal species, based on the results of 95 scientific publications. It is evident that much of the published studies have found positive effects on the differing species, while a limited number found negative, or no effect at all.

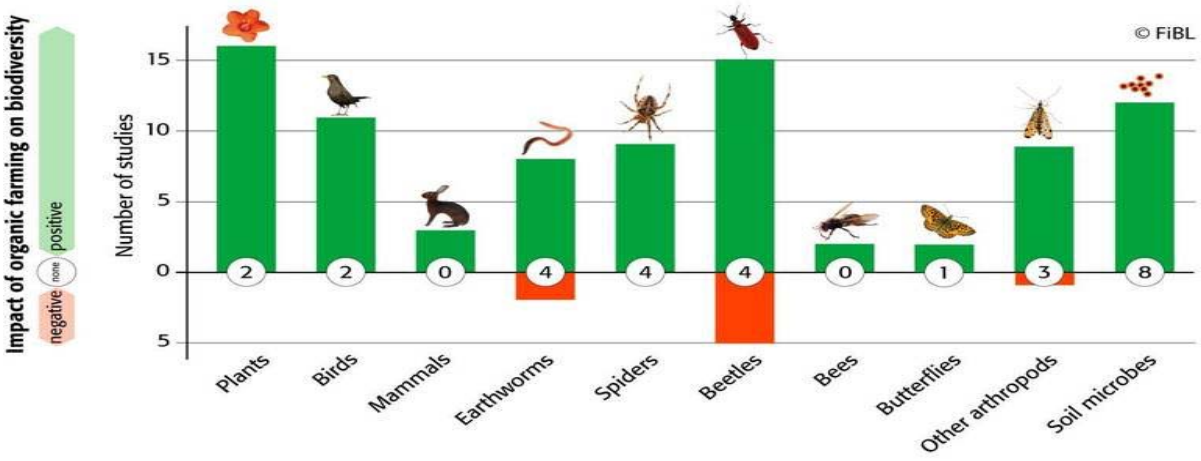


Figure 25 – Effects of organic farming on plant and animal species (Natural Resources Management and Environment Department Food and Agriculture Organization of the United Nations, 2007)

According to Bavec and Bavec (*38*), results of meta-analysis that compared biodiversity in organic and conventional farms found that organic farms generally have 30% higher species abundance and 50% higher abundance of organisms. It was also found that organic fields had up to five times higher plant species richness and 20 times higher pollinator species richness compared to conventional fields (*38*). Studies have shown that organic farming had a greater effect on biodiversity in intensively farmed regions. This means that as the percentage of arable fields of the landscape increased, biodiversity tends to increase.

As of 2015, Prince Edward Island has yet to develop a biodiversity strategy. At that time, PEI had five endangered species, four species threatened, and five species of special concern. Prince Edward Island is well below the national average of protected land, which sits at 10.5% nation-wide. PEI ranks last in the country, with only 3.2% of terrestrial area being protected, as can be seen in figure 26 (*40*).

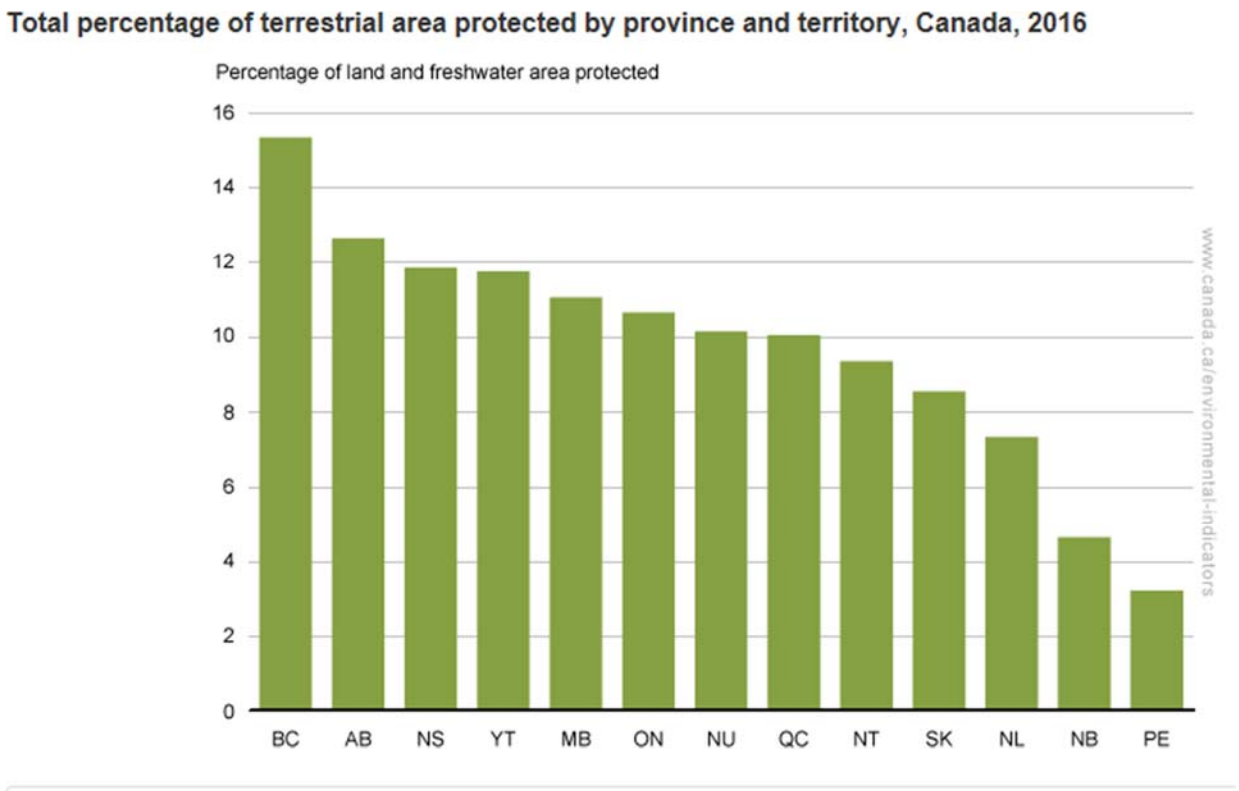


Figure 26 – Protected land by province (Environment and Climate Change Canada, 2017)

Protected areas are vital for biodiversity conservation, providing viable habitats and protection from hunters and predators. In protected areas, there are up to 15% more individual plants and animals, and 11% more species inside these areas compared to unprotected, surrounding areas (*41*). The 2016-2019 Federal Sustainable Development Strategy has set the goal of achieving the protection of at least 17% of terrestrial areas and inland water by 2020. If Prince Edward Island is going to attribute reaching this goal, a biodiversity and sustainability plan needs to be established, as the positive effects on local biodiversity is significant. A newly developed biodiversity and sustainability plan should incorporate the farm management practices of organic operations to ensure that Island farms are not damaging surrounding areas.

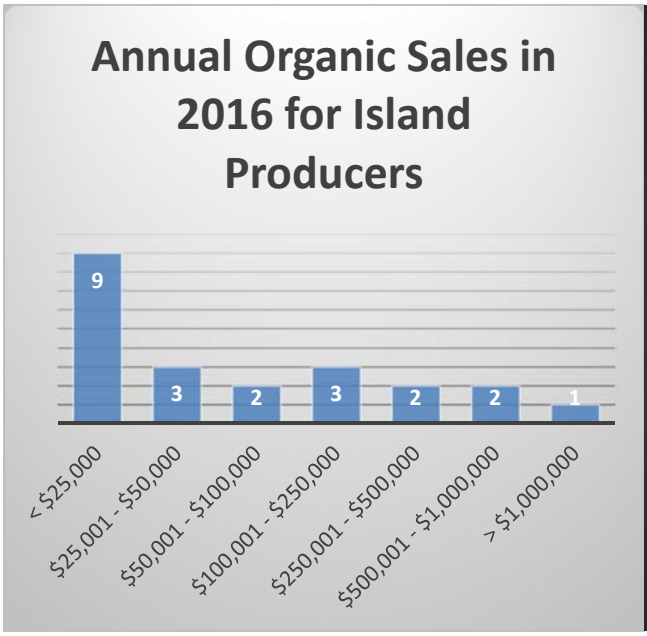
ECONOMIC IMPACT

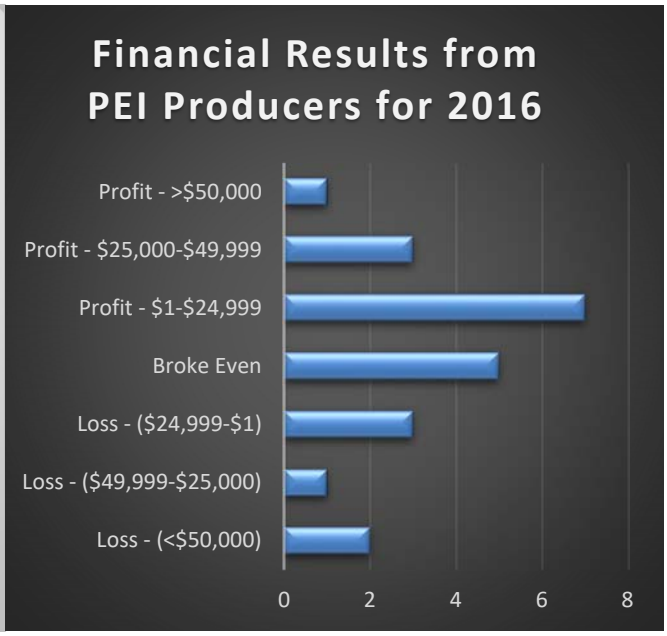
Organic agriculture is an important source of livelihood to a number of Island residents and plays a crucial role in economic development, especially with a significant agricultural market such as Prince Edward Island's. This section of the report will be aimed at determining how the organic agriculture industry effects Prince Edward Island economically. In this section, we will discuss the average net income of Island farmers, the number of jobs created and the average wages earned in these positions, the economic benefit of organic farming over conventional farming, economic spin-off and contribution to GDP. Discussions relating to the direct, indirect and induced economic impact will also be addressed.

Net Income of Island Farmers

In order to be sustainable, organic agriculture must also be profitable. The main factors that determine the profitability of organic agriculture include crop yields, labour costs, price premiums for organic products, potential for reduced income during the organic transition period, and possible cost savings from the reduction in the use of nonrenewable resources and inputs (*42*).

During the producer survey, we asked Island organic producers about their financial outcome from their organic farming operations during 2016. The most common outcome (32% of responses) was a profit between $1-$24,999, with 73% having broken even or made a profit. Most of the survey respondents were small scale farmers, with 41% having organic sales below $25,000 in 2016. Results for annual organic sales and financial outcome during the 2016 year can be seen in the charts below. The hours worked to achieve these results ranges from 1-10 hours weekly to more than 50 hours per week. 50% of producers were working greater than 50 hours weekly, followed by 21% working between 41 and 50 hours. Of the 24 producers that participated in the survey, 14 (58%) had other sources of income besides their organic farming operation.





The Ontario Ministry of Agriculture, Food and Rural Affairs (OMAFRA) recently published the 2017 Field crop budgets, which directly compares the estimated expenses for conventional and organic products (*43*). Although the report is only meant to be used as a tool to estimate expenses, costs are based on assumptions including seeding rates, levels of fertilizer use, trucking, insurance and so forth. For the comparison between organic and conventional products, we will use grain corn, soybeans, barley, and oats as our comparative products. All of the total expense comparisons include overhead expenses such as machinery depreciation and interest expense.

Starting with grain corn, total expenses including overhead are very similar between organic and conventional operations. Total expenses per acre was estimated at $564.60 for organic grain corn, and $558.35 for conventional. The organic systems had higher labour expenses ($64.20/acre vs $12.15/acre), depreciation expense ($51.85/acre vs $42.90/acre) and machinery expenses ($48.40/acre vs $40.60/acre). However, organic expenses were lower than conventional for trucking ($24.00/acre vs $36.65/acre), and drying ($52.65/acre vs $80.35/acre). One interesting comparison for the grain corn comparison was that fertilizer and herbicide expenses were very similar between the two systems when taking soil maintenance and manure/compost expenses from organic operations into account. The conventional system had estimated fertility/herbicide expenses of $155.55/acre, while organic systems were estimated to be $150.00/acre.

For soybeans, there was a greater estimated spread in total expenses between organic and conventional soybeans. Total expenses were estimated to be $410.25/acre for organic soybeans and $316.35/acre for conventional. The biggest variation was seen in the labour expense ($86.95/acre for organic and $9.65/acre for conventional), machinery expenses ($55.80/acre for organic and $35.15/acre for conventional), and depreciation ($62.60/acre vs $41.95/acre). Soil maintenance in the organic system was considerably lower than the conventional system ($50.00/acre vs $96.15/acre) due to the lack of fertilizers and herbicides.

For Barley, total expenses came in at $335.95/acre for organic and $275.25/acre for conventional. As with all organic products, labour expense came in much higher than conventional ($48.00/acre vs $9.65/acre). The seed expense for organic was also significantly higher than conventional ($103.65/acre vs $52.70/acre) due to needing approximately 150 pounds per acre for organic compared to 120 pounds per acre for conventional. Soil maintenance for organic barley ($50.00/acre) was much lower than conventional due to the lack of fertilizers and herbicides being used in conventional systems ($74.55/acre). The remaining expenses were estimated to be similar between the two farming systems.

The last product to compare, oats, has similar estimated expenses for organic and conventional systems. Total expenses are estimated to be $285.25/acre for organic oats, and $259.25/acre for conventional. Labour expenses were estimated to be the same for organic and conventional systems as for barley, with organic being the higher of the two. The only other major variation in expenses were for seed ($56.65/acre for organic and $36.50/acre for conventional), and soil maintenance ($50.00/acre for organic and $88.10/acre for conventional). All other operating and overhead expenses are roughly the same between the two operating systems.

It is worth noting here that the above expenses are based on estimates, they are highly variable depending on the individual farm situations. The information provided can be used for comparative purposes, but may vary between provinces.

Although the organic products tend to have higher operating and overhead expenses than their conventional counterparts, the organic price premium earned makes up for the higher costs. Based on an 18-year study completed by the Agronomy Journal (*44*), the price per acre of organic systems compared to conventional systems show that the organic systems significantly outperform their conventional counterparts on a per acre analysis when taking organic premiums into consideration. When comparing a four-year corn-soybean rotation, the conventional system had slightly higher returns per acre at $273/acre compared to $267/acre

in the organic system. However, when a full organic premium was applied, the average net return for organic production rose to $538/acre, significantly outperforming the conventional counterpart. In the context of the study, a full organic premium refers to a 100% increase in the price paid for the organic product over its conventional counterpart. Even when the organic premium was reduced to 50%, organic productions was still more profitable. According to the National Academy of Sciences of the Unites States of America (*41*), organic price premiums on the global scale averaged 32% or organic crops and 29% for organic systems, significantly higher than the breakeven premiums of 5% and 7% respectively. The financial incentives related to organic price premiums help to offset any additional labour costs, leaving organic agriculture as a sustainable farming option.

Job Creation

Organic agriculture is not only enriching the environment around us, but also creating jobs and helping to develop areas that lack employment opportunities. Considering that organic farming is significantly more labour intensive than conventional farming, it is not surprising to learn that organic farms tend to create more jobs. Organic farms typically require more labour, attributed to more labour-intensive management, a higher share of labour-intensive commodities such as fruits and vegetables, and the absence of chemicals commonly used on conventional farms. According to the Rodale Institute (*22*), organic agriculture promotes job creation, providing more than 30% more jobs per hectare than non-organic farms. Two practices adopted in organic farming, on-farm processing and direct marketing, can further increase the opportunities for job creation.

According to a press release by the Organic Trade Association (*45*), for every $1.23 billion (CAD) in retail sales or organic products in the United States, 21,000 more jobs were created throughout the economy. In other words, for every $1.23 million in sales, there are 21 jobs created. If we consider the projection of a $25 million market by 2025, made by the PEI Certified Organic Producers Co-operative, this would represent an estimated 325 additional jobs based on the market value of $6 million from 2012. In addition, 21% more jobs would be generated just by using organic ingredients over conventional ingredients.

Depending on the type of farming operation, labour costs can be one of the largest input costs. According to the State of Maine's Organic Impact Study (*46*), organic vegetable and fruit farms spend 29% and 27% of their expenses on labour, compared to the state average of 18%. This additional spending on labour, in turn, means more money is being spent locally, helping to stimulate the economy.

On average, local producers paid full time employees $16/hour to work approximately 47 hours weekly for 42 weeks per year. Of the 24 producers, 18 had between 0-2 full-time employees, 3 producers had between 2-5, 2 had between 5-10 and 1 producer had between 10-20. Based on the average hourly wage, the average hours worked per week, and the average weeks worked per year, full-time employees made approximately $31,300 per year. As for part-time employees, 22 out of the 24 producers had casual workers, working an average of 29 hours weekly for 18 weeks of the year, and being compensated at $13.15/hour. This equates to approximately $6,800 in wages for part-time employees.

Canadian farms are experiencing a lack of local workers during vital periods of production. Considering most farm labourer's are seasonal workers, it can be a difficult task to attract workers to rural areas for seasonal labour work. In 2014, Canadian farms struggled with a shortage of 59,000 workers, which is expected to continue raising as the industry grows. The general Canadian job vacancy rate is roughly 1.8%, but is 7% in the agriculture sector (*47*). Farmers have become reliant on foreign workers to do the jobs that local employees are veering away from. In 2014, foreign workers made up nine percent of PEI's agriculture workforce, or approximately 4,900 jobs. Even with 9% of the workforce working in agriculture, PEI was unable to fill 200 agriculture related jobs in 2014, leading to losing out on $4 million that year (*48*). Many Island farmers have been taking advantage of the Government of Canada's temporary foreign worker program, which introduces local business, including farms, to foreign workers looking for employment. When local producers were asked what the greatest challenge they faced as an organic farmer was, staffing was ranked as the biggest challenge. The nature of the business, the low wages, and long working hours make finding quality farm workers a difficult task.

Economic Spin-Off

The economic spin-off created by the Island's organic agriculture industry incurs after farms earn a profit, and contribute back to the local economy. This contribution back into the economy can happen in one of three ways; as a *direct* impact, an *indirect* impact, or an *induced* impact. A direct impact happens when an organic farm pays for expenses such as farm inputs, labor, taxes, and dividends to owners. By paying these expenses through the farm, the money is available to be spent elsewhere on the Island. When a farm purchases inputs from a local business which then that business makes payments for their own expenses, an indirect impact has occurred. These secondary businesses are spreading the money that was originally earned by the farm further into the local economy. The last impact is the induced impact, is attributed to the households who have earned income and profits through working on the farm spending

their earned money at other businesses. It is the induced impact that has the strongest effect on the local economy, as money spent by households tends to stick around the local economy longer than money used by business to buy inputs (*46*). The sum of the three impacts is referred to as the total economic impact created by the given industry.

An interesting study conducted Penn State Agricultural Economist Dr. Edward Jaenicke showed the benefits that organic farming can have on poverty rates and median household income. The study measured the impact of the organic sector in areas known as "organic hotspots", which are counties with high levels of organic agricultural activity that have neighboring counties with high organic activity (*49*). Poverty rates in these organic hotspots declined by 1.349 percentage points, while household income increased by $2,094 in these areas. Based on the poverty rate and average household income in these areas, these changes represent a 7.9% decrease and a 4.7% increase, respectively. Results from the study can be seen in figure 29 (*49*). It is worth noting here that these changes were only seen in areas considered as organic hotspots, and not in areas considered as general agriculture hotspots. Poverty rates decreased by only 0.173 percentage points and household income increased by $75 in general agriculture hotspots.

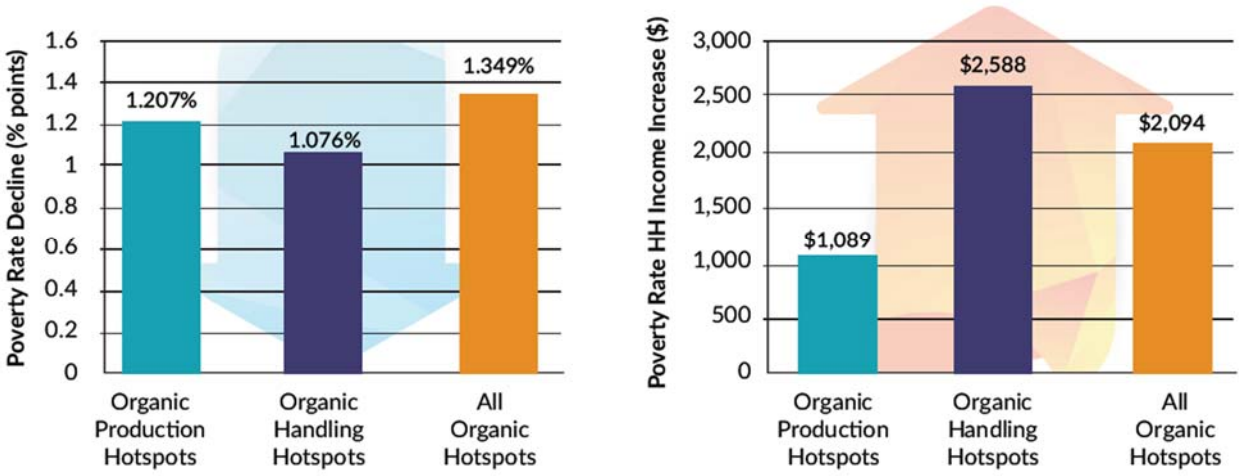


Figure 29 – Poverty rate and household income changes in organic hotspots (Penn State University, 2016)

Local organic farmers tend to involve themselves more deeply in their community by creating additional jobs in rural areas, and by selling products directly to customers. By selling their products within the province, organic farmers are keeping more money on the Island, and in turn, spending more money locally. Smaller local producers represent roughly 30% of all

organic production on PEI. These small operations are positively affecting rural economies by keeping and spending money locally.

One issue faced when measuring the total economic impact of the Island's organic agriculture industry is the lack of market information made available about the industry. Any information relating to inputs, labor expenses, market values, farm receipts, and so forth are lacking, creating a challenge to accurately measure the impact. Without this vital information, we are unable to put a dollar value on the contribution to the local economy.

Contribution to GDP

As the organic agriculture industry continues to grow, having an accurate measurement of the contribution to the Island's gross domestic product (GDP) is vitally important. However, economic and market information for the organic industry in PEI is severely lacking. The census of agriculture focuses mainly on the whole agriculture industry, without segregating between conventional and organic farming. Crop and animal production makes up 4% of the Island's total GDP in 2016, but that amount includes both conventional and organic production. We do know that crop and animal production increase by 4.7 percent in 2016, following a 1.4 percent decrease in 2015 (*50*). Nonetheless, there is not enough economic information for the Island's organic industry to accurately measure the contribution to GDP.

This creates an opportunity for PEICOPC to contribute to the knowledge made available regarding organics. PEICOPC needs to work closely with Statistics Canada to ensure that information regarding the contribution to GDP from agriculture is segregated between conventional and organics.

OPPORTUNITIES

The time is here for the public, government bodies, and lawmakers to acknowledge the many benefits that organic agriculture has to offer, especially in the agriculturally diverse province of PEI. In the past, resources have been made available to offset a portion of certification costs, to enforce organic standards, and to ensure that certified producers have fair access to any training programs. However, the resources allocated to the industry to date are only a small portion of what is necessary to allow the industry to reach its full potential. Agri-Food Canada's 2016 overview reports that $649.5 million was invested in agricultural research and development in 2015, with only $1.6 million going to the organic agriculture industry, representing 0.25% of the research and development budget.

One of the major government investment programs in place for the Island's agricultural industry is the Growing Forward 2 program. The program is designed to offer a variety of support programs to local farmers, specifically the Organic Industry Development Program which is designed to encourage growth in the organic sector and is offered to all certified organic farmers, or those who have applied to a certification body and have underwent an inspection. The program offers a maximum allowable funding of $50,000 over a five-year period to help increase market competitiveness, to gain access to specialized equipment, to help with the conversion of land, and to assist in the implementation of strategic initiatives. The Prince Edward Island budget for the program for the 2016-2017 and 2017-2018 years are $150,000 each year, allocated among the four components of the program. The program has been successful from its inception, but is set to end on March 31, 2018.

There is an opportunity for the PEI Certified Organic Producers Co-operative to work closely with the PEI Department of Agriculture and Fisheries to provide feedback about what is necessary to help the Island's organic industry continue to grow. With plans being underway to develop the next growing forward framework, PEICOPC can demonstrate the value and potential growth of the Islands organic agriculture industry to allow for greater government investments in the next framework. Currently, there is a growing need to expand the AgriInsurance program that is offered under the Growing Forward 2 program. The agriculture insurance being offered to Island farmers is limited in the number of organic products that are covered, and needs to be more inclusive of the diversity of organic horticulture and livestock products that Island farms have to offer. Having a proper insurance program that will benefit organic producers and processors will have a significant positive effect on the livelihood and stability of the rapidly expanding industry.

PEI Certified Organic Producers Co-operative has the opportunity to strengthen the Island's organic industry by developing provincial regulations or legislations that protect organic labelling. If PEICOPC can work with government bodies to create laws that enforce the standards associated with the organic label, the consumers, producers, and processors will benefit greatly. However, if PEICOPC wants to make an immediate change, regulation needs to be addressed rather than legislation. The process to create new legislation surrounding the organic label would be a time-consuming activity, whereas regulation can be addressed immediately. Right now, the Island has producers who are claiming their products are "organic", without becoming certified. If PEICOPC could help improve the regulations imposed on the Island, the industry could see new entrants and increased acreage.

Based on the producer survey, there is a major opportunity for organic processors on the Island. The Island is currently lacking processing capacity, and is in need of additional facilities.

The lack of processing capacity was ranked as the third greatest challenge that local organic producers face, trailing only staffing and yields. An increase in processing capacity could allow producers to increase production, knowing that there is enough capacity to process their products. In addition, organic processors would have an opportunity to team up with local producers looking to expand into value-added products.

RISKS AND CHALLENGES

Prince Edward Island's organic industry has seen tremendous growth over the last decade, but with this growth comes new risks and challenges that must be addressed to ensure continued success. Some issues that need to be addressed include the certified organic standard, product availability, data collection, land availability and exporting.

The Island's organic industry, as mentioned above in the Industry Analysis, is operating in a vulnerable state. Without adopting provincial regulations, the Island's certified organic producers are competing with non-certified organic producers who are able to label their products as "organic" without being certified. This lack of regulation can affect not only the producers, but also confuses consumers and can create distrust in the organic label. One of the problems with the Canadian organic standards is that the standard nor the products produced in accordance with the standard represent specific claims about the healthiness, safety and nutrition of such organic products (*51*). Considering the organic standard is being used as a marketing tool, it can cause producers to forgo the certification process while still marketing as "organic", as long as their products are only being sold within Prince Edward Island. All organic products being sold outside of PEI are subject to National organic standards. As the organic industry continues to grow, the need for effective regulation and enforcement across all jurisdictions is necessary. If the organic label becomes tainted in one area such as PEI, it can have a negative effect on the national level. Prince Edward Island needs to take steps towards enforcing the regulations to ensure the Island's organic producers are being treated fairly.

After having a discussion with a produce manager at the Stellarton, Nova Scotia Sobeys, it came to our attention that there is a lack of organic resources available. The retail produce manager confirmed that the largest issues they have been facing was getting their organic products in on time, and enough to meet the demand of their customers. Without increasing the amount of products available, the situation will continue to decline. Keeping up with market demand is one of the most significant influences for market growth. In order to allow the industry to continue to progress, organic products need to be available on a more consistent basis.

Organic data collection for Prince Edward Island is very limited, posing challenges for those currently producing, or considering to produce organic products. The lack of available information and inconsistent data can lead to uninformed decisions by producers, which poses a risk to the continued growth of the industry. A recent analysis performed by the Canada Organic Trade Association (*12*) gave Prince Edward Island, along with all other Atlantic Provinces, a one star ranking for data collection. It is not only producers who are relying on consistent and reliable information, it is also the businesses, organizations and policy makers working with the organic industry. Without the support from Federal and Provincial governments to increase the amount of data collection, the organic agriculture industry is at risk of not reaching its maximum potential.

One challenge that the organic producers face that conventional producers do not, is land rental options. Conventional producers have the option to rent or lease land annually, whereas for organic producers, the option is not as viable. The issue is the three-year transition period that organic producers face, which can potentially be very costs and risky for the producers. Whereas conventional farmers can rent land and farm that land in the same year, organic producers must secure long-term agreements just to achieve organic certification and/or appropriate soil quality levels. This severely limits access to land, and can potentially hinder industry growth. Unless the land being rented has already been converted to organic, it can be a major challenge to secure additional acreage. 42% of local producers indicated that access to land was one of the assistance requirements. If the Island's organic industry continues to expand, the limited amount of land could potentially hinder further growth.

According to Island producers, access to equipment was the greatest required assistance. Of the 24 respondents, 46% required additional access to equipment. Additional services or assistance that producers require include processing, shared storage and access to land (42%) each. The table following table illustrates the breakdown of services or assistance needed for Island producers.

Required Assistance	% of Producers
Distribution	38%
Marketing	38%
Education and training	33%
Processing	42%
Shared Storage	42%
Access to equipment	46%
Access to land	42%
Access to financing	38%
Access to government programs	38%
Certification process and requirements	21%

Figure 30 – ***What additional services or assistance do you need? (Check all that apply)***

RECOMMENDATIONS

Prince Edward Island is highly dependent on the agriculture industry for job creation, the economy, rural development, and consumer health. With a rapidly growing organic industry, PEICOPC needs to ensure that their strategies align with the needs of the industry. To maximize the potential of organic agriculture on the Island, steps need to be taken to improve education and training, consumer confidence, market accessibility, government support, and farmer to farmer assistance.

One of the most important tasks that the PEICOPC can undertake is to increase the amount and accessibility of education and training support. There is a considerable knowledge gap between organic and conventional farming, especially relating to the financial and economic impact for local farmers. Without having this information readily available, farmers and those considering to enter the organic agriculture industry are left to their own personal judgements. Organic producers need specialized agronomic research that is directed towards organic farming to influence decision making and problem solving capacity. As PEICOPC continues to gather information regarding the organic industry, specifically PEI's organic industry, the information should be made public for all local farmers to view. This should include best practice information, financial benchmarks and ratios, government support program information, conversion advice, and marketing and distribution information. Comprehensive education and training programs, such as lecture-style workshops, webinars, online resources, and hosting farmer to farmer gatherings could help improve the amount of knowledge available to current and potential farmers.

Local producers stated the need for help with export opportunities. When asked if there was a need for greater focus to promote, distribute, and negotiate on behalf of organic producers for exporting opportunities, 75% stated that there was a need for assistance. PEICOPC can benefit the Island's organic producers greatly by providing information related to exporting opportunities. By gathering and sharing information such as a step-by-step guide to exporting, a list of desirable products, and where products can be shipped, PEICOPC can help local farmers expand their business and help ensure the organic industry continues to grow.

PEICOPC is able to participate in the food-education funding program, which helps educate the youth about local food production and healthy food options. The program is designed to help connect consumers and producers, and help increase the amount of local food on the menus of schools and early child care centers. If PEICOPC were to participate with their own education program, they would be eligible to receive up to $10,000 funding to cover eligible expenses. By participating, PEICOPC could raise awareness of the Island's organic producers, and demonstrate the health benefits of choosing organically grown products.

Additional recommendations include:

1. Continue working towards provincial regulation of the organic label to improve the consumer confidence and improve the state of organics on the Island. The Island needs to regulate organic products sold within the province to eliminate the risk of non-certified organic producers listing their products as "organic".

2. Work with Statistics Canada to ensure the 2021 census of agriculture is more inclusive of the organic industry. In the past, the census of agriculture has been lacking information strictly related to organics, making it difficult to determine growth and expansion opportunities.

3. Work closely with Island's government to ensure additional funding become available in the next growing forward program. Growing Forward 2 is set to come to an end in 2018. Agriculture and Agri-Food Canada is currently taking suggestions for the next funding program. PEICOPC should be in direct contact with representatives of the Growing Forward program to state the need for additional funding for the organic industry.

4. Host information sessions for local organic farmers and for those looking to transition into the industry. By making education, training, financial and economic information available to new entrants, the industry can continue to attract new farmers.

5. As the Island's organic industry continues to expand, PEICOPC should consider re-evaluating the impact the industry has on the Island. By re-evaluating the industry three years from now, PEICOPC will be able to contribute to the accumulation and presentation of accurate market information, and help demonstrate the value the industry has on the Island.

6. Pair with the PEI Federation of Agriculture to present industry findings and opportunities during the annual meeting. This will expose federation members to the progress of the Island's organic industry, the opportunities available for local producers and processors, and the needs the industry is facing.

7. Attend Farm Credit Canada public events, such as the FCC young Farmer Summit to gather information and potentially educate young farmers about the growing organic industry and the opportunities available.

SUGGESTED FURTHER SUPPORT

One of the major challenges in completing the analysis of the impact of organic agriculture on the Island's economic, social, and environmental impacts was the lack of immediately available resources. Information relating to the social and economic impacts are very limited, with much of the completed research coming from Europe. Research conducted in North America appears to be focused more on the environmental effects of organic agriculture, rather than the economic or social effects. Fitzpatrick & Company designed the public survey to specifically gather information relating to the social aspect of the industry, however, it proved to be a difficult task to gather any material relating to the economic impact. Information such as farm receipts, market value and importing and exporting values, which is made available for virtually all other industries are a challenge to find. There is a major disparity in the amount of information made available for the Island's conventional farming industry compared to the organic sector. The information gathered by the farm census is mostly limited to conventional farming operations, with the only information relating to the organic sector being the proportion of farms being organic. If Statistics Canada were to integrate more focus on organic farming into 2021's farm census, the organic sector would benefit from updated industry information. This information would benefit producers, processors, marketers, government organizations involved in the organic industry, and potential farmers.

Additional support is required to gather information relating to best organic farming practices, organic input replacements, organic production expenses, and yields. It would be beneficial for the Island's organic industry to gather this information on a regular basis, rather than only collecting limited information during the farm census, which occurs every five years. This additional information would be advantageous for producers, processors, and potential new entrants.

For additional information regarding Atlantic Canada's organic agriculture industry, refer to the publishing and education library at the Atlantic Canadian Organic Regional Network (http://www.acornorganic.org/), and the Canadian Organic Trade Association (https://www.ota.com/canada-ota) (*52*) websites.

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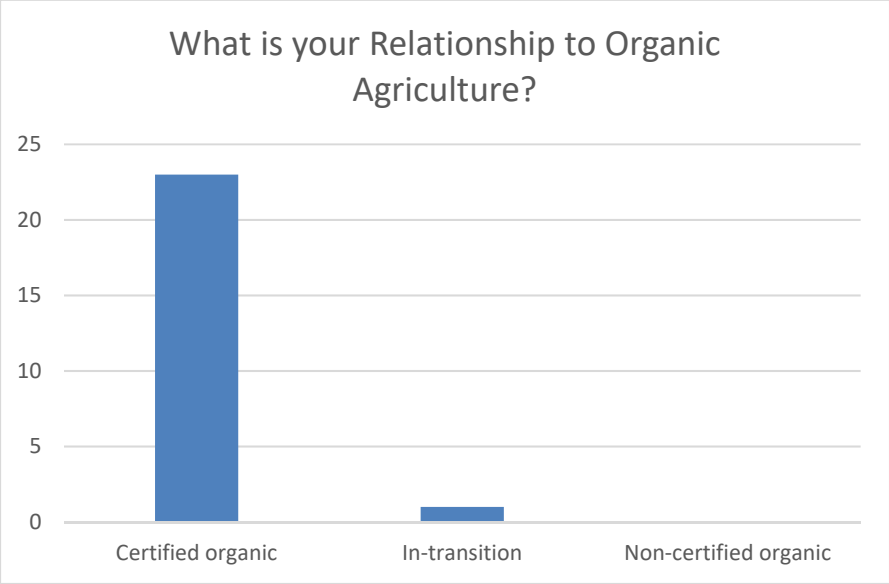
APPENDIX 1 – PRODUCERS SURVEY

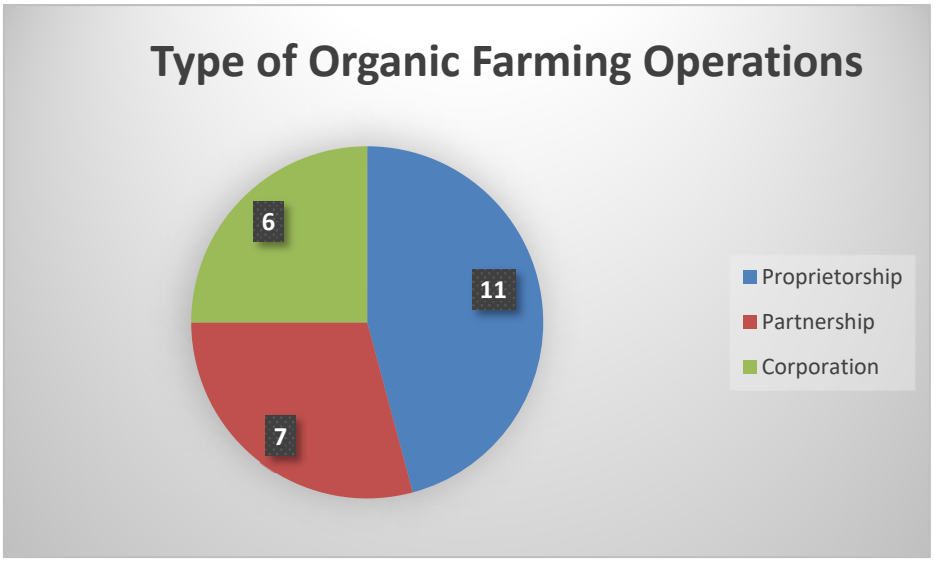
PEI Certified Organic Producers Co-operative

Organic Farming Producers Survey

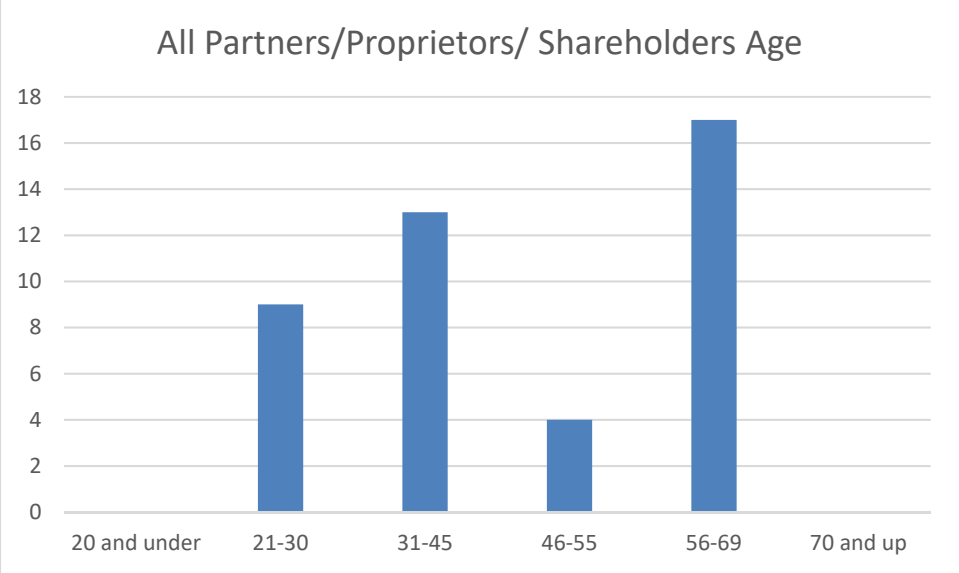
1 What is your relationship to organic agriculture?



2 What type of farm do you run?



3 Please indicate your age range:



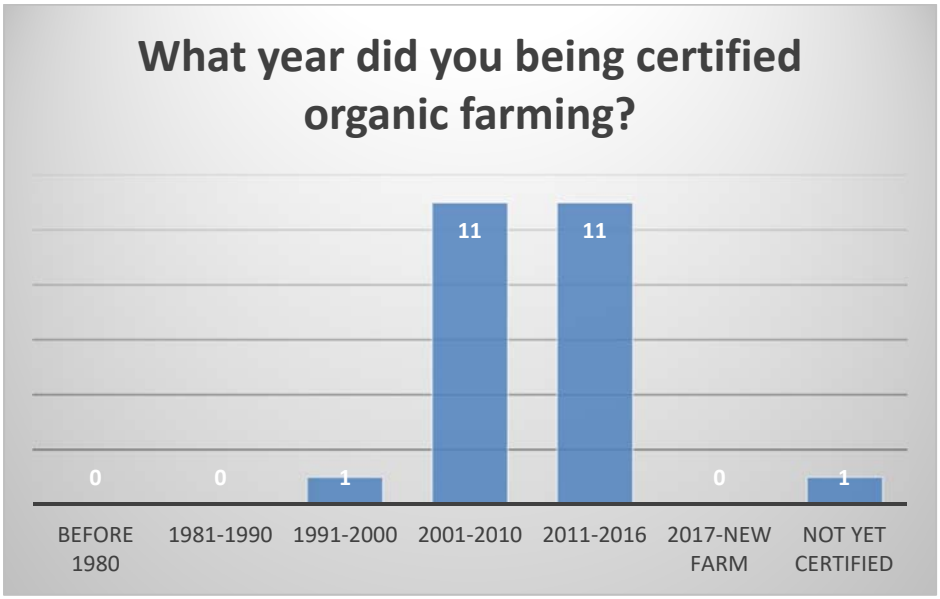
4 How many years have you been farming?

Years Farming	Responses	% of Responses
0-2	**1**	4%
2-5	**1**	4%
5-10	**6**	25%
10-20	**5**	21%
20 or more	**11**	46%

5 How many hours a week do you as a producer spend on organic farming?

Hours Worked	% of responses
1-10	13%
11-20	13%
21-30	0%
31-40	4%
41-50	21%
50+	50%

6 What year did you begin certified organic farming?

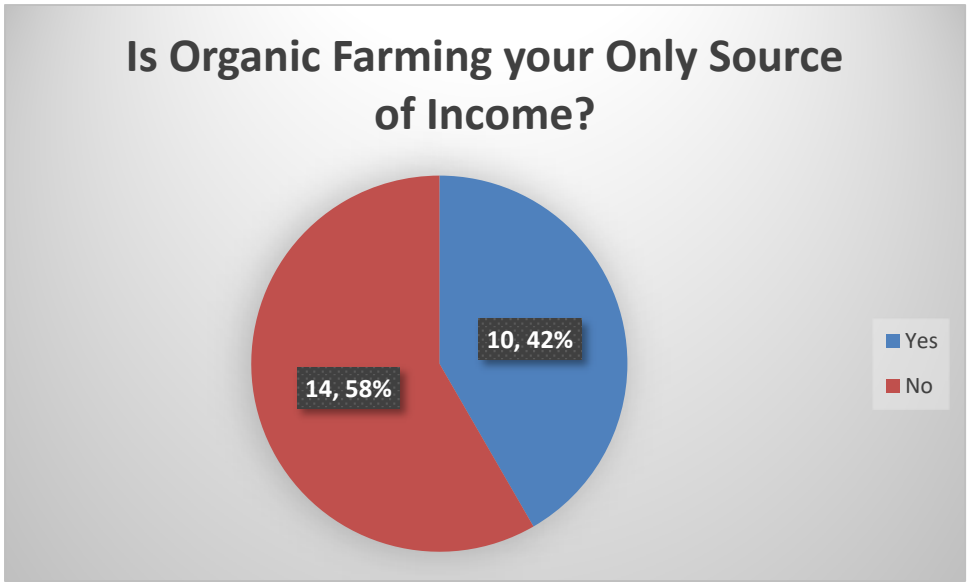


7 What is your place of birth?

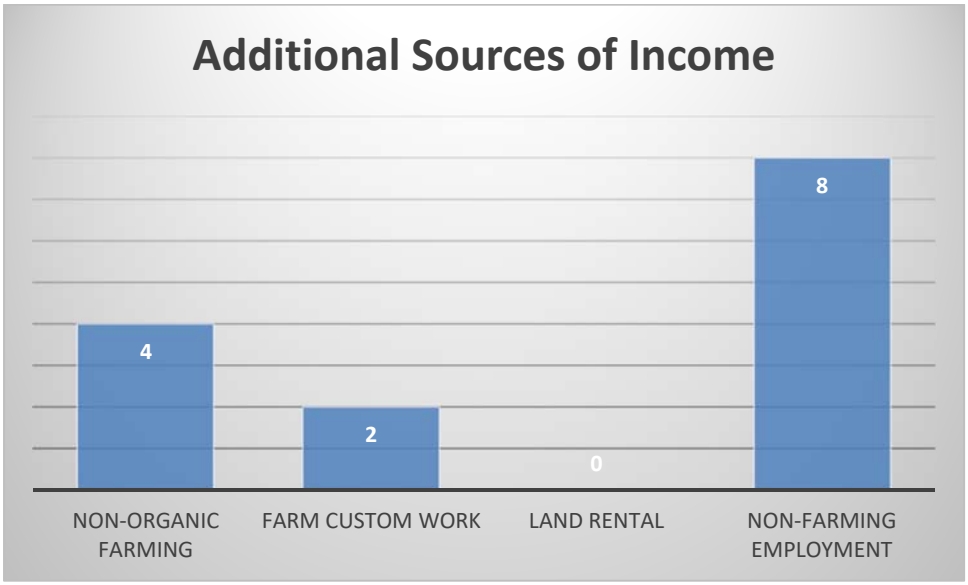
8 What best describes your farming background?

Description	Responses	% of responses
Grew up on a farm that I am still farming	**9**	38%
Grew up on a farm, but operating a farm other than my relatives	**3**	13%
Did not grow up on a farm, but worked on farms growing up and now operate my own farm	**5**	21%
Did not grow up on a farm, with limited to no exposure to farming, and now have transitioned my career to farming	**6**	25%
Other	**1**	4%

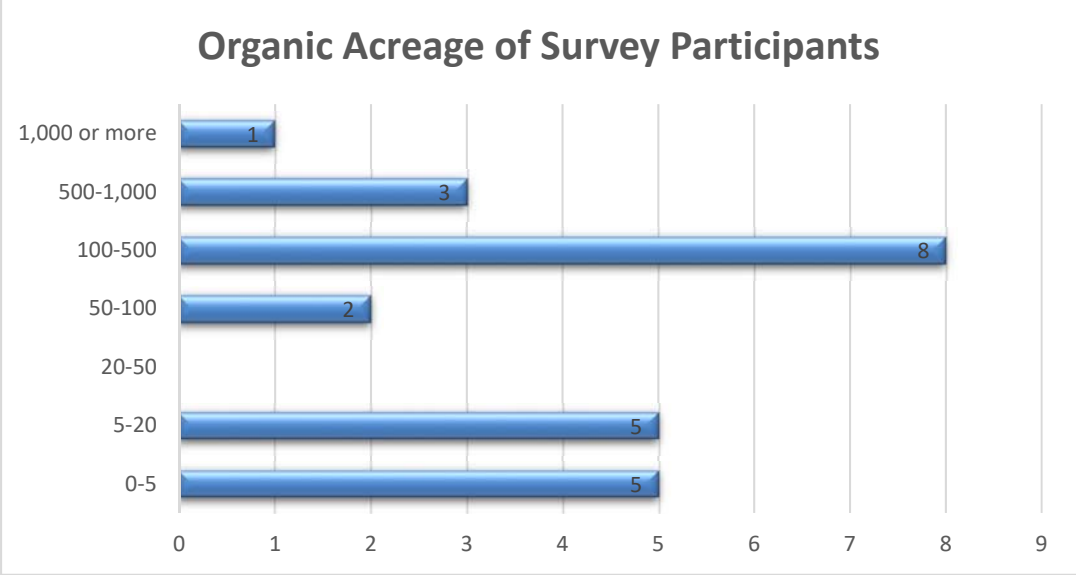
9 Is organic farming your only source of income?



(b) If you answered no to question 9 and organic farming is not your only source of income, what other sources of income do you earn?



10 How many certified organic acres do you have in production?



(b) If you produce organic livestock, how many cattle, chicken, or swine did you sell in the 2016 year?

Production	Responses
1-25	0
26-50	**3**
51-100	**0**
101-200	**0**
201-300	**0**
301-500	**0**
500 +	**1**
N/A	**20**

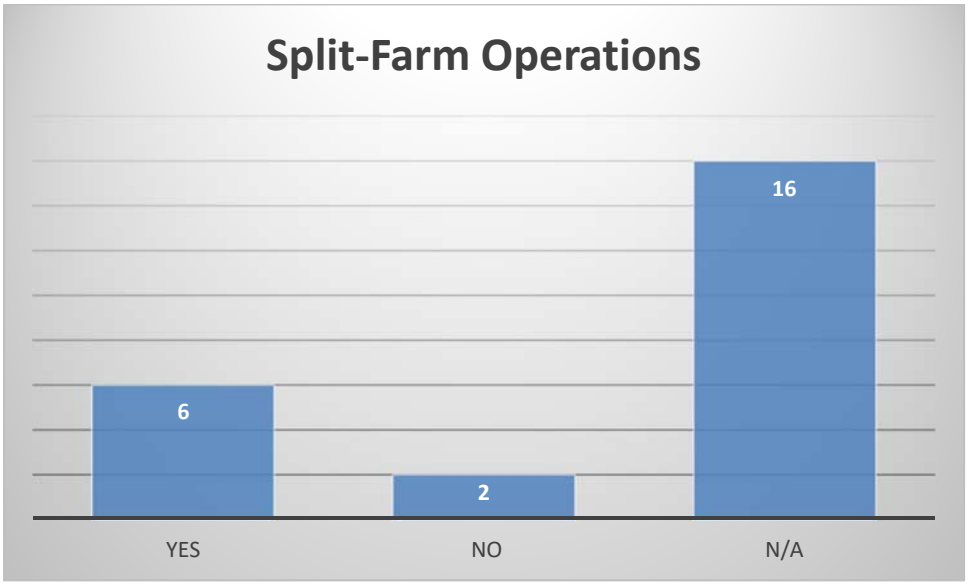
(c). If you produce organic eggs, how many units (in dozens) did you sell in 2016?

Production	Responses
1-50	**5**
51-100	**0**
101-250	**1**
251-500	**0**
501-1,000	**0**
1,001 or more	**1**
N/A	**17**

11 If you are currently in transition from conventional to organic farming, how many acres do you have in transition?

Acreage in Transition	Responses
0-5	**0**
5-20	**0**
20-50	**1**
50-100	**3**
100-500	**0**
500-1,000	**0**
1,000 or more	**0**
N/A	**20**

12 If you have a split-farm operation, have you adopted any organic farming techniques to use on the conventional part of your farming operation?



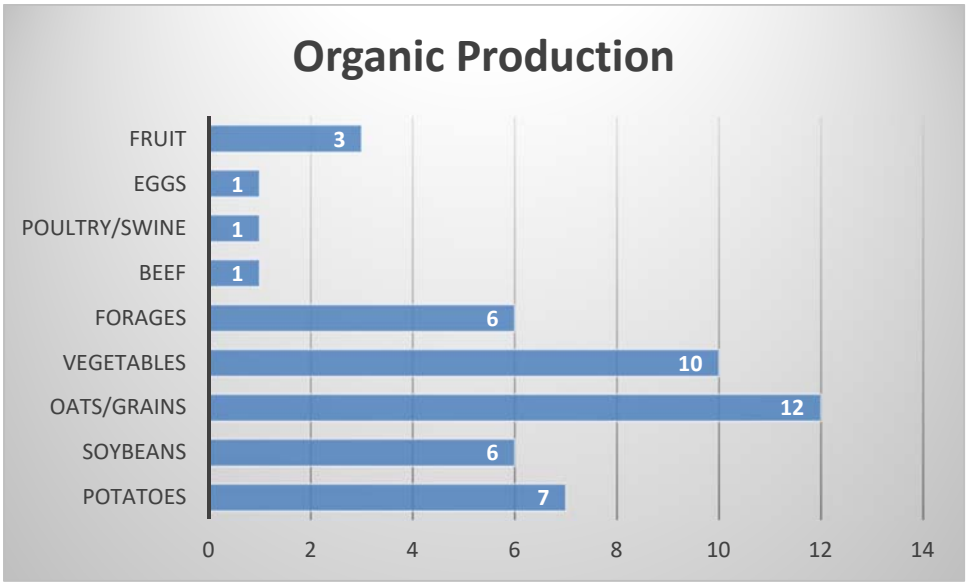
13 How many total acres, including organic, do you farm?

Total Acres	Responses	% of Responses
0-5	**3**	13%
6-20	**5**	21%
21-50	**1**	4%
51-100	**1**	4%
101-500	**8**	33%
501-1,000	**4**	17%
1,001 or more	**2**	8%

14 What percentage of your farm is organic?

Percentage Organic	Responses	% of Responses
100%	**18**	75%
80%	**1**	4%
75%	**1**	4%
50%	**1**	4%
25%	**1**	4%
15%	**1**	4%
10%	**1**	4%

15 What organic products do you currently produce?



16 If available, what was the total organic acreage for each product in 2016?

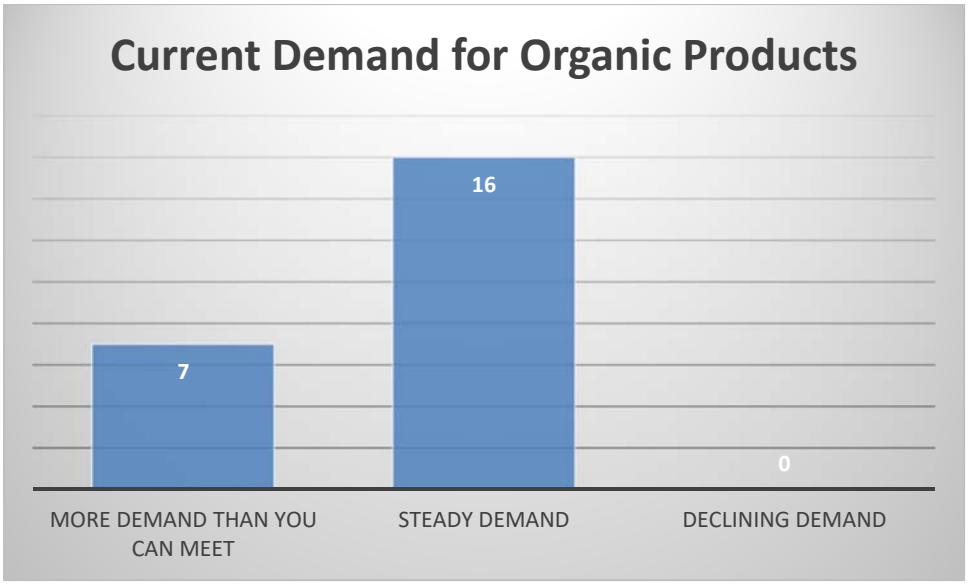
AVG

- Potatoes 55.25
- Soybeans 242.10
- Oats/Grains 158.20
- Vegetables 15.60
- Forages 60.43
- Fruit 5.30
- Other #1 (Hay/Peas/Oats Mixed) 86.00

(b). If available, what was the total revenue per acre for each organic product in 2016?

- Potatoes ___3,407.70
- Soybeans ____ 766.00
- Oats/Grains ____ 448.60
- Vegetables ___4,514.70
- Forages ___2,030.00
- Fruit _____N/A
- Other #1 (Hay/Peas/Oats Mix) ___233.00
- Other #2 (Please Indicate) _____

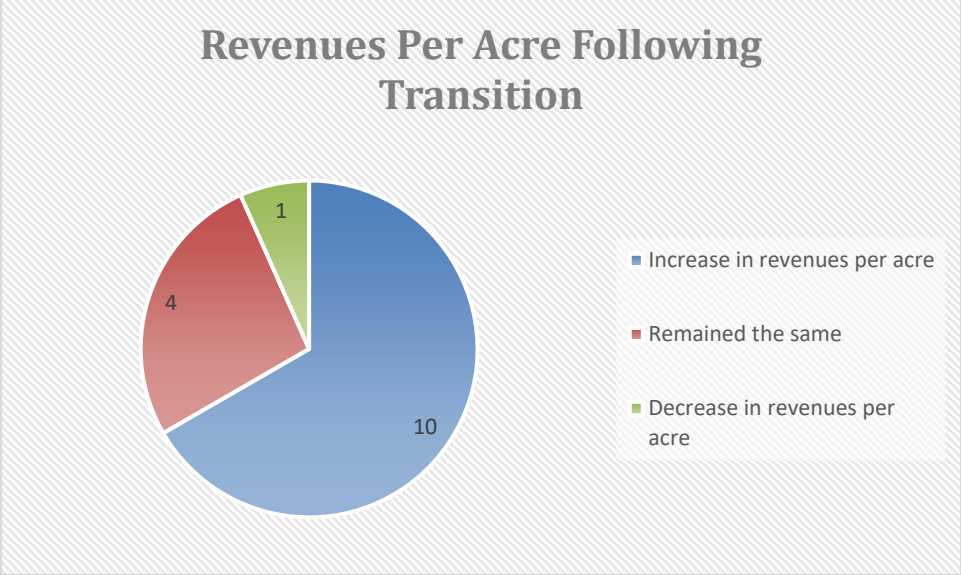
17 What is the market demand for the organic products you are currently producing?



18 Of the options listed, please rank your reasons for farming organically (1 being most important through to 7 being least important).

	Rank	AVG rank
Environment	1	**2.1**
Lifestyle	5	**4.4**
Financial gain	4	**4.227**
Human health	2	**2.9**
Improved farm practices	3	**3.762**
Increased customer confidence	6	**4.5**
Animal welfare	7	**5.3**

19 For those who transitioned from conventional farming to organic farming, how has revenues per acre been affected?



20 How many full-time employees do you have employed during your farming season?

Full-Time Employees	Responses	% of Responses
0-2	**18**	75%
2-5	**3**	13%
5-10	**2**	8%
10-20	**1**	4%
20 and up	**0**	0%

20(a). How many weeks a year do full-time staff work?

- Average of 41.53 weeks per year

20(b). If full-time staff are paid hourly, what is their hourly wage?

- Average of $16.00 hourly

20(c). If full-time staff are paid salary, what is their weekly salary?

- Average of $450 weekly

20(d). How many hours per week do your full-time staff work?

- Average of 47.08 hours per week

21 How many part-time employees do you have employed during your farming season?

Part-Time Employees	Responses	% of Responses
0-2	**19**	79%
2-5	**2**	8%
5-10	**2**	8%
10-20	**1**	4%
20 and up	**0**	0%

21(a). How many weeks a year do part-time staff work?

- Average of 17.71 weeks per year

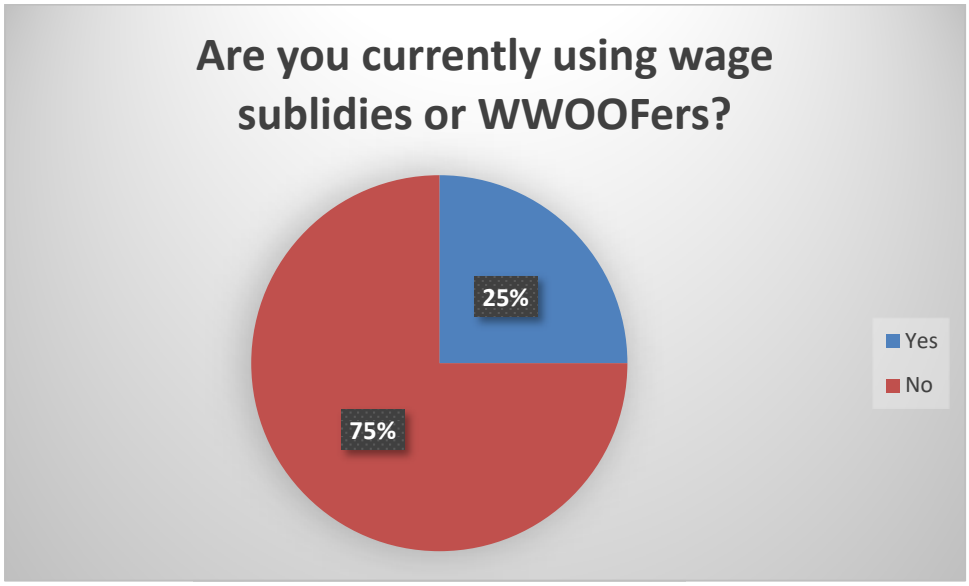
21(b). What is the hourly wage for part-time staff?

- Average wage of $13.15 hourly

21(c). how many hours are worked per week by part-time staff?

- Average of 29.14 hours per week

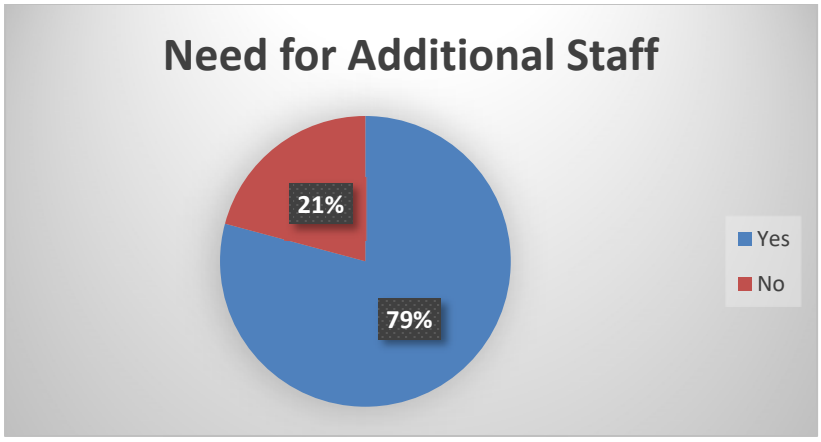
22 Are you currently using any wage subsidies or WWOOFers?



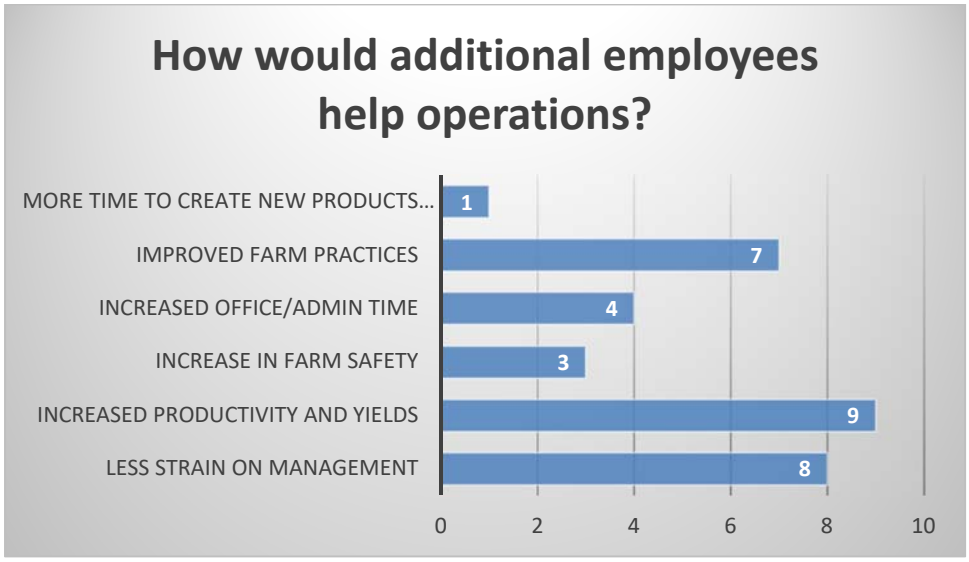
(b). If you are using WWOOFer's, how many did you utilize in 2016?

# of WWOOFer's	Responses
N/A	**23**
1	**0**
2	**0**
3	**0**
4	**0**
5	**0**
< 5	**1**

23 If additional wage subsidies or other funding were available, could you use additional staff?



23 (b). If yes, how would the additional employees help operators?



24 What is the most likely scenario in your opinion on where the organic industry is going in the next 10 years? (Please only choose one)

	Responses	% of Responses
Increased demand	**12**	50%
Increase in new participants	**2**	8%
Increase in organic acreage	**7**	29%
Remain the same	**2**	8%
Decreased demand	**0**	0%
Decrease in organic farmers	**1**	4%
Decrease in organic acreage	**0**	0%

25 Of the options listed below, please indicate the most likely scenario for your farm in the next 10 years.

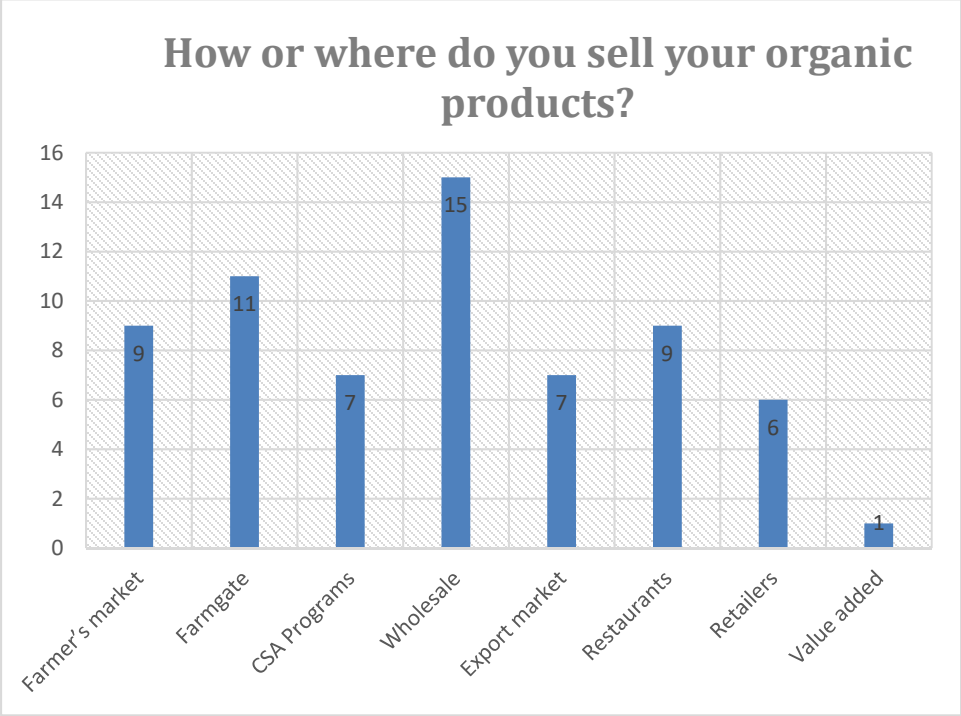
	Responses	% of Responses
Increase production	**15**	63%
Remain the same	**7**	29%
Decrease production	**2**	8%

26 If you indicated in question 25 that you intend to increase production, which organic products will production be increased for, and by how much (in acres or units)?

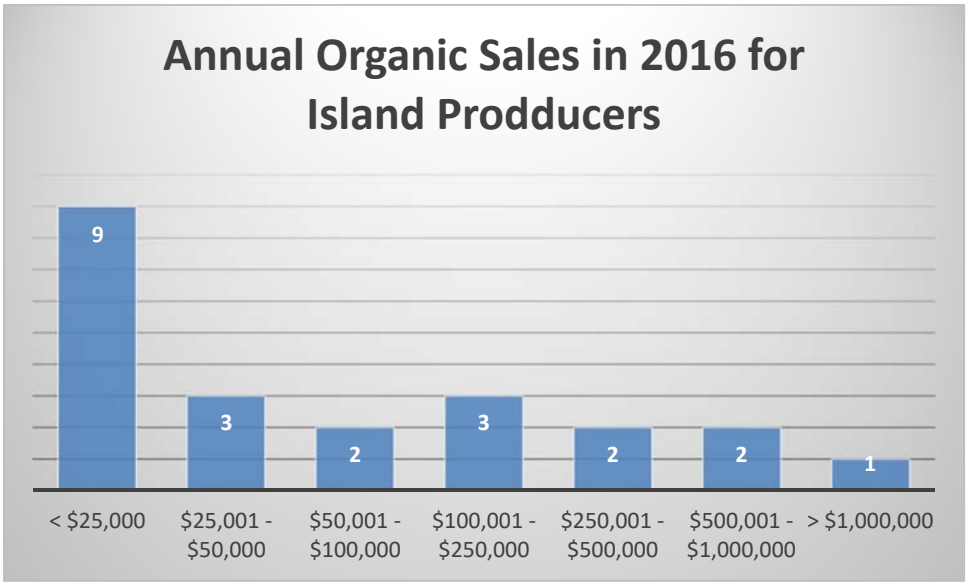
	#1	#2	#3	#4
Product	Cattle	Hemp Grain	Hay	Herbs
Acreage/ Unit	120 units	100 acres	54 acres	20 acres

	#5	#6	#7	#8
Product	Vegetables	Oats/Grains	Forages	
Acreage/ Unit	322 acres	100 acres	100 acres	

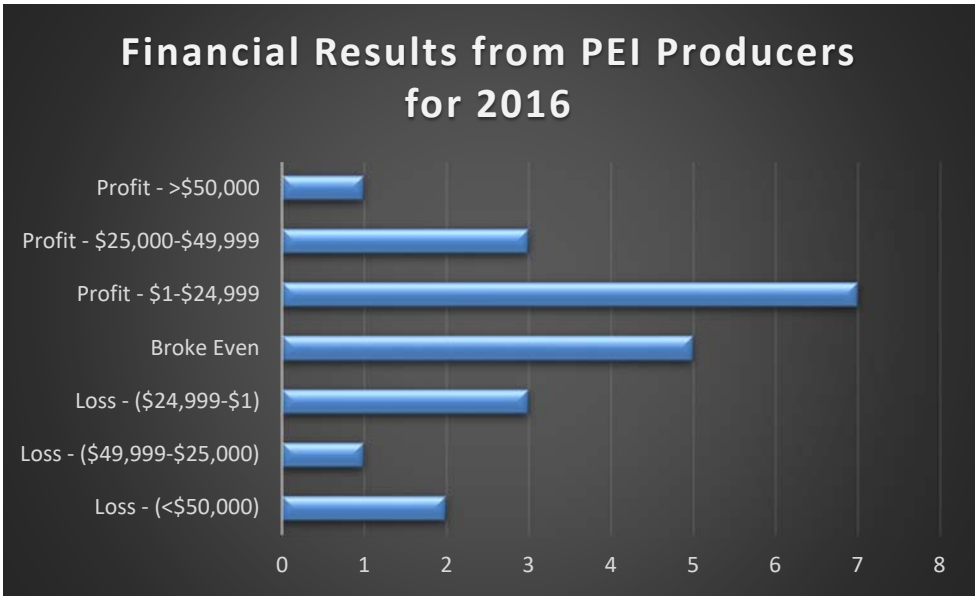
27 How or where do you sell your organic products? (Check all that apply)



28 What were your annual sales of organic products in 2016?



29 Based on your 2016 results, what was the financial outcome of your organic farming operations?



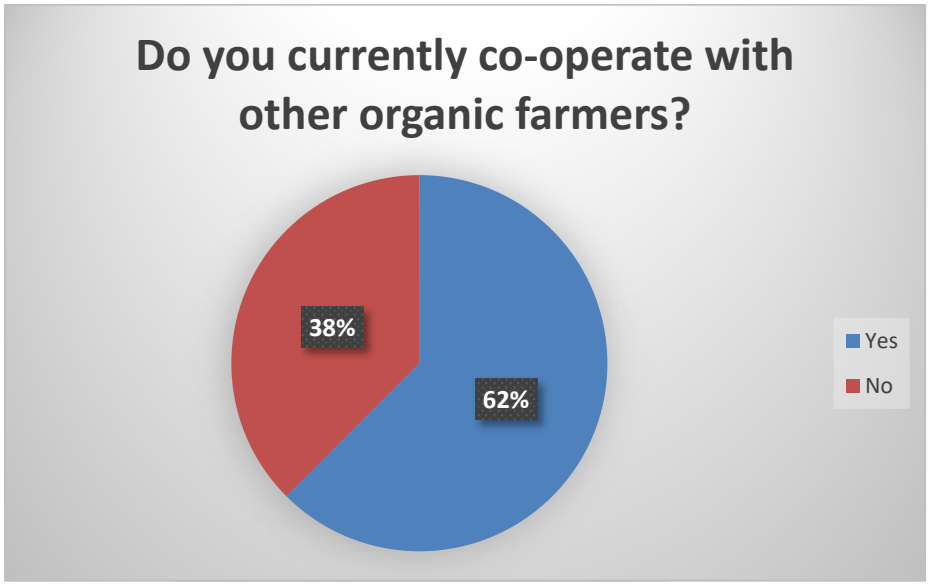
30 Of the options listed, please rank the challenges faced as an organic farmer (1 being biggest challenge through to 11 being least challenging).

Challenges	Rank	AVG Rank
Certification costs	10	**6.90**
Certification requirements	6	**6.00**
Yields	2	**4.68**
Staffing	1	**4.44**
Marketing and distribution	4	**5.39**
Profitability	9	**6.26**
Access to equipment	5	**5.72**
Access to land	7	**6.00**
Training and education	11	**7.11**
Accessing financing	8	**6.22**
Lack of processing capacity	3	**5.00**

31 What additional services or assistance do you need? (Check all that apply)

Required Assistance	% of Producers
Distribution	38%
Marketing	38%
Education and training	33%
Processing	42%
Shared Storage	42%
Access to equipment	46%
Access to land	42%
Access to financing	38%
Access to government programs	38%
Certification process and requirements	21%

32 Do you currently co-operate with other certified organic farmers?



32 (b). If yes, which resources do you share among other certified organic farmers? Check all that apply.

Resources	Responses	% of Responses
Land	**0**	0%
Laborer's	**1**	7%
Storage facilities	**0**	0%
Equipment	**5**	33%
Transportation	**0**	0%
Marketing	**2**	13%
Distribution	**1**	7%
Knowledge	**6**	40%

33 What would you consider to be the greatest social impact of organic farming? Please rank the following (1 being most important through to 6 being least important):

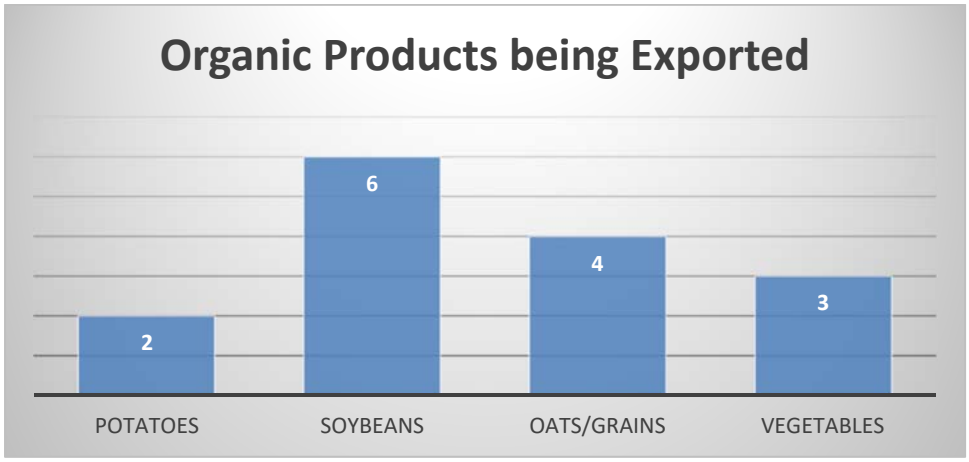
Social Impact	Rank	Avg. Rank
Customer confidence	1	**2.09**
Rural development	2	**3.14**
Lifestyle	3	**3.27**
Increased job opportunities	4	**3.68**
Youth retention	5	**4.00**
Increase in tourism	6	**4.73**

34 What would you consider to be the greatest environmental impact of organic farming? Please rank the following (1 being greatest impact through to 6 being least impact):

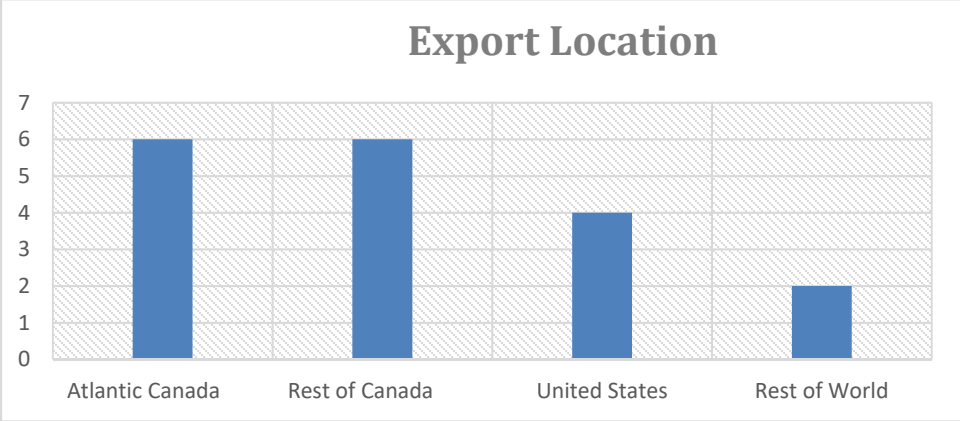
Environmental Impact	Rank	AVG Rank
Reduction in use of chemicals	1	**2.55**
Soil fertility	2	**2.95**
Biodiversity and habitat creation	3	**2.05**
Water source protection	4	**4.38**
Reduction in greenhouse gases	5	**4.62**
Climate change mitigation	6	**3.55**

35 Do you currently export any of your organic products?

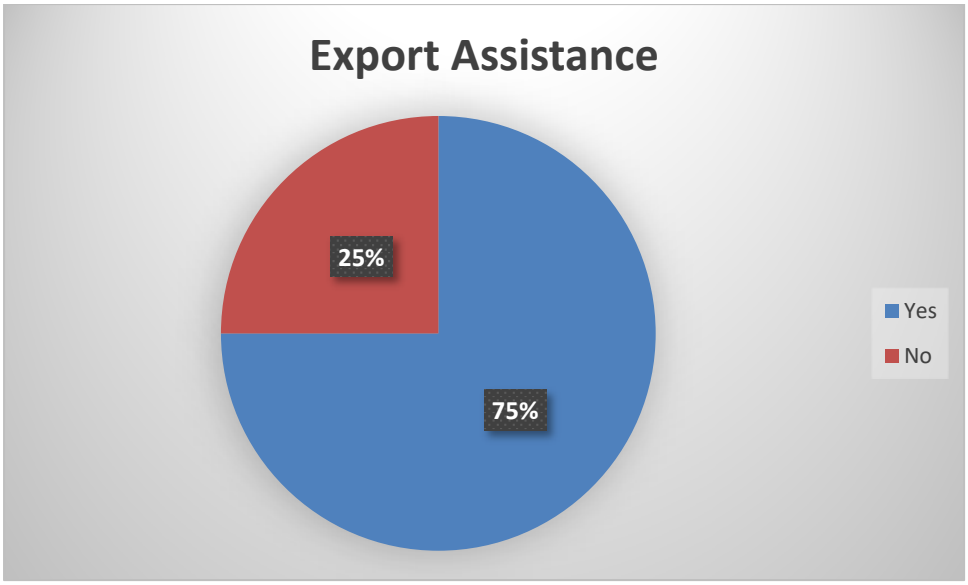
35 (b). If yes, which organic products are you exporting?



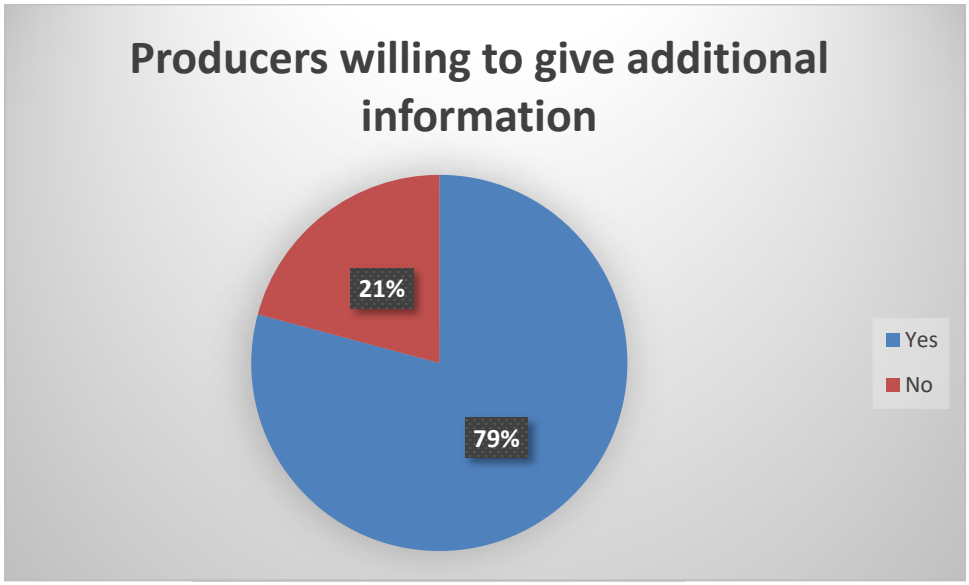
35 (c). Where do you export your organic products?



36 Do you believe there is a need for greater focus to promote, distribute, and negotiate on behalf of organic producers for exporting opportunities?



37 Can we follow up with additional questions based on some of your answers if required?



APPENDIX 2 – PER ACRE EXPENSE COMPARISON

Grain Corn		
Organic vs Conventional per acre comparison		
	Organic	**Conventional**
Expenses:		
Depreciation	$ 51.85	$ 42.90
Drying	52.65	80.35
Fertility/soil maintenance	150.00	141.40
Herbicide	-	14.15
Interest expense	31.10	28.20
Labour	64.20	12.15
Machinery expenses	48.40	40.60
Marketing board and certification fees	4.25	1.90
Other overhead	7.20	6.60
Production insurance	15.55	12.60
Seed	93.40	107.25
Storage	22.00	33.60
Trucking	24.00	36.65
	$ 564.60	$ 558.35

Soybeans		
Organic vs Conventional per acre comparison		
	Organic	**Conventional**
Expenses:		
Depreciation	$ 62.60	$ 41.95
Drying	9.25	12.15
Fertility/soil maintenance	50.00	61.15
Herbicide	-	35.00
Interest expense	33.30	23.85
Labour	86.95	9.65
Machinery expenses	55.80	35.15
Marketing board and certification fees	4.30	1.85
Other overhead	9.80	7.80
Production insurance	16.90	9.85
Seed	67.05	57.35
Storage	6.85	9.85
Trucking	7.45	10.75
	$ 410.25	$ 316.35

Barley		
Organic vs Conventional per acre comparison		
	Organic	**Conventional**
Expenses:		
Depreciation	$ 41.35	$ 40.90
Fertility/soil maintenance	50.00	74.55
Herbicide	-	8.00
Interest expense	26.10	23.60
Labour	48.00	9.65
Machinery expenses	37.20	34.65
Marketing board and certification fees	4.60	2.00
Other overhead	6.15	7.60
Production insurance	8.10	8.10
Seed	103.65	52.70
Trucking	10.80	13.50
	$ 335.95	$ 275.25

Oats		
Organic vs Conventional per acre comparison		
	Organic	**Conventional**
Expenses:		
Depreciation	$ 41.35	$ 40.90
Fertility/soil maintenance	50.00	63.70
Herbicide	-	8.00
Fingicide	-	16.40
Interest expense	24.60	21.05
Labour	48.00	9.65
Machinery expenses	37.20	34.65
Marketing board and certification fees	4.55	1.90
Other overhead	6.15	7.60
Production insurance	8.10	8.10
Seed	56.65	36.50
Trucking	8.65	10.80
	$ 285.25	$ 259.25