GREENHOUSES GROW ONTARIO

- An Economic Impact Study of the Greenhouse Industry in Ontario -

The Ontario Greenhouse Alliance
TOGA

2006

Source: Image Library, Ontario Greenhouse Vegetable Growers

PLANSCAPE
104 Kimberley Ave.,
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IN ASSOCIATION WITH:

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BUILDING COMMUNITY THROUGH PLANNING

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Municipality of Leamington

Niagara Regional Municipality

ONTARIO GREENHOUSE VEGETABLE GROWERS

The Ontario Greenhouse Alliance TOGA

Flowers Canada 40 Fleurs Canada Ontario 1966 - 2006

Executive Summary

EXECUTIVE SUMMARY

Background and Purpose

In the summer of 2005, The Ontario Greenhouse Alliance commissioned a study to assess the contribution the greenhouse agriculture sector makes to the provincial economy. The firms of Planscape and Regional Analytics were jointly retained to:

- Determine the current contribution of the greenhouse sector, both flowers and vegetables, to the economy of Ontario;
- Estimate the future contributions of the greenhouse sector to the economy of Ontario; and
- Provide a national and global context for the Ontario greenhouse sector in terms of growth opportunities, adoption of technology, competitive threats, water and energy supply and cost, border access and distribution logistics.

The study was conducted during the fall of 2005 and winter of 2006, using both primary and secondary data sources. The authors encountered challenges with both the lack of and inconsistencies with data. In response to this, caution was exercised with the data used and multiple data sources were referenced to confirm accuracy. Given the rigor of the process, the authors are comfortable that the data used in this study is reliable and reflective of industry trends but they are also of the opinion that it is conservative and under represents the real value of the greenhouse agriculture sector.

Economic Impact

Source: Ontario Greenhouse Vegetable Growers

The conclusion of the study was that the greenhouse agriculture sector is a very significant component of the provincial economy and generates major economic activity within that economy. Specifically, the analysis illustrates that the greenhouse sector had a $3.9 billion total impact on the Ontario economy in 2004; $1.1 billion in gross sales resulted in $3.1 billion of additional industrial output and $770 million in labour income.

The analysis also revealed that the "potted plants, bedding plants and cuttings" component of the industry was more "propulsive"[1] than any of the other components followed by tomatoes, cut flowers, cucumbers and peppers. The "potted plants, bedding plants and cuttings" component of the greenhouse industry generates the largest Provincial economic impact of all components simply because of the fact that this component accounts for a disproportionate share of total sales annually.

[1] "Propulsive" - having the power to propel, in this instance refers to industries with large multipliers who therefore have the ability to stimulate activity in other industries by scaling up their own output.

Given the fact that the greenhouse sector and its components all possess output multipliers in excess of 2.0, the industry can be considered to be highly propulsive within the broader Ontario economy. Total output multipliers were found to range from a low of 2.83 for potted plants, to a high of 3.06 for peppers. Multipliers are a reflection of the degree to which a given sector is connected to other industries in the host economy through backward linkages (i.e. reliance on input providers) and forward linkages (i.e. reliance on firms across all industries as customers). The substantial multipliers exhibited by the sector and its components suggest that it has strong backward and forward linkages to firms in all industrial sectors across Ontario.

The components of the greenhouse sector all possess large simple and total multipliers, implying that they are all very propulsive components of the provincial economy. Interestingly, the greenhouse industry and each of its components exhibit Simple Output Multipliers (or SOMs) and Total Output Multipliers (or TOMs) which are amongst the highest of all sectors in the province.[2]

The conclusions of the economic analysis are that the greenhouse sector in the province of Ontario:

- has undergone tremendous structural change and growth in recent years;
- generates nearly $4 billion worth of industrial activity and labour income province-wide annually;
- is strongly interconnected with most of the industries present in the economy; and,
- is comprised of components that all possess large simple and total multipliers, implying that they are all very propulsive components of the provincial economy, the greenhouse sector and each of its components exhibit SOMs and TOMs which are amongst the highest of all sectors in the province.[3]

The Ontario greenhouse sector is a major contributor to the provincial economy and is worthy of support and promotion.

Industry Profile

The greenhouse sector is a very significant component of Ontario agriculture. In studies done of regional agricultural economies, it ranks as one of the highest in terms of gross farm receipts generated, even though it is one of the smallest in terms of area farmed. In 2001, it accounted for 11% of the total gross farm receipts generated in Ontario.[4]

In terms of growth, the Ontario industry has really come into prominence over the past twenty-five years. In 2001, Statistics Canada recorded a total of 2,012 operators occupying in excess of 913 hectares (2,256 acres). The largest conglomeration of

[2] It is important to note at this juncture that the input mixes used to run the TOGA Impact Model (or TIM) are based on survey input from operators as well as an allocation procedure developed by Regional Analytics Inc.
[3] It is important to note at this juncture that the input mixes used to run the TIM are based on survey input from operators as well as an allocation procedure developed by Regional Analytics Inc.
[4] Total sales divided by total gross farm receipts. Data for total gross farm receipts is calculated on all farms reporting - Statistics Canada 2001, Catalogue No. 95F030XIE. Total greenhouse sales is based on data from Statistics Canada, Greenhouse, Sod and Nursery, Catalogue No. 22-202-XIB, 2001.

greenhouses is found in Essex County with the second largest located in the Region of Niagara. 87% of the greenhouses in Essex are dedicated to vegetable production; in Niagara, 84% are dedicated to flowers.

Although there has been a decline in the number of separately owned operations recently, the area occupied by greenhouses has increased. In 1997 there were 1,450 greenhouses occupying 603 hectares (1,490 acres); in 2004 there were 1,285 operations occupying 913 hectares (2,256 acres). This trend to larger operations is consistent with other trends in agriculture in Canada and with trends in the greenhouse industry internationally.

Historically, flower production has dominated the industry but vegetable production is gaining ground. In 1986, vegetables accounted for 39% of greenhouse area, in 2001 their share had increased to 43%. In terms of size, the largest operation in 2005 was a vegetable producer with an operation of 20.8 hectares (51 acres). The largest floriculture operation in 2005 was 16.25 hectares (40 acres).

In 2001, total value of sales[5] for vegetables, ornamental flowers and plants was $1,000,326,000[6]. Greenhouse vegetables accounted for 34%, ornamental flower and plants sales for 66%. By 2004, this value had increased to $1,102,839,025. This is a very high value and reflects the fact that greenhouse sales are proportionately amongst the highest for agricultural products in Canada. In 2004, with $2.1 billion dollars in sales, the Canadian ornamental industry alone recorded the third highest value of production of all Canadian crop farms, behind only wheat and canola.[7] Although the ornamental sector includes nursery and sod, ornamental sales, which are primarily greenhouse products, represent 68% of the total sales for the sector.

Source: Flowers Canada (Ontario)

Ontario leads the country in greenhouse production and has done so consistently over time. In 2003, Ontario accounted for 52% of the total Canadian floriculture production[8] and 58% of total greenhouse vegetable acreage[9]. In 2004, 51% of Canada's total greenhouse production acreage was located in Ontario[10].

On a global basis, Ontario occupies a significant position in greenhouse production. Although its production is exceeded by European countries such as Spain and the Netherlands, (Ontario's production is approximately 10% of the Netherlands[11]), Ontario

[5] Value of sales represents sale value at the farm gate for ornamentals, plants and vegetables.
[6] Statistics Canada Greenhouse, Sod and Nursery, Catalogue No. 22-202-XIB, 2004, pg. 14
[7] Agriculture and Agri Food Canada, Canadian Ornamental Situation and Trends, 2004, December 2005, pg 4
[8] Ontario Ministry of Agriculture Food and Rural Affairs (OMAFRA), A Profile of the Ontario Greenhouse Floriculture Industry, June 2003, pg 12
[9] Agriculture and Agri Food Canada, Introduction to the Greenhouse Vegetable Industry, December 2004, pg 1
[10] Niagara Economic Development Corporation (NEDCO), Ontario Greenhouse Vegetable Markets in the United States, November 2005, pg 3
[11] OMAFRA, A Profile of the Ontario Greenhouse Floriculture Industry, June 2003, pg 4

is the largest producer of greenhouse vegetables in North America. The southern part of Essex County around the Town of Leamington has the largest concentration of greenhouse vegetable production in North America. At approximately 355 hectares (877 acres), this area is larger than the entire corresponding American industry. Ontario ranks third in North America in the production of greenhouse floriculture products, after California and Florida. In 2003, Ontario had a trade surplus of $109 million[12] with the United States for this sector.

Source: Flowers Canada (Ontario)

In the Canadian context, Ontario dominates the very significant export market for greenhouse product, with sales to the United States of $636 million in 2003 and $586 million in 2004. Of the total Canadian product exported in 2003/04, 70% of tomatoes, 84% of cucumber, 64% of peppers and 66% of floriculture came from Ontario. The Province has seen a dramatic increase in sales of floriculture products to the United States, the destination of approximately 90% of industry exports,[13] with the peak year for sales being 2002. In the ten year period from 1994 to 2004, Ontario exported floriculture products with an approximate cumulative export value of $2.1 billion dollars to the United States, accounting for 72% of the total Canadian floriculture exports for that period[14].

Within Canada, Ontario is a leader in the production and export of greenhouse vegetables. In 2003/04, the cumulative total of Ontario greenhouse vegetable export sales exceeded $701 million, representing 71% of the Canadian total.

Greenhouse vegetable production in Canada has seen a 167% increase in national farm gate value since 1997. While peppers have seen the largest percentage increase in value, by volume tomatoes are still by far the largest component of this sector. Cucumbers, although not as fast growing as the other two vegetables, have nevertheless seen a doubling in farm gate value and have maintained their market share.

The Ontario situation mirrors the national trend. In Canada, greenhouse production area increased by 61% between 1998 and 2004; pepper production area increased by 266% from 439,260 square metres (4,728,307 sq. ft.) to 1,607,690 square metres (17,305,600 sq. ft.)[15], and export sales increased to 20% of the total vegetable export sales. There was a modest decline in Ontario's share of Canada's greenhouse pepper production during the period 2003/04, due to an increase in production in British Columbia. Overall, however, Ontario continues to dominate greenhouse vegetable production in area.

[12] OMAFRA, A Profile of the Ontario Greenhouse Floriculture Industry, June 2003, pg 3
[13] Agriculture and Agri Food Canada, Canadian Ornamental Situation and Trends (2004), December 2005, pg 10
[14] NEDCO, Ontario Greenhouse Floriculture Markets in the United States, December 2004, pg 6
[15] NEDCO, Ontario Greenhouse Vegetable Markets in the United States, November 2005, pg 6

Operating costs for greenhouses are high in comparison with open field agriculture. The most significant costs are labour and fuel. While labour is a major cost that tends to rise proportionately as area under production increases, it is easier to forecast and control. Fuel costs, conversely, are subject to fuel commodity market forces and can fluctuate significantly from season to season.

In 2004, Statistics Canada reported that there were 18,400 full and part-time employees in the greenhouse sector. This level of employment represented a 30.5% increase over the number employed in the industry in 1997. Cumulatively, the sector is a major employer in Ontario.

Issues and Trends

Although the greenhouse industry is young, growing and vibrant, there are issues to be faced.

Education and research are critical requirements of this industry. Programs to train growers and provide ongoing skills and training, need support and expansion. Coordination and strengthening of research is critical for the industry to stay ahead of, and be competitive in the international market. There are elements of this support network already in place, however, they need to be strengthened, supported and expanded. The floriculture sector is actively pursuing establishment of a research component at Vineland Station. At the same time the government is considering options for the facility. Other agricultural sectors with similar research requirements have identified a need for additional support. There seems to be a unique opportunity at Vineland to develop a research facility that can become a world leader and support the greenhouse sector into the 21st century.

As the industry has grown, so has its reliance on foreign workers to satisfy labour requirements. Reliance on offshore labour makes the industry extremely vulnerable to international events that could impact the supply. It would be prudent for the industry to address this issue either through increased mechanization or the development of programs to attract a local workforce.

Federal human resource agencies and educational institutions are aware of the potential employment opportunities offered by the greenhouse industry and initiatives have been introduced to link job training to the industry. The growers need to support these initiatives as a means to ensure a future supply of workers with appropriate skills.

Infrastructure is another critical requirement for the greenhouse industry. Access to water, three-phase power, natural gas and efficient transportation routes is essential. Governments at all levels should be encouraged to consider the needs of the greenhouse sector when planning for infrastructure. Where initiatives, such as the study of providing irrigation water for agriculture in Niagara are undertaken, the industry needs to participate to ensure that its needs are understood and addressed.

Greenhouse growers need to do a more effective job in promoting product. The implementation of the Integrated Pest Management (IPM) program that allows many products to be grown free of pesticides should be a huge promotional factor and one that the market will respond to favourably.

The greenhouse sector has evolved with very little government support. However, as the industry moves forward, participation by all levels of government is critical to support the industry. This support should come at all levels, and be in the form of supportive development regulations, infrastructure planning, resolution of trade issues, improved border access and research and development programs. This industry makes a very significant contribution to the provincial and national economies and could increase this contribution, with support.

Conclusion

The greenhouse industry is a prosperous and growing sector of the Ontario economy that is both an agricultural success story and an opportunity for growth and leadership on the international stage. It is also an agricultural sector that needs to raise its profile.

The Ontario greenhouse agriculture sector is competitive and successful in international markets, generates a healthy balance of trade, is on the cutting edge of advanced technology and has a critical mass unparalleled in North America. The remarkable growth of Ontario greenhouse agriculture is a story well worth broadcasting.

As the greenhouse sector is increasingly subjected to currency pressure, escalating costs, border issues and international trade issues, governments at all levels need to be familiar with the industry and ready to assist in solving problems. To grow, new entrepreneurs need training and access to capital. To keep up with competitors, access to evolving technology, improved pest control and leading edge research is required. Porous borders and reduced bureaucracy are crucial.

It is hoped that this study, by documenting the very significant contribution the greenhouse industry in Ontario makes at the provincial, national and international levels, will aid in raising the industry's profile and securing for it, a healthy future.

Source: Ontario Greenhouse Vegetable Growers

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AN ECONOMIC IMPACT STUDY OF THE GREENHOUSE INDUSTRY IN ONTARIO

GREENHOUSES GROW ONTARIO

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Source: Vermeer's Design Centre www.vermeers.ca

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INTRODUCTION

AN ECONOMIC IMPACT STUDY OF
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GREENHOUSES GROW ONTARIO

CHAPTER 1 INTRODUCTION

1.1 Background and Purpose

The Ontario Greenhouse Alliance (TOGA) was established in 2003 to provide a joint, unified voice for the vegetable and floral sectors of the Ontario greenhouse industry. The vegetable sector, represented by the Ontario Greenhouse Vegetable Growers, includes growers of peppers, cucumbers and tomatoes. The floral sector includes growers of cut flowers, potted plants, bedding plants and/or propagative material, most of whom are members of Flowers Canada (Ontario) Inc. What all members share, is that their product is grown under glass or plastic[1]. This common method of production and the recognition that both sectors face many common issues led to the creation of TOGA, a vehicle for identifying and addressing shared concerns.

One of the first issues identified by TOGA was the reality that, despite being one of the leading and fastest growing agricultural sectors in Canada, greenhouse agriculture tends to have a low profile. Studies done of the sector have focused on one type of commodity rather than the greenhouse sector as a whole. Because of this lack of comprehensive information, the role of the Ontario greenhouse sector in Canadian agriculture and its contribution to the economy is not well understood or appreciated. By providing a reliable profiling of the industry, this report will fill that information gap.

1.2 Study Objectives

In the summer of 2005, The Ontario Greenhouse Alliance commissioned a study to assess the contribution the greenhouse agriculture sector makes to the provincial economy. The firms of Planscape and Regional Analytics were jointly retained to:

- Determine the current contribution of the greenhouse sector, both flowers and vegetables, to the economy of Ontario;
- Estimate the future contributions of the greenhouse sector to the economy of Ontario; and
- Provide a national and global context for the Ontario greenhouse sector in terms of growth opportunities, adoption of technology, competitive threats, water and energy supply and cost, border access and distribution logistics.

[1] Note – greenhouses are constructed either of glass or plastic with selection based on the crop being grown, changes in technology, cost and grower preference. Throughout this report reference to “under glass” includes both glass and plastic.

1.3 Audience

The audience for this study is broad. Generally, the proponents[2] intend that the study will raise the profile of the greenhouse agricultural sector and provide information about this very innovative and fast growing industry which has had a relatively low profile to date. More specifically, the proponents intend that this study will be a compilation of facts about the industry that will be useful to stakeholders of the industry in understanding the challenges and the opportunities that lie ahead.

A primary audience for this report includes governments and the regulatory agencies which have an impact on the sector. It is important for these bodies to understand the importance of this sector, its role in stimulating and supporting the economy, its world-class status and its future potential, so that the actions they take will support and foster the sector.

1.4 The Study Team

The study team was structured in response to the specific requirements set out in the terms of reference. The project was coordinated by Margaret Walton of Planscape, a land use planning consulting firm specializing in planning for rural areas. Planscape has conducted economic impact studies for ten regional municipalities in Ontario and has extensive experience with this type of work. Planscape staff conducted research, both primary and secondary, and were responsible for all planning, land use, and qualitative components of the study.

Dr. Rick DiFrancesco, the principal of Regional Analytics, is an expert in economic input output analysis and a Professor at the University of Toronto. His analytical role was to assess and report on the economic impact.

Throughout the study, members of the project Steering Committee provided guidance and invaluable input. The Steering Committee included James Farrar, Administrator for TOGA, Kristen Callow, General Manager of the Ontario Greenhouse Vegetable Growers, Jamie Aalbers, Research Director, Flowers Canada (Ontario) and Dr. Irwin Smith, Executive Director for Flowers Canada (Ontario). Their contribution to the project was enhanced by significant input from members of other organizations, including municipal governments and their agencies, and from individual growers.

1.5 The Study Area and Parameters

The study encompasses all of Ontario. Because Statistics Canada was used as a major source of data, reporting has been based on the standard Census Division breakdown.

Study parameters include an overview of greenhouse production, analysis of industry structure and assessment of economic impact including employment impacts and generation of taxes and revenue for government.

[2] "Proponents" is intended to mean those who commissioned the study but also includes the study's authors.

Although numerous studies have been done of specific components of the greenhouse agriculture sector in Ontario, less attention has been paid to the industry as a whole. To understand the importance of the overall sector, it is important to bundle the various commodities together. The creation of TOGA, a strategic alliance between the Ontario Greenhouse Vegetable Growers, Ontario Greenhouse Pepper Growers Association and Flowers Canada (Ontario) has facilitated this approach.[3]

1.6 Report Structure

The purpose of this report is to profile the contribution the greenhouse agricultural sector makes to the Ontario economy. While this is the main focus of the report, in order to assess the sector's economic importance, one must understand its structure. Therefore, the next chapter of the report provides an overview of the sector, its evolution and its current status. This chapter is followed by the economic analysis, an assessment of the industry's contribution to the tax base, a discussion of issues and an assessment of trends.

Source: Flowers Canada (Ontario)

1.7 Research Methodology

The research methodology used to complete the study included the use of primary and secondary sources.

With respect to primary research, a survey, specifically designed to provide the data required for a sectoral input and output analysis of the agricultural economy, was administered to a representative sampling of the industry. Efforts were made to target a grower from each of the different commodity groups and growers with different sizes of operation. Results from this survey were used as the basis for the sectoral analysis contained in Chapter 3 of this report.

Primary research was also conducted in the form of a series of farm visits and discussions with individuals working in the industry. Visits were made to selective examples of greenhouse operations to cover the range in size and type of operation. Information gained from these tours and discussions with members of the industry enhanced the secondary research that was conducted.

The secondary statistical sources used for the study included Statistics Canada, the Ontario Ministry of Agriculture and Food and Rural Affairs, the Niagara Economic

[3] As a result of a producer vote conducted by the Farm Products Marketing Commission in the first quarter of 2005, Ontario greenhouse pepper growers chose to have their crop included under the authority of the Ontario Greenhouse Vegetable Growers (OGVG), a provincially chartered marketing board. While the Ontario Greenhouse Pepper Growers' Association has not yet been dissolved, peppers is now represented at TOGA by the OGVG.

Development Corporation, Agriculture and Agri Food Canada, Strategis, the electronic information arm of Industry Canada, Flowers Canada (Ontario) and the Ontario Greenhouse Vegetables Growers. Statistics Canada data is the primary source for data relied on by most of these organizations and therefore is the basis for the majority of the analysis. Because of this, the definitions used by Statistics Canada are the definitions that underlie the analysis. Statistics Canada has a number of different definitions used for different purposes. Therefore, the numbers used in this report may vary depending on the context in which they are being used.

The greenhouse industry is a complex industry which has seen rapid growth over a relatively short period of time. A significant portion of this growth has occurred since the last comprehensive census in 2001. The growth of the industry, combined with the fact that the last census was done five years ago, have made compilation of statistics for the industry very challenging and results in certain anomalies in data.

Source: Ontario Greenhouse Vegetable Growers

In recognition of this lack of currency in the data and in response to TOGA's concern that some of the census data may not accurately reflect the true status of the industry, the research team has attempted to confirm the data where possible and to augment Statistics Canada data with data from alternative sources. Although much of the data from alternative sources has Statistics Canada data as its base, there are several reliable sources of independent data. By using these alternative sources, combined with data collected from interviews with growers, the research team is confident that the values used accurately portray the industry.

To ensure that there is a clear understanding of the origin of data and the factors that influence its collection, references are included throughout the report noting the source of data and commenting on its nature. Over time, Statistics Canada updates and revises data and its definitions. Values can change, making cross-referencing challenging. To overcome this problem, the database used in this report is confined to a limited set of data, including the 1996 Census of Agriculture, the 2001 Census of Agriculture and the updated analysis of the greenhouse industry contained in Catalogue 22-202-XIB for 2003 and 2004. The result is that there are differences in value depending on the date of the source document, but these differences are minor and, in the opinion of the authors, do not affect the conclusions reached. The differences arise because of adjustments to the data that result from more detailed assessments of the base data over time.

Footnotes and labels have been used to clarify the nature and source of the statistics being used. A detailed bibliography is included at the end of this report. Statistics Canada acknowledges the challenges with the data and is currently working closely with the industry to improve the quality of the data collected. One result of this collaboration is the inclusion of questions in the 2006 census that will generate data that recognizes changes in the industry and which is responsive to its needs.

The analysis of economic impact was done using value of production; the statistics contained in Statistics Canada Catalogue 22-202-XIB for 2003 and 2004 for greenhouse ornamental flowers and plants, tomatoes, cucumbers and peppers. This analysis is the basis for the discussion of the overall contribution the industry makes to the Ontario economy.

For analysis of export trends, the trade data used included export sales of greenhouse tomatoes, cucumbers, peppers and agriculture products. This data is collected by the United States and then compiled and released by Strategis, an information and research service of Industry Canada. The data used in this report was trade data, which in the case of greenhouse vegetables, was collected using a harmonized coding system[4]. For the floriculture sector, codes specifically assigned to greenhouse product have not been established and therefore the data cannot be assumed to include only greenhouse product. However based on an analysis of the product that is included in the codes used, an understanding of what percentage is included that is not greenhouse product and the percentage that is not included that should be, the authors are confident that the figure is representative of the export value of greenhouse floriculture[5]. In reaching conclusions regarding trade data, the assistance of researchers at Niagara Economic Development Corporation, who have done extensive work in this area, was invaluable.

Source: Canadian Greenhouse Conference http://www.canadiangreenhouseconference.com/

[4] The commodity codes relied on in this report included HS 07020010 – Tomatoes, Greenhouse, Fresh or Chilled, HS07070010 – Cucumbers and Gherkins, Greenhouse, Fresh or Chilled and HS 07096010 Peppers of the Genus Capsicum or of the Genus Pimenta, Greenhouse, fresh /chilled.
[5] Discussion with Niagara Economic Development Corporation Staff 2006

CHAPTER 2
PROFILE OF GREENHOUSE INDUSTRY IN ONTARIO

CHAPTER 2 PROFILE OF GREENHOUSE INDUSTRY IN ONTARIO

2.1 Historical Development of Greenhouse Industry

The greenhouse industry is a relatively young sector of agriculture. Although there have been greenhouse operations in production since the turn of the century, it was at the end of the Second World War when many Europeans emigrated to Canada, that the industry really took hold. The largest group of agricultural immigrants were Dutch, many of whom had roots in the large greenhouse industry in the Netherlands. It was these immigrant families who started many of the large greenhouse operations in existence in Ontario today. Italians are the other ethnic group that are well represented in the Ontario greenhouse industry.

Over time, the links to the Netherlands have remained strong and there continues to be constant interaction between the greenhouse industries in the two countries. This exchange has been of great benefit to Canada, since the industry in the Netherlands is extensive and advanced.

Although immigration from the Netherlands has declined from the levels it reached after the Second World War, it has continued and the Dutch still have a strong presence in the Canadian farming community. In 2001, 23% of the immigrant farm population in Canada was Dutch in origin[6].

Initially, most of the greenhouse operations grew vegetables but as time passed, the industry expanded to include floriculture. Today, clustering has emerged with the majority of greenhouse operations in the Niagara Peninsula growing flowers and those in southwestern Ontario specializing in vegetables. Interestingly, there has also been a divide along ethnic lines; those of Italian descent have tended to focus on vegetable production while the Dutch descendants have moved into floriculture.

One of the difficulties in accurately tracking the growth of the greenhouse industry arises because Statistics Canada has changed the threshold size for inclusion in the census several times. This change in threshold size explains why census data indicates there was decline in number and area of greenhouse operations between 1981 and 1986. This apparent decline is actually due to the fact that in 1986, Statistics Canada introduced a threshold size of 7,500 square feet for greenhouse operations, thereby excluding a number of smaller operations that would have been included in 1981. In 1992, another change was made to the criteria, rendering it impossible to compare estimates made since 1992 with those generated prior to 1992. In this report, tracking of trends is generally based on census data from 1996 forward.

Regardless of changes in statistical accounting, it is obvious that the greenhouse industry has seen constant growth since the early part of the 20th century. What began as a handful of operations has expanded to a recorded total for Ontario in 2001 of 2,012 operations occupying an area of 9,139,267 square metres.[7]

[6] Statistics Canada Agricultural Census 2001
[7] Ibid. (This figure includes vegetable, floriculture, mushroom and other operations.)

2.2 Regional Distribution

Although as shown in **Figures 1, 2** and **3,** there are greenhouse operations found in most regions of the Province, the industry has tended to develop in areas where the climate is benevolent, conditions are favourable and there is close proximity to market. Access to the border is of particular importance because of the volume that is exported to the United States and the "just-in-time," perishable nature of the product.

In 2001, the largest cluster of operations was in Essex County in the southwestern part of the province with the second largest cluster found in the Niagara Peninsula. As indicated on **Figure 4**, Essex County has twice the area of greenhouses as Niagara. 87% of greenhouses in Essex County are dedicated to vegetable production. In Niagara, 84% are dedicated to flowers.

It is still interesting to note that although there are clusters of operations, greenhouse activity occurs widely across the province. This dispersion is important for the industry because the presence of many operations, regardless of size, supports the businesses that service the industry. Having sufficient market is critical for these service providers to stay in business and the availability of service is in turn critical to greenhouse operators.

Greenhouse activity in northern areas of the Province is associated with the forestry industry. Companies such as Forest Care, which has greenhouses in Wawa and St. Williams, grow seedlings for the forestry industry.

At the local municipal level, as shown in **Figure 5,** in 2001 Leamington had both the largest number of operations and the largest area under cover in the Province. Leamington is home to more greenhouse area than the entire Region of Niagara. Kingsville, the municipality abutting Leamington, contains the second largest area of greenhouse, both in the County and in the Province.

In Niagara in 2001, the largest cluster of greenhouses was found in the Town of Lincoln, followed by St. Catharines and then Niagara-on-the-Lake. Greenhouses are very important to Niagara. A study of the Niagara agricultural economy completed in 2003, noted that greenhouse production accounted for 42.6% of the gross farm receipts generated in the Region of Niagara in 2001[8].

Source: http://flowerscanada.org/content/en/the_joy_of_flowers.htm

[8] Planscape, Niagara Regional Agricultural Economic Impact Study, June 2003. Figure 4.31

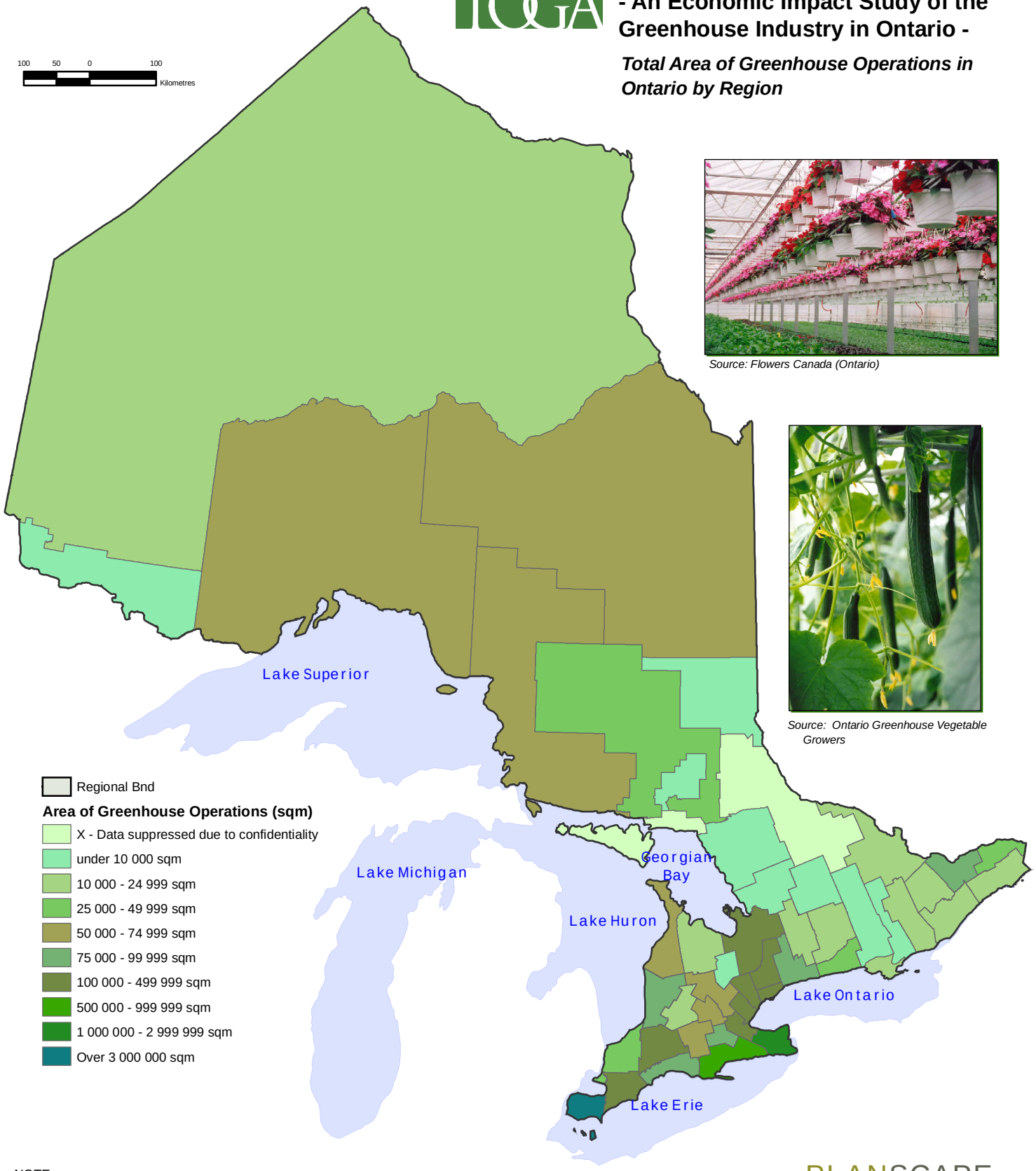
FIGURE 1

GREENHOUSES GROW ONTARIO - An Economic Impact Study of the Greenhouse Industry in Ontario -

Total Area of Greenhouse Operations in Ontario by Region

Source: Flowers Canada (Ontario)

Source: Ontario Greenhouse Vegetable Growers



NOTE:
This map is for general illustration puposes only. For boundary interpretations, please contact the Planning & Development Departments of the City, Region, County or District.

Source:
Geomatics Canada http://ess.nrcan.gc.ca/geocan/index_e.php; Statistics Canada - Catalogue No. 95F0301 XIE

PLANSCAPE

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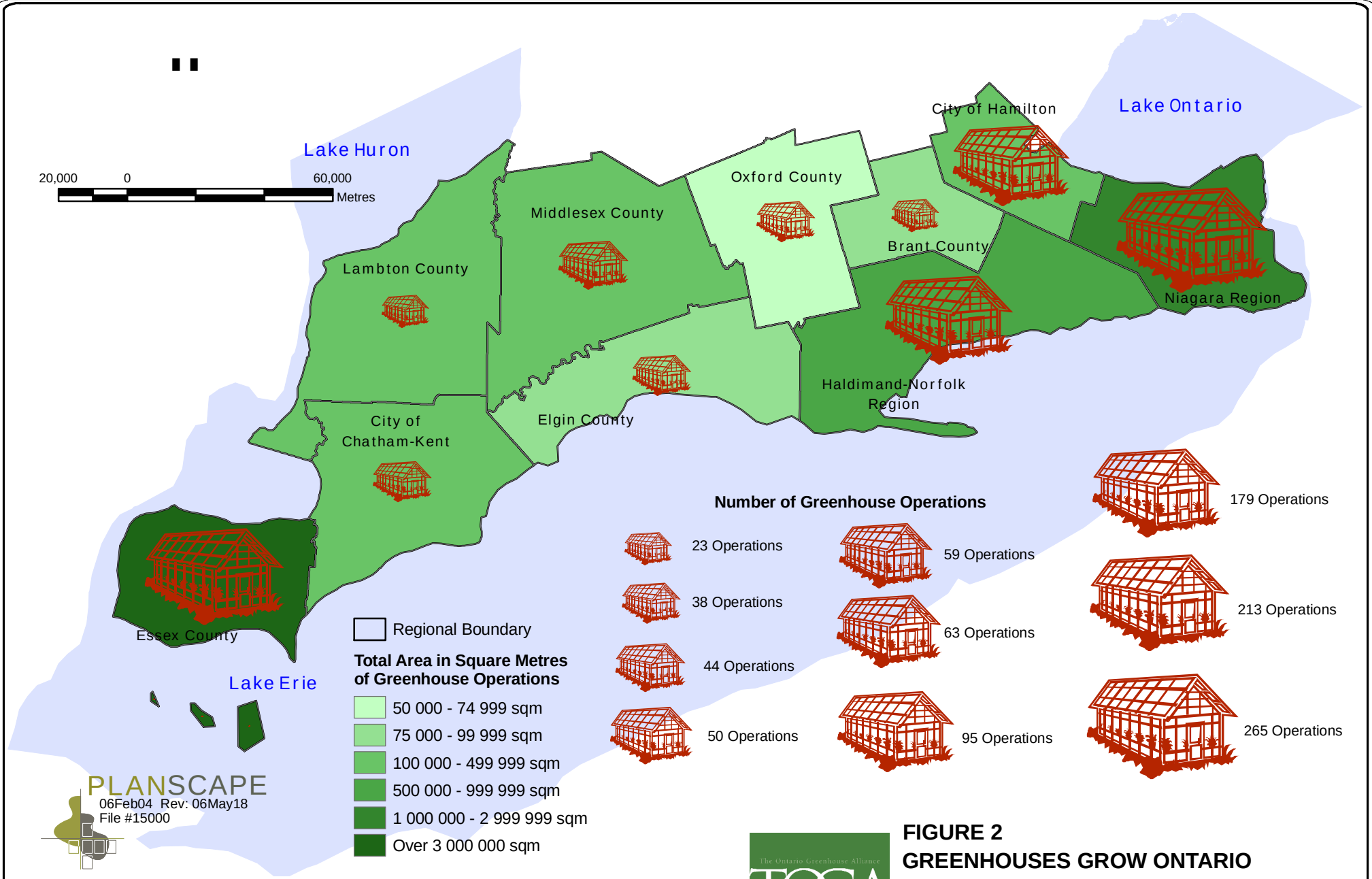


FIGURE 2
GREENHOUSES GROW ONTARIO
- An Economic Impact Study of the Greenhouse Industry in Ontario -
Total Number and Area of Greenhouse Operations in Southern Ontario by Region

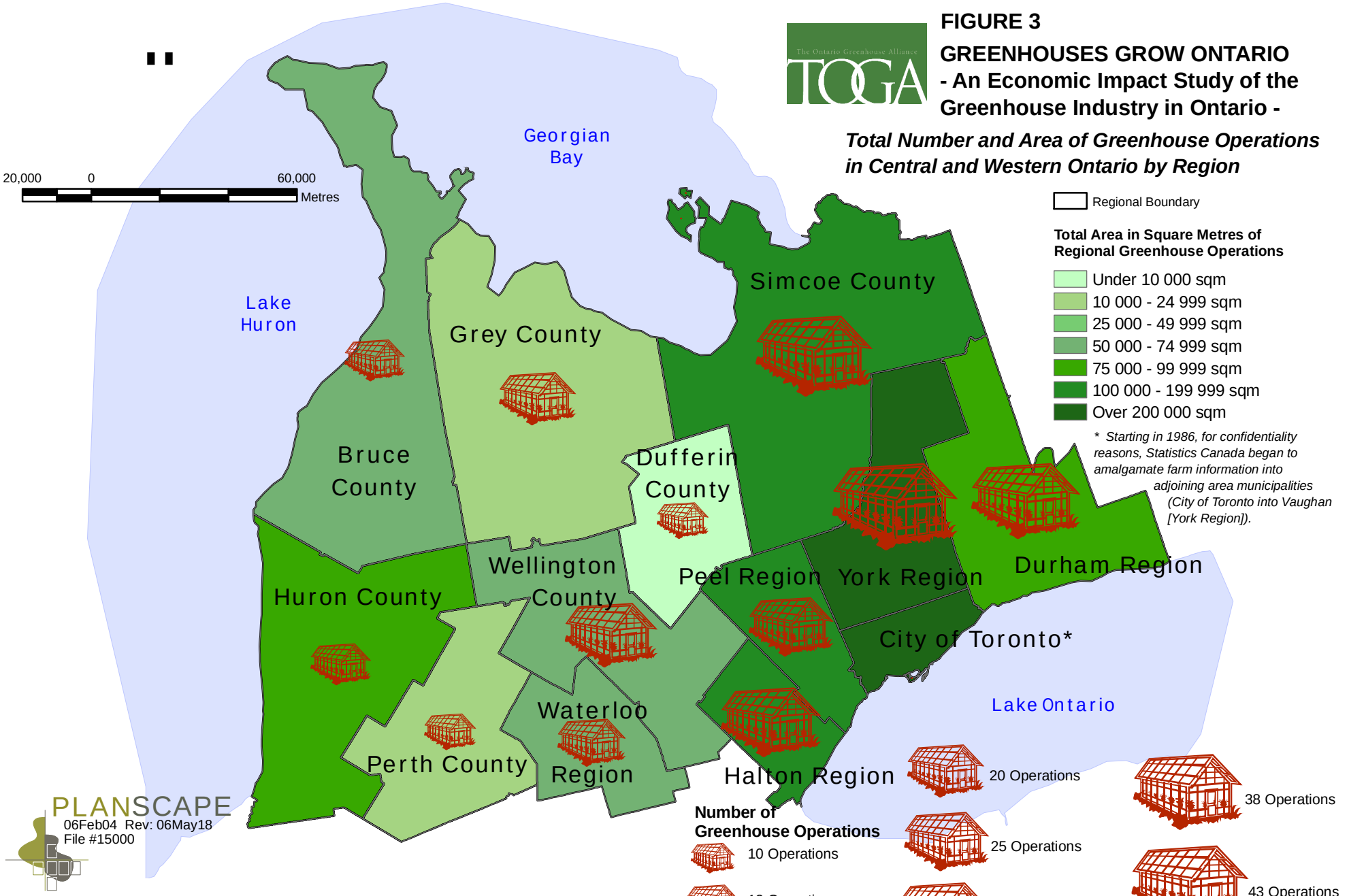
NOTE:
This map is for general illustration puposes only. For boundary interpretations, please contact the Planning & Development Departments of the City, Region, County or District.

Source:
Geomatics Canada http://ess.nrcan.gc.ca/geocan/index_e.php; Statistics Canada - Catalogue No. 95F0301 XIE

FIGURE 3

GREENHOUSES GROW ONTARIO - An Economic Impact Study of the Greenhouse Industry in Ontario -

Total Number and Area of Greenhouse Operations in Central and Western Ontario by Region



PLANSCAPE
06Feb04 Rev: 06May18
File #15000

NOTE:
This map is for general illustration puposes only. For boundary interpretations, please contact the Planning & Development Departments of the City, Region, County or District.
Source:
Geomatics Canada http://ess.nrcan.gc.ca/geocan/index_e.php;
Statistics Canada - Catalogue No. 95F0301 XIE

Figure 4 Number and Area of Greenhouse Operations for Ontario and Region, 2001

Geographic Location	Number of Greenhouse Operations				Area of Greenhouse Operations (m2)			
	Total	Flori-culture	Vegetables	Other	Total	Flori-culture	Vegetables	Other
Ontario	2,012	1,359	681	351	9,139,267	4,056,418	4,434,030	478,850
City of Hamilton	95	70	17	17	321,866	235,761	57,333	22,605
Niagara Region	265	215	41	27	1,690,098	1,424,263	219,692	28,366
Haldimand-Norfolk Cty	179	107	41	57	812,089	575,156	140,338	38,855
Brant County	38	26	8	7	90,692	64,160	21,307	4,708
Oxford County	50	26	13	19	70,538	46,638	15,863	7,139
Elgin County	63	23	18	29	91,140	40,205	19,463	21,721
City of Chatham-Kent	44	23	9	17	192,969	16,962	135,715	39,916
Essex County	213	56	162	15	3,974,205	455,002	3,437,688	61,486
Lambton County	23	15	7	5	48,816	23,651	15,855	9,206
Middlesex County	59	39	13	17	173,729	141,370	14,530	9,063
Peel Region	35	30	7	3	138,308	131,010	3,822	766
Dufferin County	17	12	4	3	7,754	x	567	x
Wellington County	54	41	17	8	53,164	49,264	1,820	490
Halton Region	46	36	16	8	178,773	118,369	46,244	8,938
Waterloo Region	39	35	21	3	53,692	48,402	x	x
Perth County	24	18	11	2	18,501	14,991	x	x
Huron County	32	21	11	7	98,018	x	x	x
Bruce County	31	26	8	5	55,403	x	x	595
Grey County	29	26	7	2	17,568	x	x	x
Simcoe County	69	42	30	11	133,387	92,224	21,896	6,084
Hastings County	24	21	4	2	5,781	x	374	x
Prince Edward County	20	13	10	5	19,088	10,210	3,143	3,937
Northumberland County	33	26	11	6	28,410	18,074	9,001	821
Peterborough County	31	25	9	6	12,852	10,921	1,232	409
City of Kawartha Lakes	23	19	8	1	14,900	13,453	x	x
Durham Region	58	42	13	12	83,010	72,534	9,192	967
York Region	77	59	24	8	256,838	176,993	73,344	1,784
Muskoka District	16	13	5	2	6,765	5,739	x	x
Haliburton County	4	4	2	1	808	x	x	x
Parry Sound District	16	16	5	0	4,059	3,430	173	0
Stormont, Dundas & Glengarry U.C.	30	24	15	4	18,114	x	4,859	x
Prescott & Russell U.C.	14	13	6	1	26,043	x	2,415	x
City of Ottawa	48	31	20	7	87,435	40,379	44,038	2,091
Leeds & Grenville U.C.	28	27	12	3	19,316	16,634	2,359	240
Lanark County	19	16	9	0	17,521	16,329	1,128	0
Frontenac County	18	12	8	2	13,877	x	2,932	x
Lennox & Addington Cty	10	3	3	4	7,779	x	2,272	x
Renfrew County	24	20	10	2	15,924	x	1,654	x
Nipissing District	10	10	2	0	x	x	x	0
Manitoulin District	3	3	1	0	x	x	x	0
Sudbury District	8	7	3	1	41,186	x	47	x
City of Greater Sudbury	12	8	2	3	8,799	7,935	x	x
Timiskaming District	5	3	3	1	6,427	x	269	x
Cochrane District	12	7	10	5	73,146	3,082	2,184	67,805
Algoma District	16	12	10	4	51,250	x	x	x
Thunder Bay District	30	24	7	5	59,357	27,284	1,097	30,570
Rainy River District	7	7	5	1	9,482	6,737	x	x
Kenora District	11	7	3	3	21,718	7,344	58	14,307

Note: Data for number and area of greenhouse operations is calculated on all farms reporting. Total accumulated number of greenhouse operations includes mushroom operations.

x Data suppressed due to confidentiality restrictions.

Source: 2001 Statistics Canada - Catalogue No. 95F0301XIE; 1996 Statistics Canada - Agriculture Profile of Ontario - Catalogue No 95-177-XPB; 1991, 1981 Agricultural Statistics for Ontario - OMAFRA - Publication 20

Figure 5 Top 10 Regional Greenhouse Operations by Area (m^2) Region by Area Municipality, 2001

Geographic Location	Greenhouse Operation - Area Under Glass							
	Total		Floriculture		Vegetables		Other Products	
	No. of Farms	m^2	No. of Farms	m^2	No. of Farms	m^2	No. of Farms	m^2
Canada	6,073	18,352,644	4,024	8,455,634	2,532	7,734,154	1,043	1,744,172
Ontario	2,012	9,139,267	1,359	4,056,418	681	4,434,030	351	478,850
Essex County	**213**	**3,974,205**	**56**	**455,002**	**162**	**3,437,688**	**15**	**61,486**
Leamington	131	2,563,479	27	296,640	107	2,192,234	10	59,572
Kingsville	57	1,315,537	16	x	43	1,169,158	1	x
Essex	10	66,822	2	x	8	x	1	x
Amherstburg	3	766	2	x	2	x	1	x
LaSalle	3	4,207	3	x	1	x	0	0
Tecumseh	4	8,879	4	8,879	0	0	0	0
Lakeshore	5	14,515	2	x	1	x	2	x
Niagara Region	**265**	**1,690,098**	**215**	**1,424,263**	**41**	**219,692**	**27**	**28,366**
Fort Erie	5	x	3	9,941	2	x	0	0
Port Colborne	7	11,297	3	x	3	x	3	x
Wainfleet	22	69,087	15	44,802	8	x	1	x
West Lincoln	21	69,879	16	45,139	6	x	3	x
Pelham	31	155,273	23	115,400	4	33,342	6	4,703
Welland	3	x	3	x	0	0	0	0
Thorold	6	27,932	5	x	0	0	1	x
Niagara Falls	8	10,582	6	8,798	0	0	2	x
Niagara-on-the-Lake	46	264,242	41	257,505	4	x	5	x
St. Catharines	29	282,422	26	270,587	2	x	3	x
Lincoln	62	643,252	52	510,157	9	110,388	3	15,768
Grimsby	25	140,149	22	121,569	3	18,581	0	0
Haldimand-Norfolk County	**179**	**812,089**	**107**	**575,156**	**41**	**140,338**	**57**	**38,855**
Haldimand	57	225,318	53	198,961	11	x	2	x
Norfolk	122	586,771	54	376,195	30	x	55	x
City of Hamilton	**95**	**321,866**	**70**	**235,761**	**17**	**57,333**	**17**	**22,605**
York Region	**77**	**256,838**	**59**	**176,993**	**24**	**73,344**	**8**	**1,784**
Vaughan	10	76,882	7	65,712	3	x	1	x
Markham	10	8,641	10	x	3	372	1	x
Richmond Hill	4	29,450	3	x	2	x	1	x
Whitchurch-Stouffville	15	24,199	12	22,183	2	x	2	x
King	25	92,534	14	x	13	48,921	2	x
East Gwillimbury	9	22,954	9	x	1	x	1	x
Georgina	4	2,178	4	1,992	0	0	0	0
City of Chatham-Kent	**44**	**192,969**	**23**	**16,962**	**9**	**135,715**	**17**	**39,916**

Figure 5 Top 10 Regional Greenhouse Operations by Area (m^2) Region by Area Municipality, 2001 cont'd.

Geographic Location	Greenhouse Operation - Area Under Glass							
	Total		Floriculture		Vegetables		Other Products	
	No. of Farms	m^2	No. of Farms	m^2	No. of Farms	m^2	No. of Farms	m^2
Halton Region	**46**	**178,773**	**36**	**118,369**	**16**	**46,244**	**8**	**8,938**
Oakville	3	x	3	x	2	x	1	x
Burlington	9	83,463	7	44,025	3	x	1	x
Milton	24	69,525	18	55,036	9	x	6	x
Halton Hills	10	x	8	x	2	x	0	0
Middlesex County	**59**	**173,729**	**39**	**141,370**	**13**	**14,530**	**17**	**9,063**
Southwest Middlesex	4	x	2	x	1	x	1	x
Strathroy-Caradoc	14	86,786	6	75,829	3	5,342	7	5,613
Thames Centre	8	33,536	6	20,232	3	x	2	x
Middlesex Centre	12	15,588	8	10,730	3	x	4	x
London	7	16,953	6	x	0	0	1	x
North Middlesex	6	4,406	5	x	3	x	0	0
Adelaide Metcalfe	6	12,948	4	x	0	0	2	x
Lucan Biddulph	2	x	2	x	0	0	0	0
Peel Region	**35**	**138,308**	**30**	**131,010**	**7**	**3,822**	**3**	**766**
Mississauga	6	11,492	5	x	1	x	1	x
Brampton	14	94,919	12	91,593	3	x	1	x
Caledon	15	31,897	13	x	3	x	1	x
Simcoe County	**69**	**133,387**	**42**	**92,224**	**30**	**21,896**	**11**	**6,084**
Adjala-Tosorontio	6	3,391	4	1,905	2	x	1	x
Clearview	6	6,846	5	x	1	x	1	x
New Tecumseth	1	x	0	0	1	x	0	0
Springwater	8	3,286	5	2,468	3	x	2	x
Bradford West Gwillimbury	18	42,147	9	23,170	8	x	1	x
Severn	6	1,763	4	x	1	x	3	1,486
Innisfil	5	10,652	4	x	2	x	0	0
Ramara	4	x	3	x	3	x	0	0
Essa	7	x	2	x	6	3,077	2	x
Oro-Medonte	5	11,994	3	x	1	x	1	x
Tiny	3	x	3	x	2	x	0	0
Tay	0	0	0	0	0	0	0	0

Note: Data for number and area of greenhouse operations is calculated on all farms reporting. Total accumulated number of greenhouse operations includes mushroom operations.

x Data suppressed due to confidentiality restrictions.

Source: 2001 Statistics Canada - Catalogue No. 95F0301XIE

2.3 Total Number of Operations, Covered Area, Total Greenhouse Sales 1996 & 2001[9]

Figure 6 provides a summary of the number of greenhouse operations in Ontario in 2001. At that time, the Census reported 2,012[10] greenhouse operations, each generating $2,500 or more in gross farm receipts[11]. This number includes flower, vegetable, mushroom and "other"[12] greenhouse operations. The breakdown of area is fairly evenly split between vegetables and flowers.[13] In an update released by Statistics Canada in 2004, the total number of greenhouses growing vegetables and flowers was listed as 1,285[14]. Mushroom and "other" production accounted for less than 5% of total area in 2001. Because of their relatively small numbers, mushroom and "other" production are not included for the balance of the analysis in this report.

Figure 6 - Provincial Statistics for Greenhouse Operations, 2001.

Ontario	*Greenhouse Operations*
Total Number	2,012
Total Area (m^2)	9,139,267
Total Area - Flowers	4,056,418
Total Area - Vegetables	4,434,030
Total Area - Other Products	478,850
Total Sales	$1,000,326,000

*Note: Data for number and area of greenhouse operations is calculated on all farms reporting. Total accumulated number of greenhouse operations includes mushroom operations. * Total sales excludes mushrooms. It includes vegetables, ornamental flowers and plants. Source: 2001 Statistics Canada - Catalogue No. 95F0301XIE; 2003 Statistics Canada - Greenhouse, Sod and Nursery Industries, Catalogue No. 22-202-XIB*

In 2001, total value of sales[15] for vegetables, ornamental flowers and plants was $1,000,326,000[16]. Greenhouse vegetables accounted for 34% of this total, ornamental flower and plants sales for 66%. By 2004, this value had increased to $1,102,839,025. This is a very high value and reflects the fact that greenhouse sales are proportionately among the highest for agricultural products in Canada. In 2004, with $2.1 billion dollars in sales, the Canadian ornamental industry alone recorded the third highest value of production of all Canadian crop farms, behind only wheat and canola.[17] Although the ornamental sector includes nursery and sod, ornamental sales, which are primarily greenhouse products, represent 68% of the total sales for the sector.

Figures 7 and **8**, list the change in number of greenhouses and greenhouse area in Ontario as documented in the 1996 and 2001 census. On these tables, it is interesting to note that a relatively low overall increase is recorded. In fact, in many regions the number of operations actually declined between 1996 and 2001. In terms of area, however, a different picture emerges. For regions with a large greenhouse presence, the increases in area under cover are actually very significant.

[9] Total Greenhouses sales are taken from Statistics Canada, Catalogue 22-202-XIB, 2002 and include only vegetables and flowers. pg 11
[10] Includes mushrooms and other product
[11] Gross farm receipts is the total annual revenue generated by all farm activities before deducting expenses.
[12] Statistics Canada lists "Other" greenhouse products as cuttings, tree saplings, etc.
[13] Reference to flowers should be assumed to be floriculture.
[14] Statistics Canada, Greenhouse, Sod and Nursery, Catalogue No. 22-202-XIB, 2004.
[15] Value of sales represents sale value at the farm gate for ornamentals, plants and vegetables.
[16] Statistics Canada, Greenhouse, Sod and Nursery, Catalogue No. 22-202-XIB, 2004. pg 15
[17] Agriculture and Agri Food Canada, Canadian Ornamental Situation and Trends, 2004, December 2005, pg 4

Figure 7 Number of Greenhouse Operations for Ontario and Regions (Percentage of Change), 1996 and 2001

Geographic Location	Number of Greenhouse Operations								Percentage of Change			
	1996				2001				1996 - 2001			
	Total	Floriculture	Vegetables	Other	Total	Floriculture	Vegetables	Other	Total	Floriculture	Vegetables	Other
Ontario	2085	1465	785	409	2,012	1,359	681	351	-3.5%	-7.2%	-13.2%	-82.6%
City of Hamilton	107	78	26	16	95	70	17	17	-11.2%	-10.3%	-34.6%	-82.1%
Niagara Region	253	198	62	26	265	215	41	27	4.7%	8.6%	-33.9%	-89.8%
Haldimand-Norfolk Cty	174	106	66	47	179	107	41	57	2.9%	0.9%	-37.9%	-68.2%
Brant County	47	31	10	11	38	26	8	7	-19.1%	-16.1%	-20.0%	-81.6%
Oxford County	55	36	21	15	50	26	13	19	-9.1%	-27.8%	-38.1%	-62.0%
Elgin County	66	41	24	22	63	23	18	29	-4.5%	-43.9%	-25.0%	-54.0%
City of Chatham-Kent	53	33	16	20	44	23	9	17	-17.0%	-30.3%	-43.8%	-61.4%
Essex County	200	63	140	28	213	56	162	15	6.5%	-11.1%	15.7%	-93.0%
Lambton County	24	20	6	6	23	15	7	5	-4.2%	-25.0%	16.7%	-78.3%
Middlesex County	64	45	15	13	59	39	13	17	-7.8%	-13.3%	-13.3%	-71.2%
Peel Region	40	35	9	8	35	30	7	3	-12.5%	-14.3%	-22.2%	-91.4%
Dufferin County	8	7	2	2	17	12	4	3	112.5%	71.4%	100.0%	-82.4%
Wellington County	53	41	18	14	54	41	17	8	1.9%	0.0%	-5.6%	-85.2%
Halton Region	56	39	13	15	46	36	16	8	-17.9%	-7.7%	23.1%	-82.6%
Waterloo Region	39	33	18	7	39	35	21	3	0.0%	6.1%	16.7%	-92.3%
Perth County	17	14	5	3	24	18	11	2	41.2%	28.6%	120.0%	-91.7%
Huron County	23	15	11	4	32	21	11	7	39.1%	40.0%	0.0%	-78.1%
Bruce County	24	19	6	5	31	26	8	5	29.2%	36.8%	33.3%	-83.9%
Grey County	37	31	18	10	29	26	7	2	-21.6%	-16.1%	-61.1%	-93.1%
Simcoe County	75	49	32	14	69	42	30	11	-8.0%	-14.3%	-6.3%	-84.1%
Hastings County	23	22	8	5	24	21	4	2	4.3%	-4.5%	-50.0%	-91.7%
Prince Edward County	22	17	12	5	20	13	10	5	-9.1%	-23.5%	-16.7%	-75.0%
Northumberland County	30	25	14	8	33	26	11	6	10.0%	4.0%	-21.4%	-81.8%
Peterborough County	20	18	8	4	31	25	9	6	55.0%	38.9%	12.5%	-80.6%
City of Kawartha Lakes	26	20	10	3	23	19	8	1	-11.5%	-5.0%	-20.0%	-95.7%
Durham Region	66	51	17	15	58	42	13	12	-12.1%	-17.6%	-23.5%	-79.3%
York Region	84	66	26	9	77	59	24	8	-8.3%	-10.6%	-7.7%	-89.6%
Muskoka District	18	16	4	-	16	13	5	2	-11.1%	-18.8%	25.0%	-87.5%
Haliburton County	6	6	2	1	4	4	2	1	-33.3%	-33.3%	0.0%	-75.0%
Parry Sound District	15	12	5	3	16	16	5	0	6.7%	33.3%	0.0%	-100.0%
Stormont, Dundas & Glengarry U.C.	28	20	17	6	30	24	15	4	7.1%	20.0%	-11.8%	-86.7%
Prescott & Russell U.C.	23	16	13	3	14	13	6	1	-39.1%	-18.8%	-53.8%	-92.9%
City of Ottawa	60	40	32	11	48	31	20	7	-20.0%	-22.5%	-37.5%	-85.4%
Leeds & Grenville U.C.	35	33	13	7	28	27	12	3	-20.0%	-18.2%	-7.7%	-89.3%
Lanark County	16	16	5	3	19	16	9	0	18.8%	0.0%	80.0%	-100.0%
Frontenac County	20	15	7	4	18	12	8	2	-10.0%	-20.0%	14.3%	-88.9%
Lennox & Addington Cty	16	12	6	1	10	3	3	4	-37.5%	-75.0%	-50.0%	-60.0%
Renfrew County	24	22	7	4	24	20	10	2	0.0%	-9.1%	42.9%	-91.7%
Nipissing District	11	10	7	1	10	10	2	0	-9.1%	0.0%	-71.4%	-100.0%
Manitoulin District	4	4	1	-	3	3	1	0	-25.0%	-25.0%	0.0%	-100.0%
Sudbury District	8	6	4	1	8	7	3	1	0.0%	16.7%	-25.0%	-87.5%
City of Greater Sudbury	11	7	4	2	12	8	2	3	9.1%	14.3%	-50.0%	-75.0%
Timiskaming District	9	6	3	4	5	3	3	1	-44.4%	-50.0%	0.0%	-80.0%
Cochrane District	16	6	9	3	12	7	10	5	-25.0%	16.7%	11.1%	-58.3%
Algoma District	18	16	7	5	16	12	10	4	-11.1%	-25.0%	42.9%	-75.0%
Thunder Bay District	38	32	14	8	30	24	7	5	-21.1%	-25.0%	-50.0%	-83.3%
Rainy River District	8	8	3	1	7	7	5	1	-12.5%	-12.5%	66.7%	-85.7%
Kenora District	15	9	9	6	11	7	3	3	-26.7%	-22.2%	-66.7%	-72.7%

Note: Data for accumulated number of greenhouse operations includes mushroom operations and is calculated on all farms reporting.

- Nil or zero

Source: 2001 Statistics Canada - Catalogue No. 95F0301XIE; 1996 Statistics Canada - Agriculture Profile of Ontario - Catalogue No 95-177-XPB; 1991, 1981 Agricultural Statistics for Ontario - OMAFRA - Publication 20

Figure 8 Historical - Area (m^2) Under Glass of Greenhouse Operations for Ontario and Regions (Percentage of Change), 1996 and 2001

Geographic Location	Area of Greenhouse Operations (m^2)								Percentage of Change			
	1996				2001				1996 - 2001			
	Total	Flori-culture	Vege-tables	Other	Total	Flori-culture	Vege-tables	Other	Total	Flori-culture*	Vege-tables*	Other*
Ontario	5,881,001	3,353,837	2,059,086	403,726	9,139,267	4,056,418	4,434,030	478,850	55.4%	20.9%	115.3%	18.6%
City of Hamilton	284,509	211,143	49,981	20,307	321,866	235,761	57,333	22,605	13.1%	11.7%	14.7%	11.3%
Niagara Region	1,261,654	1,017,828	222,481	15,673	1,690,098	1,424,263	219,692	28,366	34.0%	39.9%	-1.3%	81.0%
Haldimand-Norfolk Cty	328,121	174,658	122,439	23,213	812,089	575,156	140,338	38,855	147.5%	229.3%	14.6%	67.4%
Brant County	96,094	65,667	25,022	4,337	90,692	64,160	21,307	4,708	-5.6%	-2.3%	-14.8%	8.6%
Oxford County	84,688	50,167	27,686	6,365	70,538	46,638	15,863	7,139	-16.7%	-7.0%	-42.7%	12.2%
Elgin County	86,546	47,629	25,015	13,193	91,140	40,205	19,463	21,721	5.3%	-15.6%	-22.2%	64.6%
City of Chatham-Kent	122,149	34,678	56,081	27,440	192,969	16,962	135,715	39,916	58.0%	-51.1%	142.0%	45.5%
Essex County	1,785,792	440,290	1,260,107	76,444	3,974,205	455,002	3,437,688	61,486	122.5%	3.3%	172.8%	-19.6%
Lambton County	35,721	25,399	2,089	8,149	48,816	23,651	15,855	9,206	36.7%	-6.9%	659.0%	13.0%
Middlesex County	196,119	157,682	8,894	28,426	173,729	141,370	14,530	9,063	-11.4%	-10.3%	63.4%	-68.1%
Peel Region	83,013	69,729	9,575	3,511	138,308	131,010	3,822	766	66.6%	87.9%	-60.1%	-78.2%
Dufferin County	7,022	5,732	x	x	7,754	x	567	x	10.4%	x	x	x
Wellington County	34,737	28,085	3,827	2,144	53,164	49,264	1,820	490	53.0%	75.4%	-52.4%	-77.1%
Halton Region	210,610	136,767	62,752	7,608	178,773	118,369	46,244	8,938	-15.1%	-13.5%	-26.3%	17.5%
Waterloo Region	47,823	35,207	2,997	9,522	53,692	48,402	x	x	12.3%	37.5%	x	x
Perth County	18,305	x	x	x	18,501	14,991	x	x	1.1%	x	x	x
Huron County	21,830	15,593	x	x	98,018	x	x	x	349.0%	x	x	x
Bruce County	42,550	x	x	x	55,403	x	x	595	30.2%	x	x	x
Grey County	24,001	17,332	1,703	1,230	17,568	x	x	x	-26.8%	x	x	x
Simcoe County	128,469	93,857	25,894	7,120	133,387	92,224	21,896	6,084	3.8%	-1.7%	-15.4%	-14.6%
Hastings County	3,055	2,464	249	167	5,781	x	374	x	89.2%	x	50.2%	x
Prince Edward County	13,769	8,917	2,001	879	19,088	10,210	3,143	3,937	38.6%	14.5%	57.1%	347.9%
Northumberland County	25,270	17,454	6,288	1,417	28,410	18,074	9,001	821	12.4%	3.6%	43.1%	-42.1%
Peterborough County	18,881	14,940	3,201	265	12,852	10,921	1,232	409	-31.9%	-26.9%	-61.5%	54.3%
City of Kawartha Lakes	17,017	13,155	2,666	1,106	14,900	13,453	x	x	-12.4%	2.3%	x	x

Figure 8 Historical - Area (m^2) Under Glass of Greenhouse Operations for Ontario and Regions (Percentage of Change), 1996 and 2001 cont'd.

Geographic Location	Area of Greenhouse Operations (m^2)								Percentage of Change			
	1996				2001				1996 - 2001			
	Total	Floriculture	Vegetables	Other	Total	Floriculture	Vegetables	Other	Total	Floriculture*	Vegetables*	Other*
Durham Region	82,409	71,805	7,826	1,577	83,010	72,534	9,192	967	0.7%	1.0%	17.5%	-38.7%
York Region	217,810	155,432	43,000	14,069	256,838	176,993	73,344	1,784	17.9%	13.9%	70.6%	-87.3%
Muskoka District	6,320	6,269	47	-	6,765	5,739	x	x	7.0%	-8.5%	x	x
Haliburton County	1,220	x	x	x	808	x	x	x	-33.8%	x	x	x
Parry Sound District	3,384	x	x	x	4,059	3,430	173	0	19.9%	x	x	x
Stormont, Dundas & Glengarry U.C.	15,886	6,247	6,197	3,147	18,114	x	4,859	x	14.0%	x	-21.6%	x
Prescott & Russell U.C.	28,673	17,429	x	x	26,043	x	2,415	x	-9.2%	x	x	x
City of Ottawa	279,449	258,122	16,094	2,535	87,435	40,379	44,038	2,091	-68.7%	-84.4%	173.6%	-17.5%
Leeds & Grenville U.C.	24,568	21,614	2,271	591	19,316	16,634	2,359	240	-21.4%	-23.0%	3.9%	-59.4%
Lanark County	10,556	9,462	157	137	17,521	16,329	1,128	0	66.0%	72.6%	618.5%	-100.0%
Frontenac County	11,917	10,050	1,481	215	13,877	x	2,932	x	16.4%	x	98.0%	x
Lennox & Addington County	6,937	6,062	x	x	7,779	x	2,272	x	12.1%	x	x	x
Renfrew County	16,193	13,678	x	x	15,924	x	1,654	x	-1.7%	x	x	x
Nipissing District	9,433	5,773	x	x	x	x	x	0	x	x	x	x
Manitoulin District	4,796	x	x	-	x	x	x	0	x	x	x	x
Sudbury District	2,915	2,020	x	x	41,186	x	47	x	1312.9%	x	x	x
City of Greater Sudbury	6,265	5,347	x	x	8,799	7,935	x	x	40.4%	48.4%	x	x
Timiskaming District	12,274	x	x	x	6,427	x	269	x	-47.6%	x	x	x
Cochrane District	38,246	4,242	966	33,008	73,146	3,082	2,184	67,805	91.3%	-27.3%	126.1%	105.4%
Algoma District	44,860	x	588	x	51,250	x	x	x	14.2%	x	x	x
Thunder Bay District	55,471	25,449	824	29,159	59,357	27,284	1,097	30,570	7.0%	7.2%	33.1%	4.8%
Rainy River District	4,130	3,833	x	x	9,482	6,737	x	x	129.6%	75.8%	x	x
Kenora District	19,543	5,493	957	13,093	21,718	7,344	58	14,307	11.1%	33.7%	-93.9%	9.3%

*Note: x Data suppressed due to confidentiality restrictions; * Area Under Glass is approximate. Mushroom operations excluded.*
Source: 2001 Statistics Canada - Catalogue No. 95F0301XIE; 1996 Statistics Canada - Agriculture Profile of Ontario, Catalogue No 95-177-XPB; 1991 Agricultural Statistics for Ontario, OMAFRA - Publication 20

2.4 Change in Number of Operations and Covered Area 1997 to 2004

Figure 9 tracks the increase in greenhouse area for vegetables and flowers during the period between 1997 and 2004. The largest increase occurred between 1998 and 2002, when the area under cover increased by more than 500,000 square metres per year. This increase slowed after 2002 to approximately 100,000 square metres per year.

Between 1997 and 2004, growth in greenhouse area in Ontario was more rapid than the growth of greenhouse area in Canada as a whole. However, as **Figure 10** shows, this growth evened out in 2004.

The breakdown between area covered in glass vs. plastic confirms that the expansion between 1997 and 2004 took place under plastic, as opposed to glass. The increasing percentage of plastic as the cover choice is probably due to the fact that plastic greenhouses have historically been more flexible, are usually cheaper to build than glass and have generally been considered to have lower energy costs. Glass greenhouses, developed in the Netherlands which has more limited light conditions, transmit more solar radiation than plastic and can result in excessive heat in the summer, which may damage the plants.

There are differences of opinion on the subject of glass vs. plastic. Recently, with advances made in design of glass greenhouses and some studies showing that glass may improve production in early spring and late fall, there is some indication that interest in glass may be growing again[18].

Source: Ontario Greenhouse Vegetable Growers

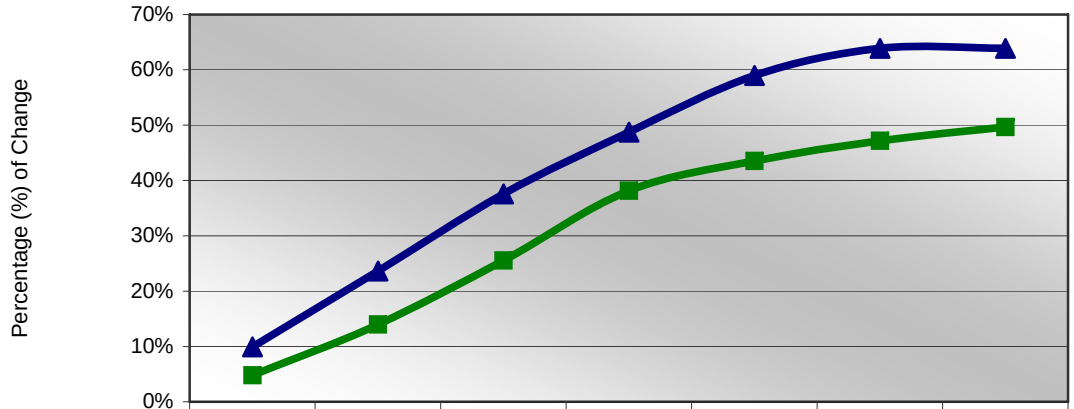
[18] Calvin and Cook, North American Greenhouse Tomatoes Emerge as a Major Market Force, April 2005, pg. 18

Figure 9 Historical - Area of Greenhouse Operations (m^2) in Ontario and Canada (Percentage of Change), 1997 to 2004

Item	Units	Ontario								Provincial Share of the National			
		1997	1998	1999	2000	2001	2002	2003	2004	1997	2000	2002	2004
Glass	m^2	2,369,027	2,107,969	2,068,950	2,273,615	2,319,702	2,359,365	2,546,843	2,376,273	52.0%	45.6%	42.8%	41.4%
Plastic	m^2	3,660,378	4,521,496	5,386,330	6,022,901	6,649,068	7,224,881	7,334,878	7,505,633	43.9%	53.8%	55.6%	55.4%
Total Area	**m^2**	**6,029,405**	**6,629,465**	**7,455,280**	**8,296,517**	**8,968,770**	**9,584,245**	**9,881,720**	**9,881,906**	**46.8%**	**51.3%**	**51.8%**	**51.2%**
Item	**Units**	**Canada**								**Percentage of Change**			
										(1997 - 2004)		**(2001 - 2004)**	
		1997	1998	1999	2000	2001	2002	2003	2004	Ontario	Canada	Ontario	Canada
Glass	m^2	4,552,712	4,284,315	4,393,383	4,981,830	5,437,194	5,511,870	5,791,109	5,743,654	0.3%	26.2%	2.4%	5.6%
Plastic	m^2	8,336,651	9,221,087	10,302,014	11,199,550	12,366,133	12,991,398	13,181,078	13,549,392	105.1%	62.5%	12.9%	9.6%
Total Area	**m^2**	**12,889,362**	**13,505,402**	**14,695,489**	**16,181,380**	**17,803,326**	**18,503,268**	**18,972,186**	**19,293,045**	**63.9%**	**49.7%**	**10.2%**	**8.4%**

Note: Area includes accumulated totals for vegetable and floriculture and excludes mushrooms. Source: Statistics Canada - Greenhouse, Sod and Nursery Industries - Catalogue No. 22-202-XIB, 1998 to 2004.

Figure 10 Historical - Area of Greenhouse Operations (m^2) in Ontario and Canada (Percentage of Change), 1997 to 2004



	1997-1998	1997-1999	1997-2000	1997-2001	1997-2002	1997-2003	1997-2004
Ontario	10.0%	23.6%	37.6%	48.8%	59.0%	63.9%	63.9%
Canada	4.8%	14.0%	25.5%	38.1%	43.6%	47.2%	49.7%

Although the area under cover increased significantly during the period between 1997 and 2004, the number of operations did not. The numbers in **Figure 11** confirm that there were more operations in 1997 than in 2004. As shown on **Figure 12**, the period between 1997 and 2001 showed considerable decline in number of operations followed by an increase of nearly 15% in Ontario between 2001 and 2004. There was a similar trend at the national level.

Figure 11 Historical - Number of Greenhouse Operations in Ontario and Canada (Percentage of Change), 1997 to 2004

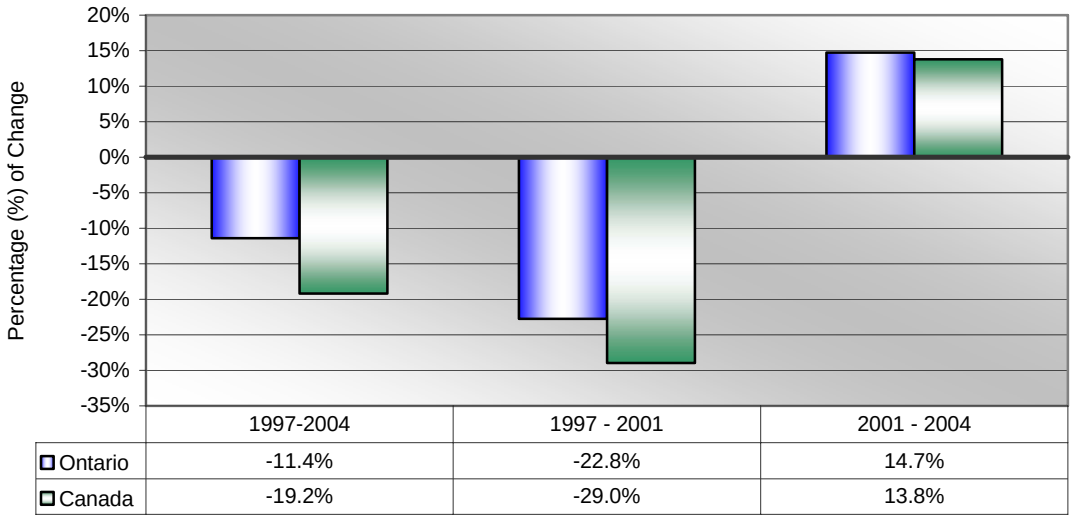
	Total Number of Greenhouse Operations							
	1997	1998	1999	2000	2001	2002	2003	2004
Ontario	1,450	1,350	1,355	1,215	1,120	1,395	1,385	1,285
Canada	4,555	4,100	3,810	3,460	3,235	4,200	4,100	3,681

Note: Area includes accumulated totals for vegetable and floriculture and excludes murshrooms. Source: Statistics Canada - Greenhouse, Sod and Nursery Industries - Catalogue No. 22-202-XIB, 1998 to 2004.

Provincial Share of the National			
1997	2000	2002	2004
31.8%	35.1%	33.2%	34.9%

Percentage of Change			
(1997 - 2004)		(2001 - 2004)	
Ontario	Canada	Ontario	Canada
-11.4%	-19.2%	14.7%	13.8%

Figure 12 Historical - Number of Greenhouse Operations in Ontario and Canada (Percentage of Change), 1997 to 2004

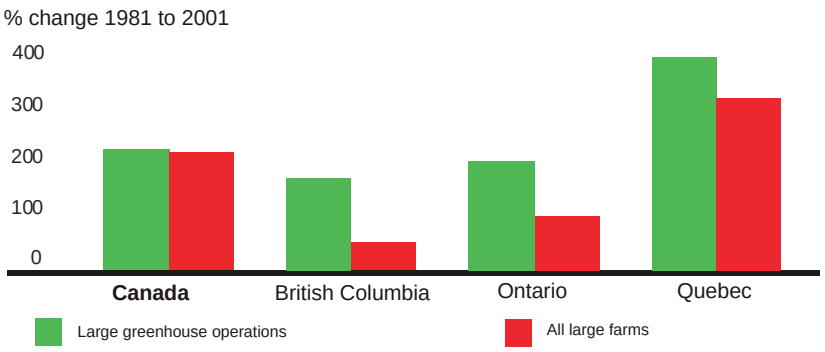


	1997-2004	1997 - 2001	2001 - 2004
Ontario	-11.4%	-22.8%	14.7%
Canada	-19.2%	-29.0%	13.8%

This trend is consistent with the trends that affected other agricultural sectors during the same period. Generally in agriculture, there has been a move to larger operations that allow economies of scale and more efficient production. In the greenhouse sector, this trend to larger operations has been more pronounced. As shown on **Figure 13,** the number of greenhouse operations generating receipts in excess of $250,000 per annum grew faster between 1981 and 2001[19] than the number of farms generally with over $250,000 in receipts.

[19] A. Sparks & E. Irving, What's Growing Under Glass, Canadian Agriculture at a Glance, Statistics Canada, pg. 65

Figure 13 Growth of large greenhouse operations compared with all large farms



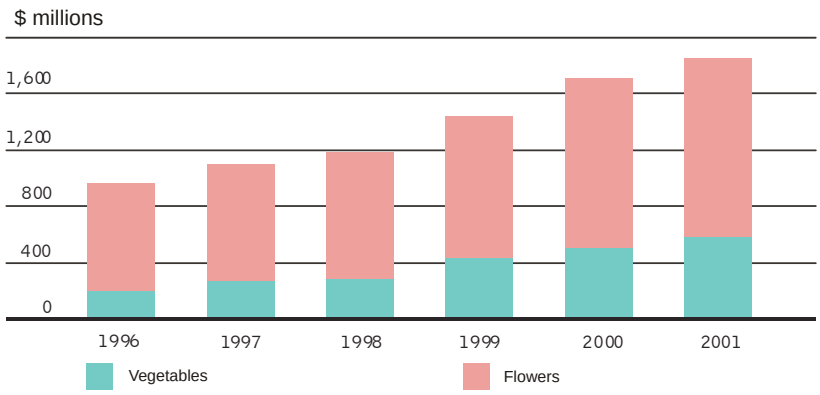
Note: "Large" denotes operations with receipts of $250,000 or more per year.

Source: *1981 and 2001 Census of Agriculture; What's growing under glass? Catalogue No. 96-328-MIE*

2.5 Operations and Sales

Many greenhouse operators started in agriculture by growing market garden vegetables, then moved gradually to growing under glass. A percentage of these growers then switched to flower production, which traditionally has had better profit margins than vegetables. The very interesting book, "Floral Passion"[20], that documents the history of many of Ontario's floral greenhouse operators, is full of accounts of families who followed this pattern. Recently, however, this pattern has changed slightly.

Figure 14 Vegetables taking a growing share of sales



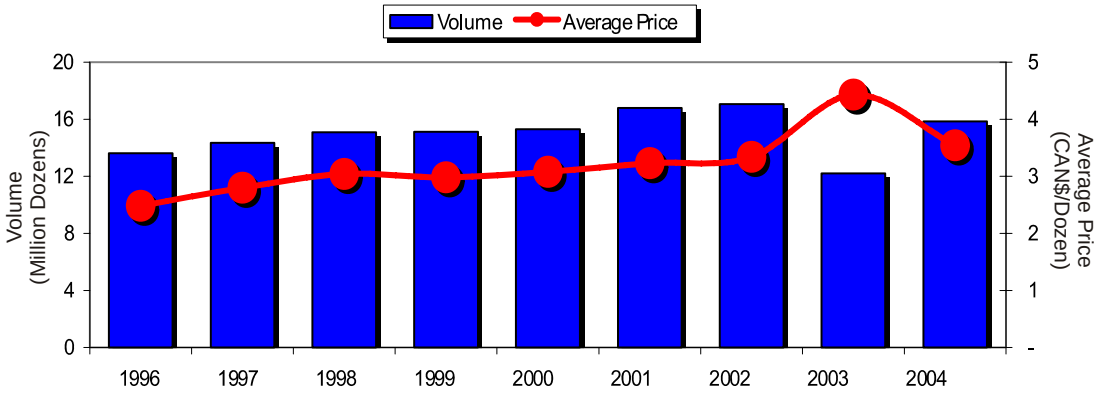
Source: *Statistics Canada, Greenhouse Survey; What's growing under glass? Catalogue No. 96-328-MIE*

In Canada, there has been an increase in the amount of space dedicated to vegetables. In 1986, greenhouse vegetables occupied 39% of the total provincial greenhouse area; in 2001 this had grown to 43% (**Figure 14**)[21].

In floral production, international competition in the cut flower industry has led to shifts in the sector. As shown on **Figure 15**, cut flower imports, which are comprised largely of chrysanthemums, carnations and roses, increased steadily between 1996 and 2002. The decrease in 2003 can be attributed to disruption in supply caused by weather. The supply has rebounded in 2004 although not back to 2003 levels.

[20] A. Vander May and others, Floral Passion
[21] A. Sparks & E. Irving, pg. 67

Figure 15 Cut Chrysanthemum, Carnation and Rose Imports into Canada, 1996-2004



Source: Agriculture and Agri-Food Canada. Canadian Ornamental Situation and Trends (2004). December, 2005.

Ontario growers who have remained in the production of cut flowers have tended to shift to cut flower types that are not easily transported. More fragile flowers, such as snapdragons, gerberas or tulips, that are easily damaged or which have a shorter shelf life, are not imported to the same extent as more durable flowers such as roses. **Figure 16**[22], which shows a breakdown of floral production by product type between 1997 and 2004, reflects these trends.

As is apparent from **Figure 16**, over time, shifts in the type of production have occurred. For example, hanging pots have seen a steady increase in volume while azaleas peaked in 2001 and declined in number in 2002, 2003 and 2004.

Source: Flowers Canada (Ontario)

[22] Note that these numbers should be taken as estimates only. Industry reporting by plant species is in the process of being refined.

Figure 16 Greenhouse Flower and Plant Production by Type and Total Value (Percentage of Change), Ontario and Canada, 1997 to 2004

Cut Flowers ('000 stems)	***Ontario***							
	1997	***1998***	***1999***	***2000***	***2001***	***2002***	***2003***	***2004***
Alstroemeria	9,832	6,592	4,525	8,985	12,886	18,488	13,855	10,960
Chrysanthemums - standard	2,610	2,299	2,520	3,538	3,936	F	2,440	F
Chrysanthemums - sprays	14,505	16,777	15,995	16,884	18,069	15,443	19,323	16,545
Gerbera	4,100	4,348	6,300	7,560	9,570	12,919	14,527	21,283
Iris	3,510	4,592	5,445	5,791	6,734	5,733	5,461	5,994
Lillies	6,545	7,717	9,600	11,610	13,852	12,342	9,050	14,780
Lisianthus	-	-	-	-	-	-	*	575
Roses - excluding sweetheart types	28,900	25,624	25,730	22,147	18,947	14,766	13,869	8,825
Roses - sweetheart	14,810	14,259	14,365	13,064	12,101	18,145	18,744	15,660
Snapdragons	7,170	7,225	9,615	11,855	8,200	15,145	15,669	16,309
Tulips	4,500	6,537	***	14,153	17,719	19,745	12,051	23,450
Other	5,330	8,324	7,800	6,086	13,928	13,890	x	11,321
Potted Plants ('000 pots)								
African Violet	-	-	-	-	-	-	*	10,681
Azaleas	1,795	1,828	2,115	1,960	2,236	2,088	1,736	1,439
Begonias	-	-	-	-	-	-	*	3693 (E)
Chrysanthemums	10,587	12,735	11,175	12,639	14,444	15,529	12,672	14,225
Geraniums	11,500	12,456	11,640	13,254	10,830	11,203	11,930	9,950
Gerbera	-	-	-	-	-	-	*	3,314
Impatiens	-	-	-	-	-	-	*	3,302
Lilies	2,960	3,119	3,340	3,757	4,284	4,672	3,826	4,774
Minature Roses	-	-	-	-	-	-	*	11,529
Petunias	-	-	-	-	-	-	*	1,231
Poinsettias	6,250	7,264	7,100	7,741	7,759	8,491	8,758	6,269
Tropical, Foliage and Green Plants	7,625	5,466	6,985	8,817	8,190	10,895	9,629	10,771
Hanging Pots (Foliage)	727	554	795	805	1,157	2,227	4,677	1,191
Hanging Pots (Spring)	3,350	3,197	3,955	4,300	3,892	5,233	5,075	5,363
Other	36,610	52,499	47,850	66,523	70,401	75,761	54,806	51,496
Cuttings ('000 cuttings)								
Chrysanthemums	10,500	11,185	16,125	11,300	12,173	13,737	14,575	14,430
Geraniums	10,500	13,588	11,715	13,010	8,903	13,577	9,886	6,802
Impatiens	-	-	-	-	-	-	*	3,278
Pansies	-	-	-	-	-	-	*	1,710
Poinsettias	3,364	44,493	6,900	8,370	6,646	6,680	12,454	6,122
Seedlings and Other	103,210	137,103	145,500	137,093	205,122	189,395	148,185	191,212
Bedding Plants ('000 plants)								
Ornamental Bedding Plants	202,000	198,550	210,000	186,685	198,428	208,500	206,359	230,792
Vegetable Plants	151,620	224,477	230,000	319,442	370,080	300,034	356,625	287,094
Value of Ornamental and Plant Sales ($'000)	**$412,602**	**$467,266**	**$516,418**	**$636,600**	**$661,920**	**$745,053**	**$750,394**	**$733,986**

F Too unreliable to be published.
- Nil or zero.
x Data suppressed due to confidentiality restrictions.
** New categories for 2004. Tototal for 2003 and previously are included in the category "Other".*
**** Not applicable*
(E) Use with caution.
Source: Statistics Canada: Catalogue No. 22-202; Ontario Ministry of Agriculture, Food and Rural Affairs, www.omafra.gov.on.ca/english/stats/hort/greenhouse.html

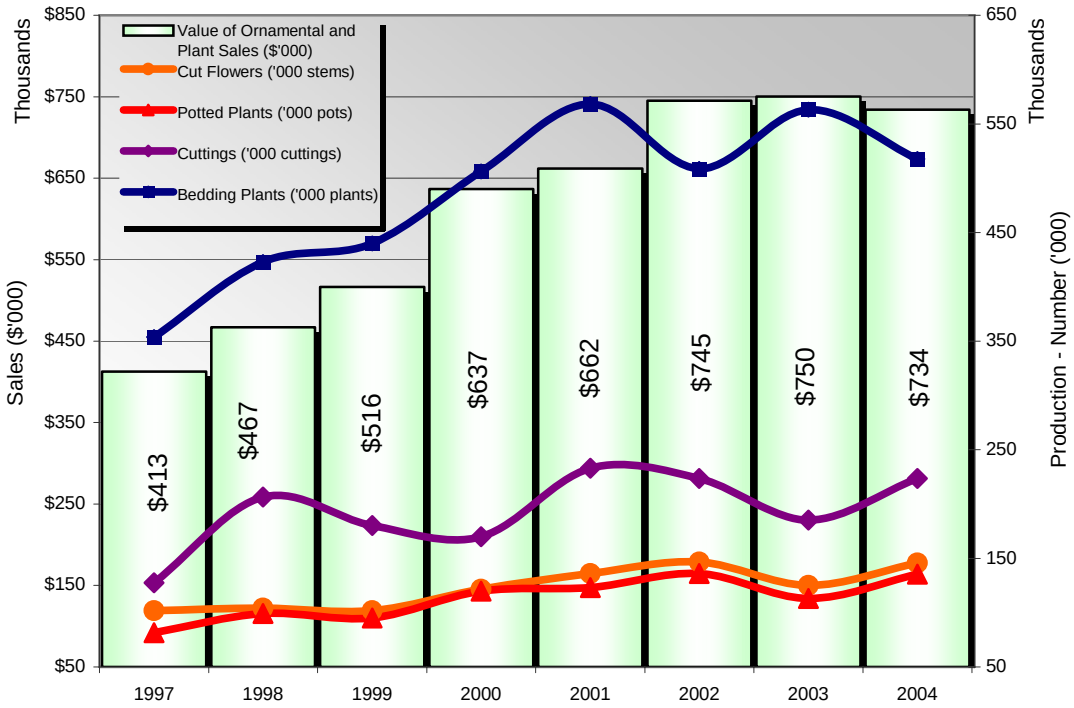
Figures 17 and **18** summarize volume of production by category and track changes in value of sales. From this information as graphed on Figure 18, it becomes apparent that there have been fluctuations in all sectors occurring in different years.

Figure 17 Trends in Greenhouse Flower and Plant Production by Type and Total Value for Ontario, 1997 to 2004

Number by Type [1]	***Ontario***							
	1997	***1998***	***1999***	***2000***	***2001***	***2002***	***2003***	***2004***
Cut Flowers ('000 stems)	101,812	104,294	101,895	121,673	135,942	146,616	124,989	145,702
Potted Plants ('000 pots)	81,404	99,118	94,955	119,796	123,193	136,099	113,109	135,535
Cuttings ('000 cuttings)	127,574	206,369	180,240	169,773	232,844	223,389	185,100	223,554
Bedding Plants ('000 plants)	353,620	423,027	440,000	506,127	568,508	508,534	562,984	517,886
Value of Ornamental and Plant Sales ($'000)	**$412,602**	**$467,266**	**$516,418**	**$636,600**	**$661,920**	**$745,053**	**$750,394**	**$733,986**

Note: [1] *Numbers are approximate. Source: Statistics Canada: Catalogue No. 22-202.*

Figure 18 Trends in Greenhouse Flower and Plant Production by Type and Total Value for Ontario, 1997 to 2004



Value of sales for the floricultural industry increased dramatically between 1997 and 2004, with the largest increase occurring between 1997 and 2002. Growth slowed between 2002 and 2003 and there was actually a decline in value of sales between 2003 and 2004. This decline can be attributed in part to the increase in the value of the Canadian dollar versus the American dollar, which adversely impacts the revenue generated by exports. However, overall value of sales for the 5 year period increased by 15%.

Marketed production for all three vegetable categories (cucumbers, peppers and tomatoes) increased between 1998 and 2004. However, as shown on **Figures 19** and **20**, the

increases were not constant. Peppers experienced a decline between 1998 and 1999 but surged ahead for the rest of the period ending up with the largest percentage increase in production. Cucumbers saw a drop in production between 2001 and 2002 but had recovered and reached their highest production level of the period in 2004. In 2003 and again in 2004, tomato volumes dropped below what was achieved in 2002, but overall, experienced a large percentage increase in volume of marketed production between 1998 and 2004. Tomato volumes declined in 2001 due to a countervail action launched by the United States field tomato growers. Declines in the 2004 volume were a result of growers switching from tomato to pepper production. Value of sales for the three commodity groups, as documented on **Figure 20**, reflect these trends. On a percentage basis, between 1997 and 2004, the value of greenhouse vegetable production increased more than 200%.

Overall, the greenhouse sector is extremely significant in the provincial economy. In 2001, it accounted for approximately 11% of gross farm receipts generated in Ontario.[23] Greenhouse production is heavily intensive in its use of land, and therefore, generates much higher returns per acre in comparison to field agriculture.

2.6 Greenhouse Size

Figure 21 provides a breakdown of the area and number of operations in regions where there is a significant cluster of operations. This information is used to generate an average size for each region, which is shown graphically on **Figure 22**. While this graph is accurate in depicting the area where larger operations exist, it is somewhat misleading with respect to the actual size profile of greenhouse operations. Within each region, there will be considerable variation between small and large operations.

Information from the industry confirms that greenhouse operations vary considerably in size from less than a thousand square metres to a handful of operations larger than 10 hectares. To get a picture of the range in sizes of operation, statistics from the Ontario Greenhouse Vegetable Growers (OGVG) and Flowers Canada (Ontario) (FCO) were summarized on **Figure 23**. This summary provides an accurate size range for tomato, pepper and cucumber operations because all greenhouse vegetable producers are required to belong to OGVG and pay a fee based on square footage. Membership in Flowers Canada (Ontario) is voluntary, with an estimated 60% of greenhouse floriculture operations as members. As a result, the figures for floriculture operations do not include the entire industry and should be considered accordingly.

A review of **Figures 23** and **24** confirms that the majority of flower operations are less than a hectare in size while the vegetable operations tend to be larger. The area of the largest member belonging to Flowers Canada (Ontario) in 2005 was 16.25 hectares; the largest member of OGVG was 20.8 hectares in size.

Although the size of operations, particularly in the vegetable sector, is increasing in Ontario, this trend has not resulted in the establishment of very large operations such as are found in the United States or Mexico. In the United States, for example, although the total greenhouse area dedicated to tomatoes is half the size of what exists in Ontario, 67% of it is controlled by four firms. The greenhouses operated by these firms range in size from 32 hectares to 67 hectares.

[23] Total sales divided by total gross farm receipts. Data for total gross farm receipts is calculated on all farms reporting - Statistics Canada 2001, Catalogue No. 95F030XIE. Total greenhouse sales is based on data from Statistics Canada, Greenhouse, Sod and Nursery, Catalogue No. 22-202-XIB, 2001.

Figure 19 Trends in Greenhouse Vegetable Production and Farm Gate Value by Type for Ontario, 1997 to 2004

	Ontario							
	1997	***1998***	***1999***	***2000***	***2001***	***2002***	***2003***	***2004***
Tomato Production (kg)	46,927,759	80,013,694	106,612,351	130,498,525	145,203,989	149,606,103	138,345,673	136,622,022
Farm Gate Value ($)	$71,069,000	$126,420,000	$145,101,000	$177,223,000	$210,238,000	$216,611,685	$188,274,000	$210,245,000
Cucumber Production (kg)**	33,533,850	53,376,117	64,598,850	70,217,800	75,231,800	57,225,000	57,497,500	79,570,000
Farm Gate Value ($)	$35,932,000	$77,822,467	$91,863,000	$97,252,000	$107,667,000	$74,500,000	$81,700,000	$92,151,000
Pepper Production (kg)	3,413,283	3,227,763	1,970,859	6,167,495	6,781,206	10,906,629	13,199,538	15,567,290
Farm Gate Value ($)	$11,514,000	$8,940,000	$7,600,000	$17,983,000	$18,385,000	$32,429,000	$40,935,000	$56,250,000
Total Farm Gate Value ($)	**$118,515,000**	**$213,182,467**	**$244,564,000**	**$292,458,000**	**$336,290,000**	**$323,540,685**	**$310,909,000**	**$358,646,000**

Note: Farm gate value refers to the value producers receive for their crops.
*Source: ** Based on an estimated average weight of one dozen cucumbers weighing 5.45kg (Source: TOGA); Statistics Canada Greenhouse, Sod and Nursery Industries, Catalogue No. 22-202-XIB*

Figure 20 Trends in Greenhouse Vegetable Production and Farm Gate Value by Type for Ontario, 1997 to 2004

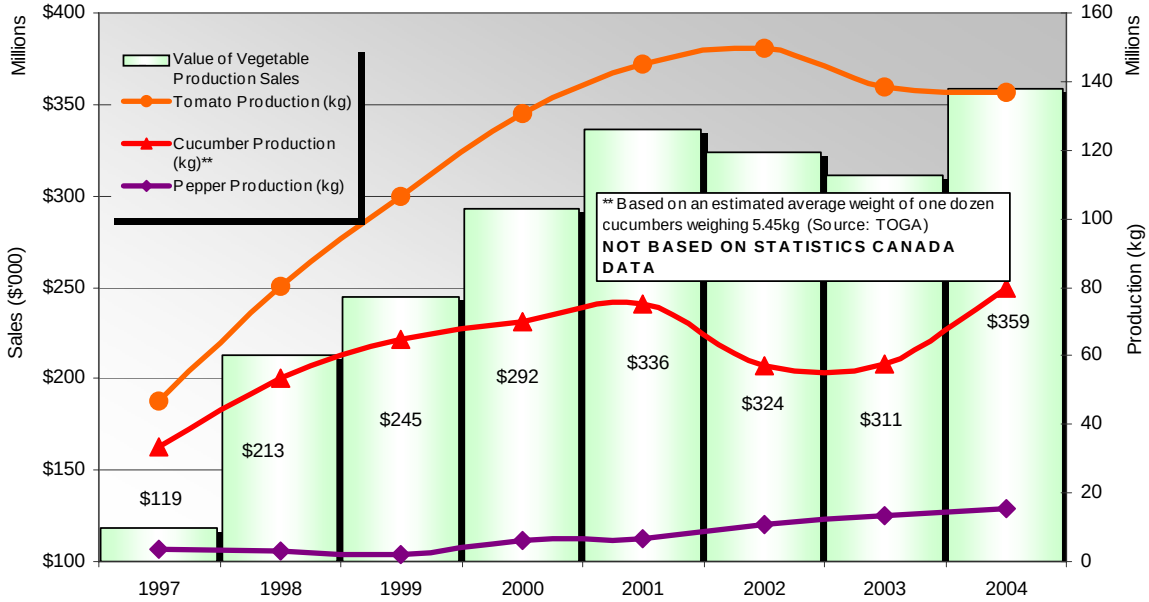


Figure 21 Average Size (m2) of Greenhouse Operations (based on accumulated area totals of 10 hectares or greater) for Ontario and Regions, 2001

Geographic Location	Total - Greenhouse Operations			Avg Size/Operation
	Number	Area (m^2)	Area (ha)	(m^2)
Ontario	2,012	9,139,267	914	4,542
Essex County	213	3,974,205	397	18,658
Niagara Region	265	1,690,098	169	6,378
Haldimand-Norfolk County	179	812,089	81	4,537
City of Chatham-Kent	44	192,969	19	4,386
Peel Region	35	138,308	14	3,952
Halton Region	46	178,773	18	3,886
City of Hamilton	95	321,866	32	3,388
York Region	77	256,838	26	3,336
Huron County	32	98,018	10	3,063
Middlesex County	59	173,729	17	2,945
Simcoe County	69	133,387	13	1,933

Note: Data for number and area of farms is calculated on accumulated totals from vegetable, floriculture and mushrooms. Source: 2001 Statistics Canada, Census of Agriculture - Catalogue No. 95F0301XIE

Figure 22 Average Size (m^2) of Greenhouse Operations (based on accumulated area totals of 10 hectares or greater) for Ontario and Regions, 2001

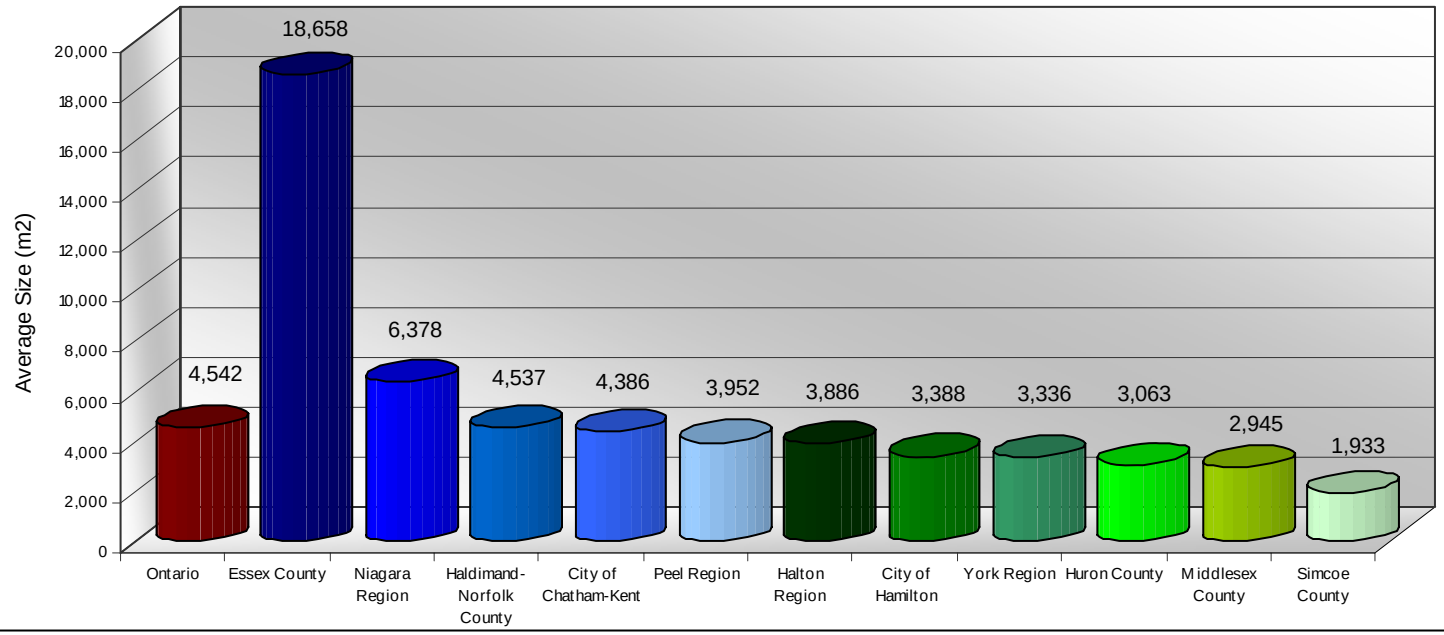
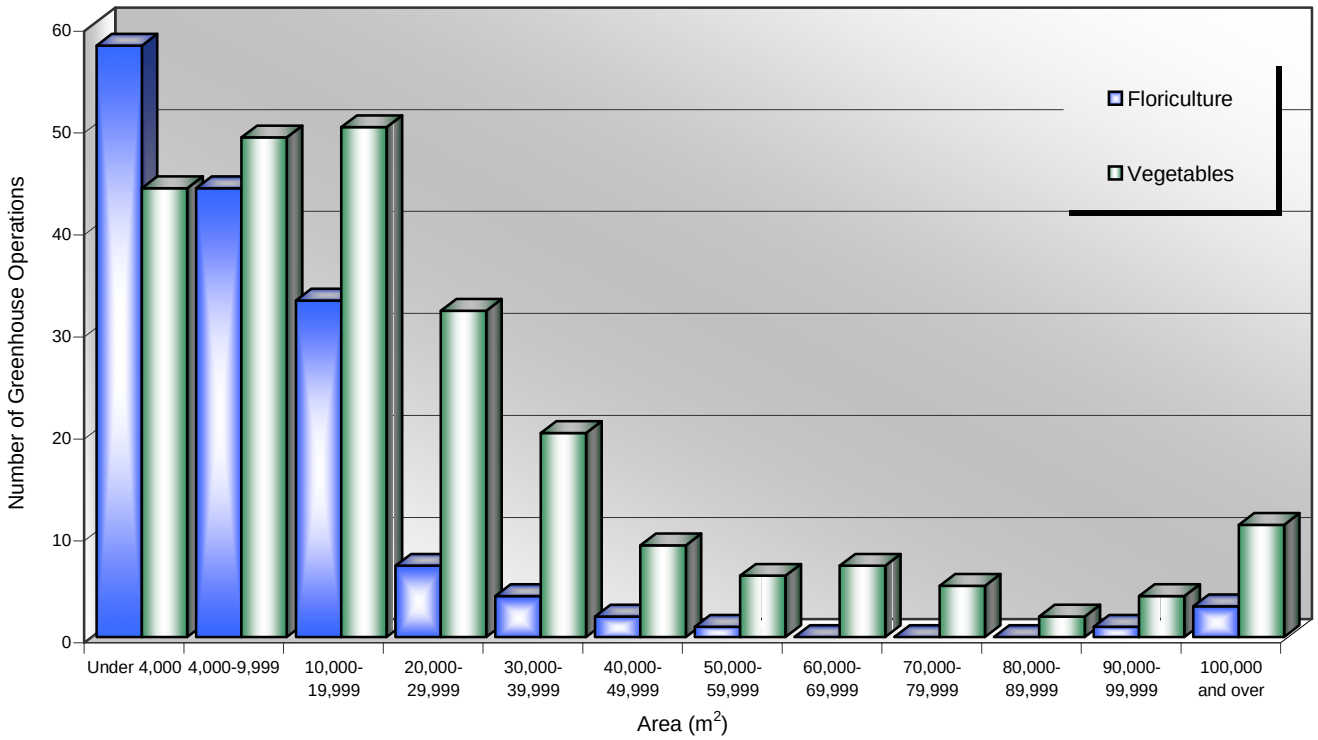


Figure 23 - Number of Greenhouse Operation by Type and Area, 2005

Greenhouse Operation by Type	*Total Number*	*Area (m2)*											
		Under 4,000	*4,000-9,999*	*10,000-19,999*	*20,000-29,999*	*30,000-39,999*	*40,000-49,999*	*50,000-59,999*	*60,000-69,999*	*70,000-79,999*	*80,000-89,999*	*90,000-99,999*	*100,000 and over*
Total - Floriculture	**153**	**58**	**44**	**33**	**7**	**4**	**2**	**1**	**-**	**-**	**-**	**1**	**3**
Tomatoes	60	11	9	14	6	4	3	3	2	3	1	-	4
Cucumbers	86	19	24	22	10	4	4	-	1	-	-	2	-
Peppers	20	-	1	2	7	4	-	1	1	-	-	1	3
Tomatoes & Cucumbers	8	4	-	-	1	2	-	-	1	-	-	-	-
Tomatoes & Peppers	6	-	-	-	1	1	-	-	-	1	-	1	2
Cucumbers & Peppers	4	-	-	1	-	-	-	1	1	-	-	-	1
Tomatoes, Cucumbers & Peppers	1	1	-	-	-	-	-	-	-	-	-	-	-
Unknown	54	9	15	11	7	5	2	1	1	1	1	-	1
Total - Vegetable	**239**	**44**	**49**	**50**	**32**	**20**	**9**	**6**	**7**	**5**	**2**	**4**	**11**
Total Greenhouse Operations	**392**	**102**	**93**	**83**	**39**	**24**	**11**	**7**	**7**	**5**	**2**	**5**	**14**

Source: Flowers Canada (Ontario), 2006; Ontario Greenhouse Vegetable Growers, January 25, 2006.

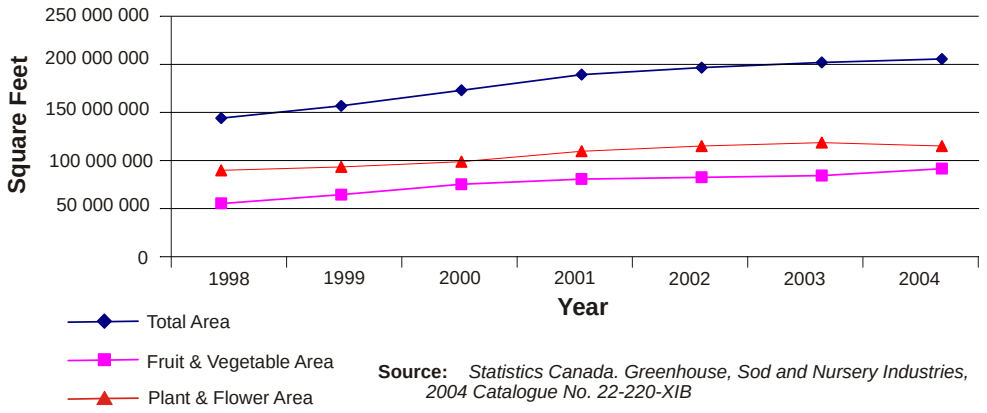
Figure 24 Number of Greenhouse Operations by Type and Area, 2005



2.7 Ontario's Role Nationally and Internationally

As **Figure 25** shows, the greenhouse industry in Canada is significant and is growing. While flower production currently occupies more area, vegetable production is catching up. Between 1997 and 2004, the farm gate value of greenhouse vegetables grew by 167% (**Figure 26)**. For flowers, during the same period, sales increased by $607 million or 73%.

Figure 25 Total Greenhouse Area in Canada



Source: *Statistics Canada. Greenhouse, Sod and Nursery Industries, 2004 Catalogue No. 22-220-XIB*

Figure 26 Farm Gate Value of Canadian Greenhouse Vegetable Production, 1997 and 2004

Greenhouse Commodity	*Farm Gate Value*		*Growth*
	1997	*2004*	
Total - Floriculture	**$834,051,200**	**$1,441,115,300**	**73%**
Tomato	$140,151,900	$413,421,400	195%
Cucumber	$64,033,500	$131,472,900	105%
Pepper	$43,641,900	$132,551,760	204%
Other Vegetable	$22,495,830	$42,976,048	91%
Total - Vegetable	**$270,323,130**	**$720,422,108**	**167%**
Total Canadian Value	**$1,104,374,330**	**$2,161,660,963**	**96%**

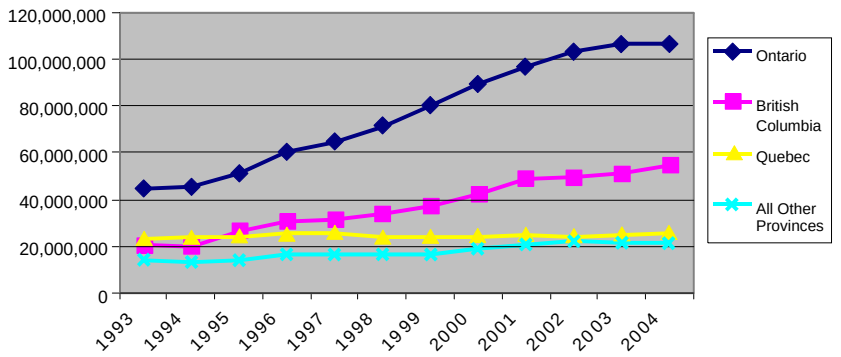
Source: Aggregated data from Statistics Canada, Greenhouse, Sod and Nursery Industries, Catalogue No. 22-202-XIB

Ontario leads the country in greenhouse production and has done so consistently over time (**Figure 27**). In 2003, Ontario accounted for 52% of the total Canadian floriculture production[24] and 58% of total greenhouse vegetable acreage[25]. In 2004, 51% of Canada's total greenhouse production acreage was located in Ontario[26]. The national distribution of greenhouse production is shown on **Figure 28**.

[24] Ontario Ministry of Agriculture Food and Rural Affairs (OMAFRA), A Profile of the Ontario Greenhouse Floriculture Industry, June 2003, pg 12
[25] Agriculture and Agri Food Canada, Introduction to the Greenhouse Vegetable Industry, December 2004, pg 1
[26] Niagara Economic Development Corporation (NEDCO), Ontario Greenhouse Vegetable Markets in the United States, November 2005, pg 5

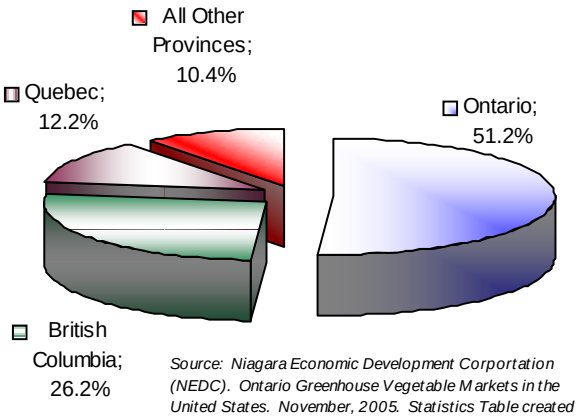
Ontario is generally holding its own in production share by sector. **Figure 29** shows a breakdown of the value of sales for floriculture and vegetables by province, from 2001 to 2004. Ontario has led in value of production throughout this period.

Figure 27 Greenhouse Area in Canada's Growing Regions, 1993-2004



Source: *Aggregated data Statistics Canada, Greenhouse, Sod and Nursery Industries, Catalogue No. 22-202-XIB. Niagara Economic Development Corporation. Ontario Greenhouse Vegetable Markets in the United States. November, 2005.*

Figure 28 Provincial Greenhouse Acreage Comparison, 2004



Source: Niagara Economic Development Corportation (NEDC). Ontario Greenhouse Vegetable Markets in the United States. November, 2005. Statistics Table created from aggregated data published on Strategis.gc.ca

On a global basis, Ontario occupies a significant position in greenhouse production. Although its production is exceeded in European countries such as Spain and the Netherlands, (Ontario's production is approximately 10% of the Netherlands[27]), Ontario is the largest producer of greenhouse vegetable products in North America. The southern part of Essex County around the Town of Leamington has the largest concentration of greenhouse vegetable production in North America. At approximately 355 hectares (877 acres), this area is larger than the entire corresponding American industry. Ontario ranks third in North America in the production of greenhouse floriculture products, after California and Florida. In 2003, Ontario had a trade surplus of $109 million[28] with the United States for this sector.

With respect to greenhouse vegetable production, Ontario plays a major role in the North American market but is not the largest on the world stage. **Figure 30** provides an overview of the greenhouse production in other countries. Notably, Ontario has a much larger acreage of greenhouse vegetable production than the United States but lags behind the other countries listed.

[27] OMAFRA, pg 4
[28] OMAFRA, pg 3

Figure 29 Sales of Vegetable and Floriculture by Province, 2001 to 2004

Province	Value of Sales						Percentage of Change		
	2001			2002			2001 - 2004		
	Total	Floriculture	Vegetables	Total	Floriculture	Vegetables	Total	Floriculture	Vegetables
Newfoundland	$8,360,020	$8,342,000	x	$8,691,875	$8,403,700	x	-5.0%	-7.6%	x
Prince Edward Island	$2,214,730	$1,773,000	x	$2,794,800	$2,280,000	x	2.6%	10.0%	x
Nova Scotia	$36,628,100	$30,789,000	$5,869,100	$34,788,000	$28,285,000	$6,503,000	-4.2%	-1.8%	-18.7%
New Brunswick	$44,556,600	$43,926,000	$630,600	$41,746,450	$41,076,000	$670,450	-14.6%	-14.9%	0.3%
Quebec	$185,427,000	$127,101,000	$58,326,000	$200,860,000	$147,275,000	$53,585,000	26.0%	36.3%	3.5%
Ontario	$1,000,326,000	$661,920,000	$338,406,000	$1,072,219,685	$745,053,000	$327,166,685	10.2%	10.9%	9.0%
Manitoba	$24,479,000	$25,148,000	$331,000	$27,684,740	$27,356,300	$328,440	23.9%	18.7%	45.7%
Saskatchewan	$17,675,000	$14,094,000	$581,000	$26,458,200	$25,676,400	$781,800	23.6%	49.8%	25.2%
Alberta	$97,496,000	$74,426,000	$23,070,000	$104,579,400	$78,886,900	$25,692,500	8.4%	1.9%	29.4%
British Columbia	$437,302,666	$273,469,000	$163,833,666	$492,542,000	$312,293,000	$180,249,000	33.5%	20.6%	55.2%
Total Cdn Value	**$1,855,465,116**	**$1,263,988,000**	**$591,477,116**	**$2,012,365,150**	**$1,416,585,300**	**$595,779,850**	16.5%	14.0%	21.8%

Province	Value of Sales					
	2003			2004		
	Total	Floriculture	Vegetables	Total	Floriculture	Vegetables
Newfoundland	$8,461,500	$8,221,000	x	$7,943,570	$7,709,000	$234,570
Prince Edward Island	$2,511,000	$2,088,000	x	$2,271,400	$1,950,400	$321,000
Nova Scotia	$37,599,000	$31,447,000	$6,152,000	$35,073,265	$30,229,000	$4,774,265
New Brunswick	$40,006,870	$39,293,000	$713,870	$38,047,600	$37,402,000	$632,200
Quebec	$215,206,000	$161,017,000	$54,189,000	$233,693,000	$173,285,000	$60,351,000
Ontario	$1,072,542,000	$750,394,000	$322,148,000	$1,102,839,025	$733,986,300	$368,817,425
Manitoba	$27,204,100	$26,756,000	$448,100	$30,329,500	$29,847,200	$482,300
Saskatchewan	$27,647,400	$26,914,000	$733,400	$21,844,513	$21,116,200	$727,528
Alberta	$98,214,000	$72,321,000	$25,893,000	$105,703,580	$75,843,200	$29,859,220
British Columbia	$557,802,000	$331,598,000	$226,204,000	$583,915,505	$329,677,000	$254,222,600
Total Cdn Value	**$2,087,193,870**	**$1,450,049,000**	**$637,144,870**	**$2,161,660,963**	**$1,441,115,300**	**$720,422,108**

Source: Aggregated data from Statistics Canada, Greenhouse, Sod and Nursery Industries, Catalogue No. 22-202-XIB

Figure 30 Greenhouse Vegetable Growing Area, Selected Countries

Country	*Ha*		*Est. Crop Composition*
	2001	*2002 Est.*	
Canada	852	876 4% growth in 2003	58% - tomato 25% - bell pepper 12% - cucumber 5% - lettuce, herbs
United States	390	400 Growth confined to expansions in Arizona	90% - tomato 3% - bell pepper 3% - cucumber 5% - lettuce, herbs, etc.
Mexico	1,175 5-7% high-tech	1,520 29% increase	70% - tomato 8% - bell pepper 15% - cucumber 7% - melons, herbs, etc.
Netherlands	4,277	Incremental industry expansion and modernization	28% - tomato 27% - bell pepper 15% - cucumber 30% - all others
Belgium	1,100	1,177	52% - tomato 8% - bell pepper 7% - cucumber 32% - lettuce/beans
France	6,260	6,260	55% - tomato 10% - bell pepper 5% - cucumber 8% - egg plant 13% - melon 9% - strawberries
Spain	Growing at 5-7% per year since early 1990's - export oriented	70,300	74% - tomato 18% - bell pepper 8% - cucumber
Israel	3,000	Tripled since 1990 mostly high-tech	Mostly tomato
Italy		Growing strongly - domestic orientation	Mostly tomato
Morocco	11,400 (2000)	Growing rapidly - export oriented	50% - tomato
Turkey	34,000 (1999)	77% are plastic covered; 23% glass	95% vegetable production
Austrialia / New Zealand	1,550	using state-of-the-art hydroponic facilities	Mostly tomato Outdoor hydroponic lettuce

Note: This table includes both low-tech and high-tec facilities.
Source: JRG Consulting Group. Marketing Ontario Greenhouse Vegetables in the Evolving North Amercian Market. October, 2003.

2.8 Ontario Exports and Value of Production

Figures 31 to **34** provide a summary of export figures for greenhouse vegetable and floriculture product for 2003 and 2004. These figures confirm that Ontario absolutely dominates the very significant Canadian export market for greenhouse product with sales to the United States of $636 million in 2003 and $586 million in 2004. Of the total Canadian product exported in 2003/04, 70% of tomatoes, 84% of cucumbers, 64% of peppers and 66% of floriculture came from Ontario.

Figure 31 Canadian Greenhouse Vegetable Export Sales to the United States by Major Growing Region, 2003 and 2004

Tomato	***Export Sales***			***% of National Total***		
	Total	***2003***	***2004***	***Total***	***2003***	***2004***
Canada	$664,079,518	$322,633,149	$341,446,369			
Ontario	**$467,264,938**	**$238,734,962**	**$228,529,976**	**70.4%**	**74.0%**	**66.9%**
British Columbia	$192,722,511	$82,116,156	$110,606,355	29.0%	25.5%	32.4%
Quebec	$2,922,082	$1,384,176	$1,537,906	0.4%	0.4%	0.5%
All Other Provinces	$1,169,987	$397,855	$772,132	0.2%	0.1%	0.2%
Cucumber						
Canada	$111,176,731	$61,287,136	$49,889,595			
Ontario	**$93,021,826**	**$51,503,099**	**$41,518,727**	**83.7%**	**84.0%**	**83.2%**
British Columbia	$15,252,602	$8,663,218	$6,589,384	13.7%	14.1%	13.2%
Quebec	$2,050,578	$712,881	$1,337,697	1.8%	1.2%	2.7%
All Other Provinces	$851,725	$407,938	$443,787	0.8%	0.7%	0.9%
Pepper						
Canada	$219,017,616	$110,364,330	$108,653,286			
Ontario	**$140,924,127**	**$75,112,528**	**$65,811,599**	**64.3%**	**68.1%**	**60.6%**
British Columbia	$75,722,386	$34,618,443	$41,103,943	34.6%	31.4%	37.8%
Quebec	$2,097,300	$523,496	$1,573,804	1.0%	0.5%	1.4%
All Other Provinces	$273,803	$109,863	$163,940	0.1%	0.1%	0.2%
Total Vegetable Sales	**$994,273,865**	**$494,284,615**	**$499,989,250**			

Source: Niagara Economic Development Corporation (NEDC). Ontario Greenhouse Vegetable Markets in the United States. November, 2005. Statistics Table created from aggregated data published on Strategis.gc.ca

Figure 32(a) Canadian Greenhouse Tomato Export Sales to the United States by Major Growing Region, 2004

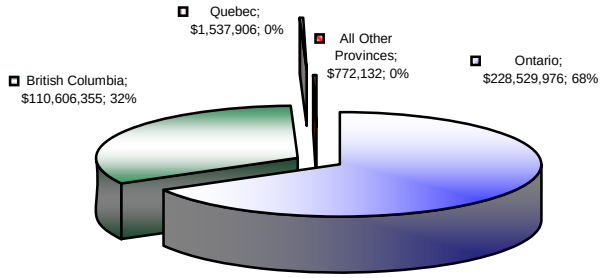


Figure 32(b) Canadian Greenhouse Cucumber Export Sales to the United States by Major Growing Region, 2004

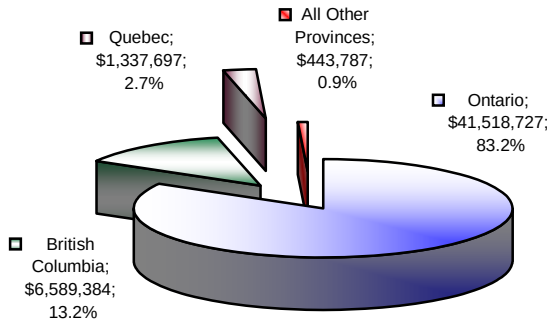
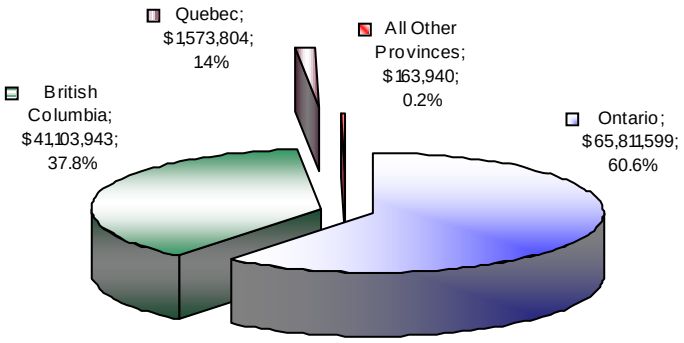


Figure 32(c) Canadian Greenhouse Pepper Export Sales to the United States by Major Growing Region, 2004



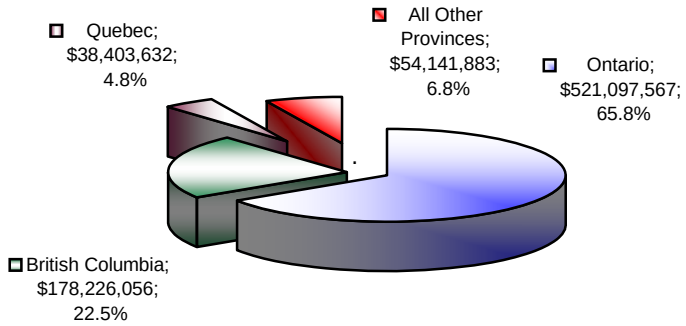
Source: Ontario Greenhouse Vegetable Growers

Figure 33 Canadian Greenhouse Floriculture Export Sales to the United States by Major Growing Region, 2003 and 2004

	Export Sales			*% of National Total*		
	Total	***2003***	***2004***	***Total***	***2003***	***2004***
Canada	$791,869,138	$405,841,110	$386,028,028			
Ontario	**$521,097,567**	**$270,553,711**	**$250,543,856**	**65.8%**	**66.7%**	**64.9%**
British Columbia	$178,226,056	$88,805,476	$89,420,580	22.5%	21.9%	23.2%
Quebec	$38,403,632	$19,489,023	$18,914,609	4.8%	4.8%	4.9%
All Other Provinces	$54,141,883	$26,992,900	$27,148,983	6.8%	6.7%	7.0%

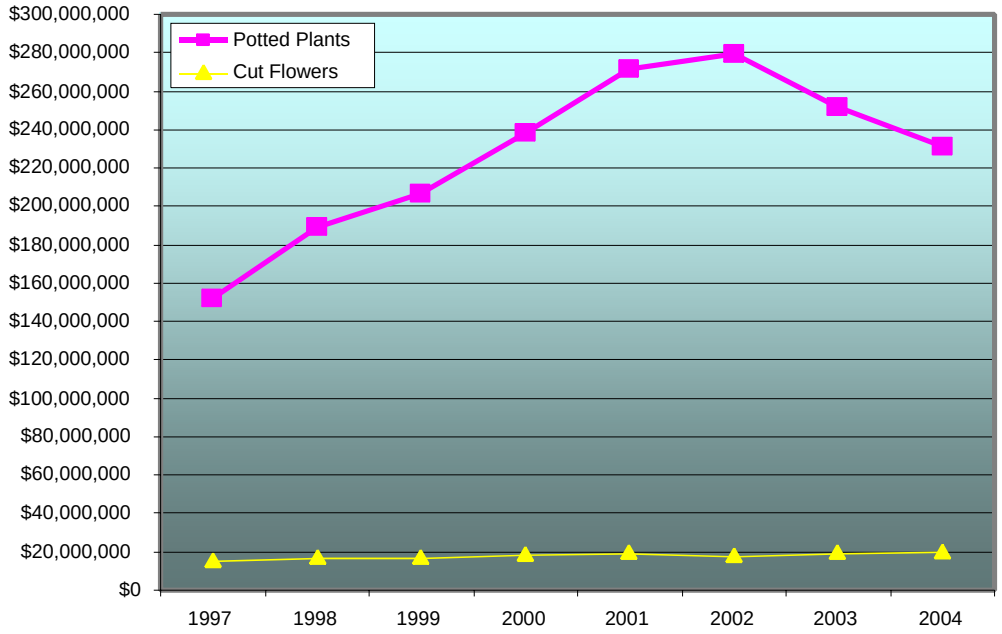
Source: Niagara Economic Development Corporation (NEDC). November, 2005. Statistics Table created from aggregated data published on Strategis.gc.ca

Figure 34 Canadian Greenhouse Floriculture Export Sales to the United States by Major Growing Region, 2004



As shown on **Figure 35,** between 1997 and 2004, Ontario saw an increase in sales of floriculture products to the United States, the destination of approximately 90% of industry exports,[29] with the peak year for sales being 2002. In the ten year period from 1994 to 2004, Ontario exported floriculture products with an approximate cumulative export value of $2.1 billion dollars to the United States, accounting for 72% of the total Canadian floriculture exports for that period[30].

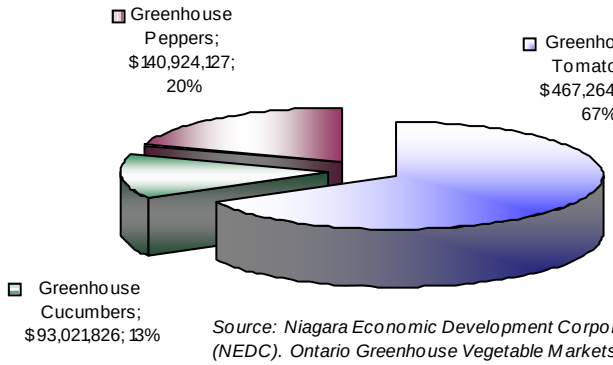
Figure 35 Ontario Floriculture Export Sales to the United States, 1997-2004



Source: *Aggregated data from published on Stratesgis.gc.ca. Niagara Economic Development Corporation. Ontario's Floriculture Industry. November, 2005.*

Within Canada, Ontario is a leader in the production and export of greenhouse vegetables. In 2003/04 the cumulative total of Ontario greenhouse vegetable export sales exceeded $701 million, 71% of the Canadian total[31]. The percentage breakdown between export sales of tomatoes, peppers and cucumbers is shown on **Figure 36**.

Figure 36 Ontario Greenhouse Vegetable Export Sales to the United Sates by Commodity, 2003-2004



Source: Niagara Economic Development Corportation (NEDC). Ontario Greenhouse Vegetable Markets in the United States. November, 2005. Statistics Table created from aggregated data published on Strategis.gc.ca

A number of American agencies, including the

[29] Agriculture and Agri Food Canada, Canadian Ornamental Situation and Trends (2004), December 2005, pg 10
[30] NEDCO, Ontario Greenhouse Floriculture Markets in the United States, December 2004, pg 6
[31] NEDCO, Ontario Greenhouse Vegetable Markets in the United States, Executive Summary, November 2005, pg 15

United States Department of Agriculture, track exports to the United States and provide very accurate statistics on the value of product crossing the border. These trade statistics are collated by Industry Canada and published by Strategis. Use of this data to track greenhouse vegetable products became much easier in 2003 when specific codes identifying greenhouse vegetable products were assigned to export shipments. Prior to 2003, field and greenhouse product were not differentiated, making tracking less accurate.

Correspondingly unique codes for greenhouse floricultural products have not yet been assigned, so figures for floriculture products may include non-greenhouse product. However, given that almost all floriculture product in Ontario originates from greenhouses and that some greenhouse product is included in categories that are not listed as floriculture, it is reasonable to assume that the trade figures generated for floriculture are representative of greenhouse product shipments. Efforts are underway to address this reporting problem by assigning specific codes for greenhouse floriculture products as was done previously for greenhouse vegetable products.

By far the largest component of Ontario greenhouse vegetable production, in terms of volume and exports, is tomatoes. As **Figure 37** shows, this sector has grown dramatically since 1994, with the percentage of production being exported rising from 23% to 60%[32]. A modest decline in sales, which could be explained by a variety of circumstances including increased competition from American production and a rising Canadian dollar, was experienced in 2003/04.

Figure 37 Canadian Greenhouse Tomato Supply and Use

Year	Production	Imports [1]	Supply	Exports [2]	Consumption	Consumption Per Capita	Export Share of Production	Exports to U.S. [3]
	metric tons					kilograms	(%)	metric tons
1994	32,900	n.a.	n.a.	7,673	n.a.	n.a.	23%	7,673
1995	41,898	4,235	46,133	11,716	34,417	1.17	28%	11,712
1996	62,642	6,201	68,843	21,936	46,907	1.58	35%	21,935
1997	78,100	7,961	86,061	38,373	47,688	1.59	49%	38,373
1998	124,835	12,021	136,856	62,441	74,415	2.46	50%	62,405
1999	163,630	11,012	174,642	80,130	94,512	3.10	49%	80,117
2000	195,235	11,589	206,824	102,212	104,612	3.40	52%	102,131
2001	219,936	11,577	231,513	106,691	124,822	4.01	49%	106,626
2002	225,102	16,273	241,375	101,625	139,750	4.45	45%	101,402
2003	220,114	14,159	234,273	131,456	102,817	3.26	60%	130,868

n.a. = not available

[1] In 1995, assuming all imports from EU, Israel, and Morocco are greenhouse and all else field grown. From 1996 to 2003, including official Canadian statistics on greenhouse imports from the United Staes and Mexico.

[2] Assuming all tomato exports are greenhouse tomatoes.

[3] For 1994, using U.S. Commerce numbers of imports from Canada as a proxy for total Canadian exports. For 1995-2003 Statistics Canada data on total exports.
Source: Statistics Canada, British Columbia Vegetable Marketing Commission, Ontario Greenhouse Vegetable Growers, U.S. Department of Commerce, Work Trade Atlas, and calculations by Cook and Calvin. Economic Research Service/USDA. North American Greenhouse Tomatoes Emerge as a Major Market Force. Volume 3. Issue 2. April, 2005.

In 2003, Ontario produced 68% of the peppers exported by Canada to the United States[33]. This share fell to 60.5% in 2004, with British Columbia increasing its share

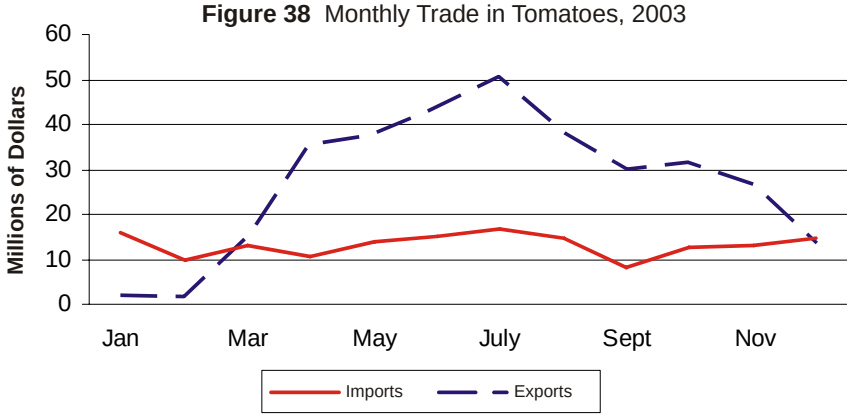
[32] L. Calvin and R. Cook, North American Greenhouse Tomatoes Emerge as a Major Market Force, pg 16
[33] NEDCO, Ontario Greenhouse Vegetable Markets in the United States, November 2005, pg 19

from 31 to 38% of exports[34]. This share drop does not necessarily represent a decline in production in Ontario but rather a strengthening of export sales from British Columbia.

Cucumbers have seen fluctuation in export sales but over the long term have exhibited steady growth and a provincial export sales share of approximately 14%. During the period from 2003/04, Ontario contributed 84% of the total Canadian exports of greenhouse cucumbers[35].

Within each calendar year, exports and imports fluctuate on a seasonal basis. The profile for tomatoes is shown on **Figure 38**. Seasonal fluctuations are experienced in all greenhouse sectors. For vegetables, the fluctuation is directly due to the abatement of greenhouse production for a seasonal window in the "least daylight hours" period of the year, beginning in November and extending as late as March for some growers. This break in production necessitates imports of product, both for the domestic buyers and to fill export contracts and avoid disruption in supply. For flowers, heavy demand on occasions such as Valentine's Day and Mother's Day necessitates an increase in imports to meet demand.

Figure 38 Monthly Trade in Tomatoes, 2003



Source: *Statistics Canada. Vista on the Agri-Food Industry and the Farm Community. Catalogue No. 21-004-XIE. March, 2005.*

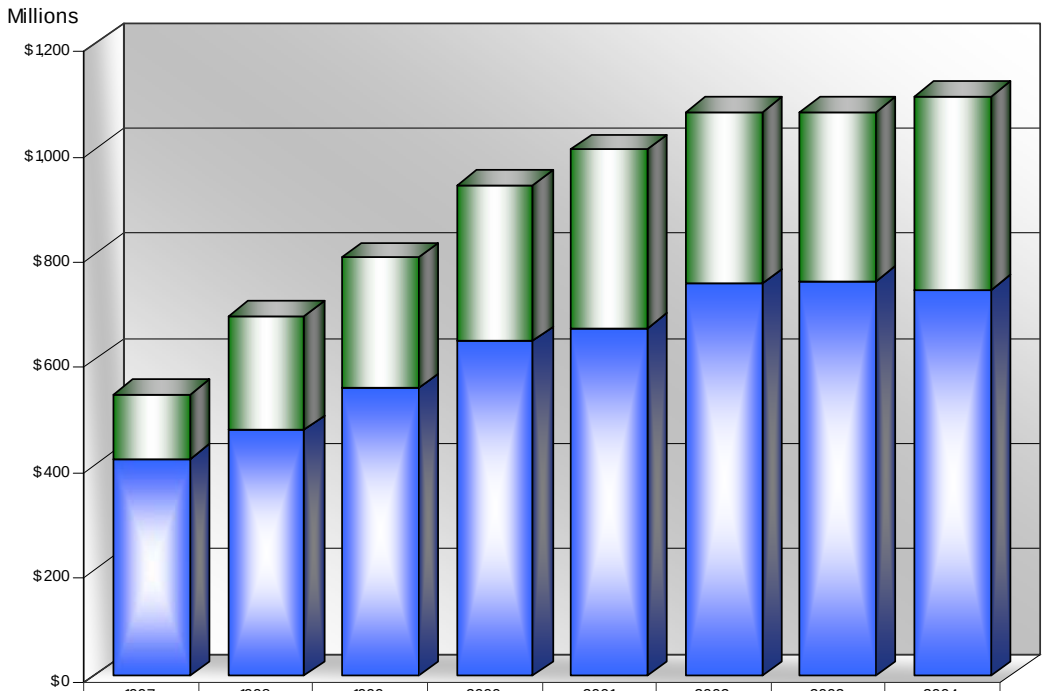
Greenhouse vegetable production in Canada has seen a 167% increase in national farm gate value since 1997. While peppers have seen the largest percentage increase in value, by volume tomatoes are still by far the largest component of this sector. Cucumbers, although not as fast growing as the other two vegetables, have nevertheless seen a doubling in farm gate value and have maintained their market share.

The Ontario situation mirrors the national trend. In Canada, greenhouse production area increased by 61% between 1998 and 2004; pepper production area increased by 266% from 439,260 square metres (4,728,307 sq. ft.) to 1,607,690 square metres (17,305,600 sq. ft.)[36], and export sales increased to 20% of the total vegetable export sales. There was a modest decline in Ontario's share of Canada's greenhouse pepper production during the period 2003/04, due to an increase in production in British Columbia. Overall, however, Ontario continues to dominate greenhouse vegetable production in area.

[34] Ibid. pg 19
[35] Ibid. pg 21
[36] NEDCO, Ontario Greenhouse Vegetable Markets in the United States, November 2005, pg 6

With respect to Ontario's share of the national breakdown in exports and sales, **Figure 39** provides a breakdown that tracks the changes that have occurred between 1997 and 2004, in Ontario's share of sales. For the floriculture industry, this figure illustrates the variation in sale destinations with sales to mass-market chain stores the specific destination that grew the most. This point is significant in that the sale of floriculture product to the general public at supermarkets and chain stores is seen as a potential growth area for sales for the industry. This growth is partially at the expense of traditional florists, whose numbers declined in 1998 and 1999 only to rebound in 2000. Overall ornamental and plant sales have increased in all market sectors between 1997 and 2004 and the industry is confident there is still considerable potential to increase sales.

Figure 39 Historical - Trends in Sales in Ontario for Floriculture and Vegetables, 1997 to 2004



	1997	1998	1999	2000	2001	2002	2003	2004
Vegetables	$122,137,000	$217,734,467	$248,654,000	$296,369,000	$338,406,000	$327,166,685	$322,148,000	$368,817,425
Floriculture	$412,602,000	$467,266,000	$546,418,000	$636,600,000	$661,920,000	$745,053,000	$750,394,000	$733,986,300

2.9 Operating Costs

Operating costs for greenhouses are high in comparison with open field agriculture. The most significant costs are labour (as shown on **Figure 40**) and fuel. While labour is a major cost that tends to rise proportionately as area under production increases, it is easier to forecast and control. Fuel costs, conversely, are subject to fuel commodity market forces and can fluctuate significantly from season to season. In 2002 a rapid escalation in electricity costs occurred as a result of market deregulation.

Figure 40 Historical - Greenhouse Operating Costs and Labour, Percentage of Provincial to National and Percentage of Change, 1997 to 2004

Item	*Units*	*Ontario*							
		1997	*1998*	*1999*	*2000*	*2001*	*2002*	*2003*	*2004*
Total Greenhouses	No.	1,450	1,350	1,355	1,215	1,120	1,395	1,385	1,285
Total Employees[1]	No.	14,100	14,635	15,050	17,025	16,630	18,380	18,865	18,400
Total Gross Yearly Payroll[1]	($)	132,800,000	149,037,000	158,150,000	199,775,000	224,275,000	238,000,000	276,000,000	261,400,000
Total Investment[2]	($)	830,500,000	859,380,000	910,197,000	1,165,000,000	1,279,520,000	1,409,820,000	1,449,100,000	1,486,000,000
Total Purchase Value[3]	($)	100,460,000	107,370,000	125,830,000	165,560,000	169,883,000	192,492,000	192,247,000	188,912,000
Total Fuel Cost	($)	50,065,000	50,356,000	57,275,000	90,793,000	123,041,000	128,295,000	165,389,000	151,600,000
Item	*Units*	*Canada*							
		1997	*1998*	*1999*	*2000*	*2001*	*2002*	*2003*	*2004*
Total Greenhouses	No.	4,555	4,100	3,810	3,460	3,235	4,200	4,100	3,681
Total Employees[1]	No.	34,660	35,760	35,705	38,840	38,700	43,270	43,560	43,245
Total Gross Yearly Payroll[1]	($)	281,290,400	309,654,000	328,111,000	392,545,000	433,355,000	473,357,400	517,032,000	508,997,500
Total Investment[2]	($)	1,914,841,000	1,871,309,000	1,995,241,000	2,403,354,000	2,661,918,000	2,834,790,000	2,903,935,000	3,065,593,810
Total Purchase Value[3]	($)	202,327,700	212,805,400	242,035,000	308,128,000	309,860,000	348,336,000	366,817,000	361,707,100
Total Fuel Cost	($)	96,608,100	97,696,000	110,081,000	159,944,000	208,369,000	218,276,600	266,042,000	257,325,925

Percentage Share of National				*Percentage of Change*			
				(1997 - 2004)		*(2001 - 2004)*	
1997	*2000*	*2002*	*2004*	*Ontario*	*Canada*	*Ontario*	*Canada*
31.8%	35.1%	33.2%	34.9%	-11.4%	-19.2%	14.7%	13.8%
40.7%	43.8%	42.5%	42.5%	30.5%	24.8%	10.6%	11.7%
47.2%	50.9%	50.3%	51.4%	96.8%	81.0%	16.6%	17.5%
43.4%	48.5%	49.7%	48.5%	78.9%	60.1%	16.1%	15.2%
49.7%	53.7%	55.3%	52.2%	88.0%	78.8%	11.2%	16.7%
51.8%	56.8%	58.8%	58.9%	202.8%	166.4%	23.2%	23.5%

Note: References: Statistics Canada: Catalogue No. 22-202.

[1] Includes full-time and part-time labour.

[2] Includes land, buildings, equipment and machinery at fair market value.

[3] Includes value of flowers, plants, cuttings, seeds and bulbs purchased.

Source: Ontario Ministry of Agriculture, Food and Rural Affairs, www.omafra.gov.on.ca/english/stats/hort/greenhouse.html

Fuel costs can represent 20% to 35%[37] of cost of production, depending on the type of product being produced. Based on input from gas company representatives, the authors estimated that in 2003, heating costs to produce a kilogram of product would range between $0.35 and $0.50 based on 50 kg/m2 yields.[38] Many greenhouse operations, particularly in Niagara, rely on natural gas for heating. In the Leamington / Kingsville area, use of bunker oil as an alternative to natural gas, is not uncommon.

Electricity charges can absorb up to 10% of the energy costs for a greenhouse. Electricity is absolutely critical to greenhouse operations to operate the computers and automated equipment that control heat, irrigation and nutrient injection. Any breakdown in this equipment can mean the loss of an entire crop in a very short period.

The other significant cost associated with greenhouse operations is the capital cost of construction. Estimates place the cost of developing an acre of greenhouse in a range of $500,000 to $1, 000,000 per acre. In addition to the building costs, there are costs associated with heating, irrigation, electrical systems, nutrient injection, and computer systems. In areas where municipal services such as water are available, there is the potential for permit fees and development charges to add significantly to capital costs of expansion.

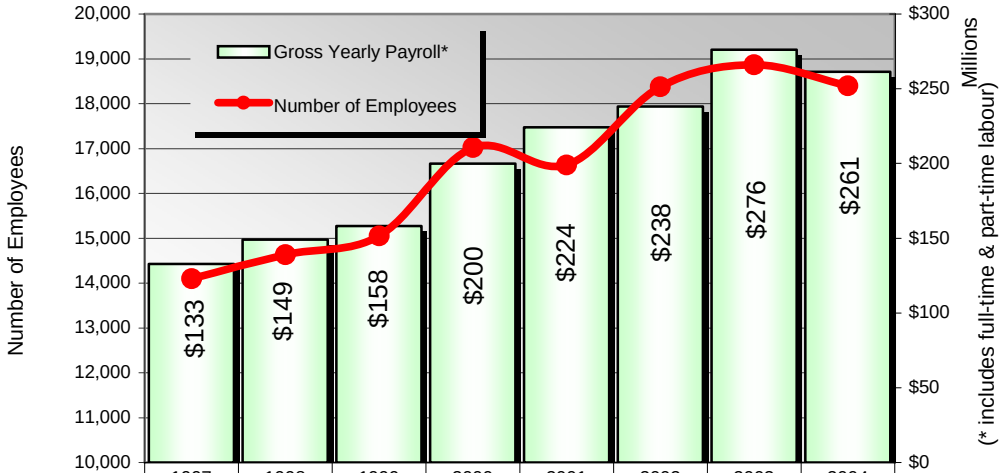
2.10 Employment Figures

In 2004, Statistics Canada reported that there were 18,400 full and part-time employees in the greenhouse sector. This level of employment represented a 30.5% increase over the number employed in the industry in 1997.

Source: Ontario Greenhouse Vegetable Growers

[37] Brown, Wayne. "A Profile of the Ontario Greenhouse Floriculture Industry" Ontario Ministry of Agriculture, Food and Rural Affairs, June 2003, pg 8
[38] JRG Consulting Group, Marketing Ontario Greenhouse Vegetables in the Evolving North American Market, Guelph, October 2003, pg 67

Figure 41 Historical - Trends in Number of Employees and Gross Yearly Payroll* in Greenhouse Industry for Ontario, 1997 to 2004



	1997	1998	1999	2000	2001	2002	2003	2004
Gross Yearly Payroll*	$132,800,0	$149,037,0	$158,150,0	$199,775,0	$224,275,0	$238,000,0	$276,000,0	$261,400,0
Number of Employees	14,100	14,635	15,050	17,025	16,630	18,380	18,865	18,400

Greenhouses require a range of labour skills. Estimates are that the equivalent of three full time workers is required to tend an acre of crop[39]. To address their needs for semi-skilled, part-time labour to plant and tend to crops, greenhouse operators have utilized the offshore farm labour program, the Caribbean and Mexican Agricultural Seasonal Agricultural Program (CMASAP) administered by FARMS[40] in Ontario.

It is difficult to assess the age profile of operators as there is no breakdown provided by Statistics Canada on the basis of commodity group. However, the authors' observation is that this sector has a younger profile than Ontario agriculture generally, where the average age of an Ontario farmer in 2001 was 50.7 years. This younger age structure may be due to a combination of factors including the relative age of the industry, the emphasis on technology, and the continuing entry into the industry by the next generation of family members. Whatever factors are responsible, having a lower age profile bodes well for the health and future of the industry.

2.11 Overview

This review of the statistics related to the greenhouse agriculture sector confirms that it is a significant sector. Regardless of the criteria, whether it is value of production, area under cultivation, export sales, national share of production or employment, it is a sector that is leading and expanding.

[39] Leamington Kingsville Resource Jump Team, Final Report, December 20, 2002, pg. 13
[40] FARMS is an acronym for Foreign Agricultural Resource Management Services

CHAPTER 3
THE GREENHOUSE INDUSTRY'S ROLE IN ONTARIO'S ECONOMY

CHAPTER 3 THE GREENHOUSE INDUSTRY'S ROLE IN ONTARIO'S ECONOMY

The growth that has occurred in the greenhouse agricultural sector in Ontario in the last 20 years has resulted in this sector becoming a significant economic force in the provincial economy. In response to this growth, TOGA determined that it would be appropriate to conduct an estimate of the economic impact of the greenhouse industry and its main commodity groups in the Province of Ontario.

Commodity specific detail was obtained by a significant primary data gathering exercise in which owners/operators of greenhouse operations in the various sub-sectors were surveyed as to their input purchases and sales. The result is an economic impact statement that differentiates the commodity groups which comprise the Ontario greenhouse agricultural sector in terms of their ability to stimulate output and wage payments throughout the province. On this basis, the various commodity groups can be compared in terms of their overall propulsiveness[41] vis-à-vis the broader regional economy. By facilitating a better understanding of the absolute and relative importance of the greenhouse industry and its constituent commodity groups in Ontario, decision makers will be provided with the information required to better understand the trade-offs involved in policy decisions which impinge on greenhouse agriculture.

In this chapter, the structure of the sector is described, the methodology used to estimate economic impacts is discussed, and primary findings are presented.

3.1 Examining the Structure of the Ontario Greenhouse Sector

As noted in Chapter 2, Statistics Canada has changed its definition of what constitutes a greenhouse operation several times over the past 2 decades. Currently, greenhouse operations are defined as any "…operation where plants are grown under glass, plastic, or similar type protection."[42] The dominant components of the Ontario greenhouse sector, so defined, are presented in **Figure 42**.

Source: http://www.ontariogreenhouse.com/virtual.cfm

Overall, the Ontario greenhouse agricultural sector generated well over $1 Billion in gross sales (in nominal terms) in 2004 (see Figure 42) with each of the major groups accounting for a significant portion of the industry's activity in the province.

[41] "Propulsiveness" - refers to the ability of a given sector to stimulate activity in other industries by scaling up its own output.
[42] Statistics Canada (2005), Greenhouse, Sod and Nursery Industries: 2004, Catalogue number 22-202 XIB, pg 10.

Figure 42 The Ontario Greenhouse Industry by Major Commodity Group, 2004

Component	*Sales in 2004**
Greenhouse - Tomatoes	$210,245,000
Greenhouse - Peppers	$56,250,000
Greenhouse - Cucumbers	$92,151,000
Greenhouse - Cut Flowers	$110,097,900
Greenhouse - Potted Plants, Bedding Plants & Cuttings	$623,888,100
Total Value of Greenhouse Sales	**$1,092,632,000**

** Source: Statistics Canada: Catalogue No. 22-202-XIB, 2004*

3.2 Economic Impact Analysis Methodology

This assessment of the economic impact of the greenhouse sector in Ontario was completed in several stages:

1. Greenhouse operators in the various commodity groups were surveyed with respect to the nature of their operations, and specifically their input requirements;
2. Augmented Input-Output (IO) tables for the Province of Ontario (based on the 2001 IO tables)[43] were created using the information gathered from the sample of greenhouse operators;
3. A regional economic impact model was developed and tested (referred to below as the TOGA Impact Model or TIM); and,
4. The augmented IO tables and the economic impact model were used to estimate the direct, indirect and induced economic impacts of the greenhouse sector and each of its components in Ontario.

3.3 Survey of Greenhouse Operators

The first step in measuring the economic impacts stemming from the activities of a given industry involves the determination of that industry's input structure. An industry's input structure shows all of the inputs required to produce its output, as well as the relationship between output levels and the rate at which various inputs are required.

The greenhouse agricultural sector of Ontario is not represented explicitly in the Input-Output (IO) tables for Ontario, but rather is subsumed in a larger aggregate category called "Crop and Animal Production". As a result, the input structure of the greenhouse sector had to be estimated via a survey of greenhouse operators in Ontario. Specifically, a quasi-random sample of greenhouse operators across commodity groups, across size classes, and across the regions of Ontario was used to estimate the input structure of the provincial greenhouse sector.

[43] The 2001 IO Tables represent the most current IO tables available for the Province of Ontario at this time. It is also worth noting that provincial IO tables at higher levels of industry disaggregation are not available. Higher degrees of industry disaggregation are available only at the national level.

3.4 Creation of an Augmented IO Database for Ontario

Given that the greenhouse industry is not represented in the provincial IO tables which formed the basis for this analysis, the tables themselves had to be augmented in a manner which allowed the greenhouse industry and its components to be represented explicitly. The creation of this database made use of the survey data discussed above, as well as a variety of balancing techniques to ensure that critical accounting identities in the IO data were maintained.

3.5 The Development of a Provincial Economic Impact Model

The assessment of the economic impact of the Ontario greenhouse industry necessitated the development of an impact model capable of assessing the direct, indirect and induced effects (in terms of labour income and industry output) of the activities of the greenhouse industry and its components. The final model developed for this purpose is a regional IO model which treats personal consumption and imports endogenously.[44]

3.6 Computing the Direct, Indirect and Induced Effects of the Greenhouse Industry

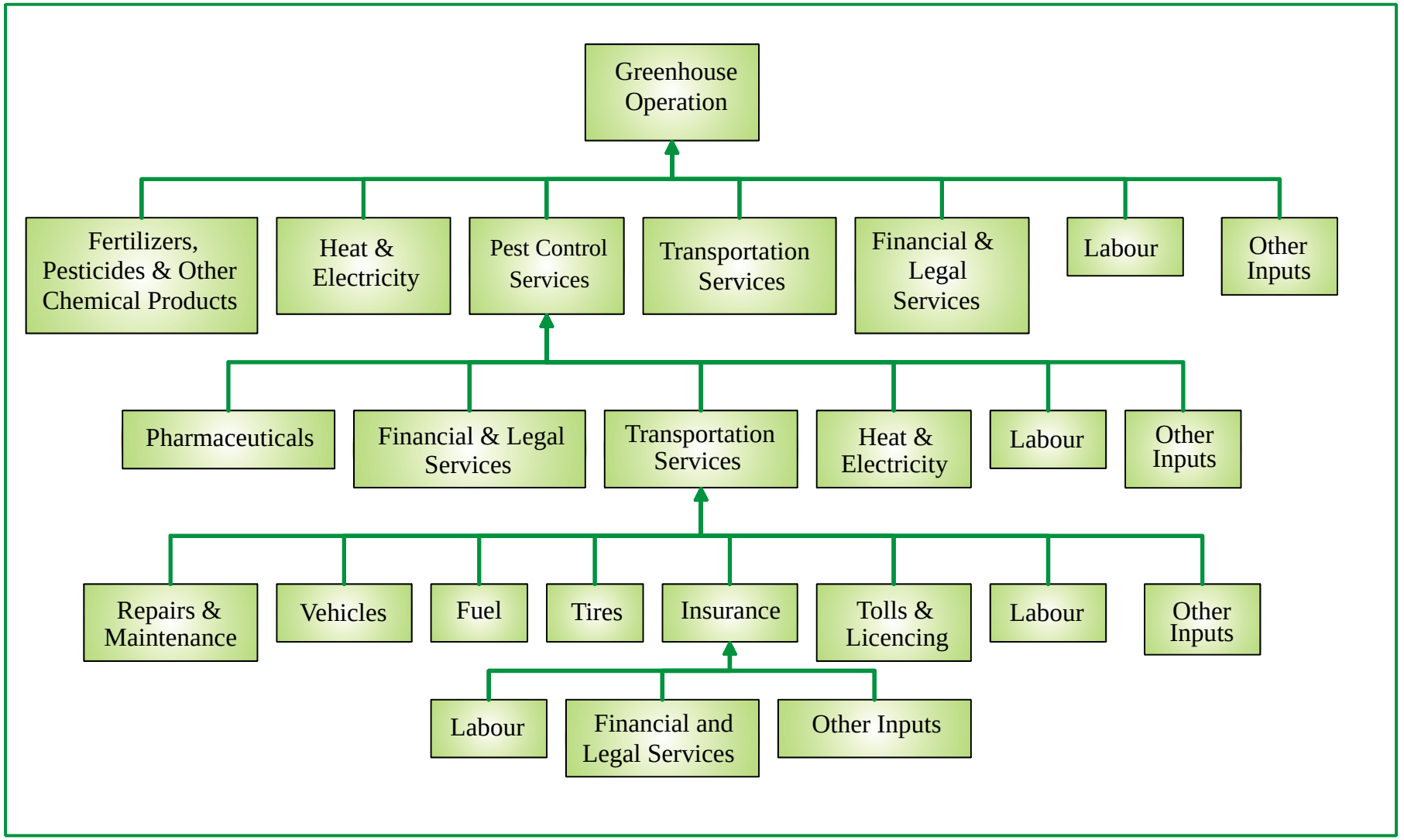
The total economic impact of any industry is defined as the sum of its direct, indirect and induced economic impacts in the host economy. Direct impacts are those which stem from the direct input requirements of the industry in question (e.g., the greenhouse sector's purchases of seedlings, diesel fuel, and labour).

Direct input purchases trigger additional rounds of spending as input providers purchase inputs to produce their outputs (e.g., the producer of seedlings purchasing electricity, the diesel fuel wholesaler purchasing labour and the services of legal and financial experts etc.). These additional rounds of spending triggered by the direct input purchases are referred to as the indirect effects (see **Figure 43** for a representation of these rounds of spending - the income multiplication process in a regional economy)[45].

[44] The term "endogenous" means that these values are determined by the model as opposed to being taken parametrically from outside of the model. Models which treat personal consumption expenditures endogenously do so by incorporating a feedback from industry output, to personal consumption expenditures, and back to industry output (as industries produce goods and services to satisfy "induced" consumption demand).

[45] **Figure 43** presents a very simplified view of the income multiplication process as it pertains to the greenhouse industry (GHI). Specifically, the GHI at the top of the figure is represented as buying inputs from a sampling of relevant industries. It is important to note that Figure 43 is a hypothetical picture of the linkages stemming from the GHI and it is not meant to be a true depiction of the linkages between the GHI and the broader provincial economy. Indeed, Figure 43 is only meant to convey a rudimentary understanding of the linkage concept, and its relationship to the notion of a multiplier effect for the GHI.

Figure 43 Schematic Representation of a Hypothetical (and truncated) Pattern of Linkages Emanating from a Greenhouse Operation



Induced impacts refer to those additional rounds of spending that stem from income earned by workers in the various industries in the economy which are impacted directly and indirectly by the initial shock (i.e., by the activities of the industry in question – the greenhouse industry).[46] In other words, as the greenhouse industry increases its output, it must purchase more inputs from its suppliers. As the greenhouse industry pays its employees, and as firms supplying the greenhouse industry pay their employees, personal consumption expenditures in the economy increase as employees allocate a portion of their earnings to personal consumption (e.g. food, services, vehicles, electronics, etc.). This increase in personal consumption expenditures can be said to be "induced" by the initial activities of the greenhouse industry (i.e. scaling up its production level), and this demand for goods and services must also be met with industrial activity in the province if it is to be satisfied. This is the induced effect. To ignore this feedback from industry output to labour income to personal consumption, and back to industrial output would be tantamount to assuming that none of the income earned by employees of the greenhouse industry, and by the employees of all other industries affected directly or indirectly by it, is spent in the economy, i.e. that workers save 100% of their earnings or that their consumption demands are completely satisfied by imports. Neither is a defensible assumption.

The economic impact model developed in task three above was designed to allow for the computation of direct, indirect and induced effects of any exogenous shock to the provincial economy.[47] The TOGA Impact Model (TIM) was used to compute the direct, indirect and induced economic impacts of the greenhouse industry in Ontario.

3.7 The Results

3.7.1 The Input Structure of the Greenhouse Sector in Ontario

Figure 44 presents a picture of the estimated input structure of the greenhouse sector (GHS) in Ontario.[48] The values plotted in the chart represent the dollar value of input from each industry in the economy required to sustain one dollar's worth of output from the greenhouse sector. As such, these values provide a reasonable picture of the internal structure of the sector in Ontario.

The results indicate that the most important industries in terms of providing inputs to the greenhouse sector include:

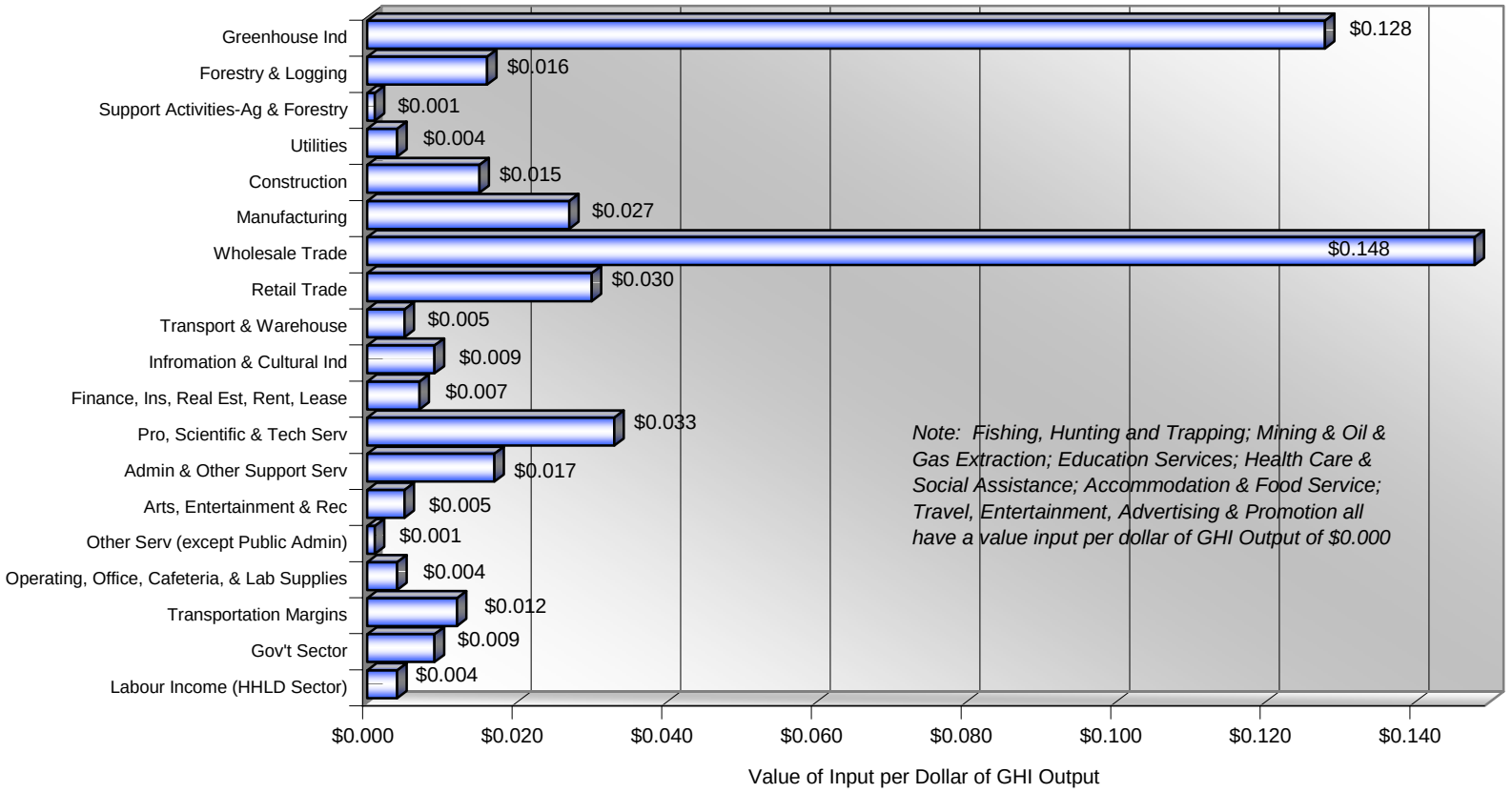
- manufacturing at nearly $0.15 of input required per dollar of GHS output;
- crop and animal production at nearly $0.13 of input required per dollar of GHS output;

[46] When an industry is called upon to provide inputs to the GHI, it too must draw inputs from its suppliers (see Figure 42). All industries buy labour to conduct their business, and a portion of the income earned by labour is spent in the economy (e.g. to buy manufactured items, services, consumables, etc.), and this additional consumption demand must be met with additional industrial output. It is this additional industrial output, induced by the consumption behaviour of workers, which constitutes the induced effect of an initial shock.

[47] The term "shock" refers to the fact that IO models are often used to compute the industry output impacts of a given change or "shock" to the demand for a region's outputs. In this case, the 2004 gross sales values for the greenhouse industry and its components were taken from Statistics Canada publication 22-202 XIB, and these values were used as the shock. So, the model was run in a manner which allowed the impacts of these levels of activity in the GHI and its components to be assessed.

[48] In the interests of protecting the confidentiality of the operators who cooperated with this research project, input profiles for the individual components will not be presented. Suffice it to say, that variation across the components was minimal and key points are reflected in the values for the GHI as a whole as presented in Figure 44.

Figure 44 Experimental Input Structure of the Greenhouse Industry



- labour (i.e., households) at $0.12 per dollar of GHS output; and,
- finance, insurance, real estate and renting and leasing with just over $0.03 per dollar of GHS output.

The fact that the greenhouse industry draws on so many industries, and that it draws so heavily from manufacturing, means that it is deeply interwoven with the fabric of the broader Ontario economy, and therefore has tremendous potential to transmit demand shocks widely throughout the provincial economy or to be "propulsive".

3.7.2 Output Multipliers

One of the most often used measures of a sector's importance within a regional economy is the output multiplier. Output multipliers simply reveal the extent to which a sector is "propulsive" in the host economy. These multipliers are, in part, a reflection of the interconnectedness illustrated in **Figure 44**).

Propulsiveness[49] refers to the ability of a given sector to stimulate activity in other industries by scaling up its own output. Industries with large output multipliers therefore, are industries which draw inputs from many other industries in the economy, and therefore transmit demand shocks to the remainder of the economy through these input, or backward linkages. Industries which possess large multipliers are therefore considered to be propulsive, while those with small multipliers are not. Multipliers represent a very expedient way to prioritize sectors in a given economy in terms of their potential to generate economy-wide socio economic benefits if stimulated.

Output multipliers come in many forms, but the two most commonly used are the Simple and Total (truncated) output multipliers. Simple Output Multipliers (or SOMs) show the direct and indirect effect on all industries of the economy of increasing the demand for the output of one industry (i.e., that industry for which the SOM is computed) by one dollar. Total Output Multipliers (or TOMs) are interpreted in the same way but they measure the direct, indirect and the induced effects on all sectors of the same one dollar shock. By virtue of the fact that TOMs include induced effects, in addition to the direct and indirect effects, TOMs are by definition larger than the associated SOMs. A truncated TOM is one in which the labour income effect has not been included in the multiplier.[50]

Figure 45 presents simple and total (truncated) output multipliers for all sectors, at the small level of sectoral aggregation, present in the Ontario economy including the greenhouse sector and its components. The greenhouse industry as a whole has a TOM of 2.81 meaning that for each dollar of output, the Ontario greenhouse industry generates 2.81 dollars worth of production in the economy as a whole, including direct, indirect and induced effects. If the induced effects are ignored, the greenhouse sector still exhibits a respectable SOM of 2.01.

[49] "Propulsiveness" - refers to the ability of a given sector to stimulate activity in other industries by scaling up its own output.
[50] It is important to note that TOMs do capture the industry output effects of consumer spending (i.e., the induced effect of the shock) but they do not include the dollar value of the household sector impact. When the focus is on understanding the true impact on industries, there is no need to include the household sector. The effect of including the household output impact (i.e., labour income) in the multiplier is to generate very large multipliers which can give a distorted picture of the relative importance of industries.

Figure 45: Simple and Total Output Multipliers

	Output Multiplier	
	Simple	***Total (truncated)***
Greenhouse Industry	**2.01**	**2.81**
Vegetable Greenhouse Operations	**2.00**	**2.84**
Flowers, Potted Plants, Bedding Plants & Cuttings	**1.99**	**2.92**
Tomato Greenhouse Operations	**2.06**	**2.91**
Pepper Greenhouse Operations	**2.15**	**3.06**
Cucumber Greenhouse Operations	**1.95**	**2.73**
Cut Flower Greenhouse Operations	**1.82**	**2.73**
Potted Plant Greenhouse Operations (with bedding plants & cuttings)	**1.90**	**2.83**
Crop & Animal Production (less greenhouse operations)	1.85	2.39
Forestry and Logging	1.72	2.51
Fishing, Hunting and Trapping	1.59	2.49
Support Activities for Agriculture & Forestry	1.66	2.62
Mining and Oil and Gas Extraction	1.61	2.30
Utilities	1.39	1.94
Construction	1.63	2.53
Manufacturing	1.84	2.47
Wholesale Trade	1.60	2.65
Retail Trade	1.55	2.62
Transportation and Warehousing	1.66	2.59
Information and Cultural Industries	1.67	2.51
Finance, Insurance, Real Estate, Renting & Leasing	1.44	2.02
Professional, Scientific & Technical Services	1.59	2.69
Administrative & Other Support Services	1.55	2.63
Education Services	1.42	2.38
Health Care and Social Assistance	1.32	2.04
Arts, Entertainment and Recreation	1.73	2.74
Accommodation and Food Services	1.67	2.66
Other Services (except Public Administration)	1.52	2.61
Operating, Office, Cafeteria, and Laboratory Supplies	2.13	2.62
Travel & Entertainment, Advertising & Promotion	2.33	3.05
Transportation Margins	2.27	2.99
Non-profit Institutions servicing households	1.42	2.84
Government Sector	1.54	2.73

The components of the greenhouse sector all possess large simple and total multipliers, implying that they are all very propulsive components of the provincial economy. Interestingly, the greenhouse industry and each of its components exhibit SOMs and TOMs which are amongst the highest of all sectors in the province.[51]

[51] It is important to note at this juncture that the input mixes used to run the TIM are based on survey input from operators as well as an allocation procedure developed by Regional Analytics Inc.

3.7.3 Total Economic Impacts of the Greenhouse Sector (GHS) and Components

The multipliers presented and discussed in the previous section suggest that the greenhouse sector, as well as its individual components, is very propulsive in the provincial economy. **Figure 46** presents a summary of the results obtained by running the TIM for three different levels of sectoral disaggregation for the greenhouse sector, for the years 2003 and 2004. The three levels of sectoral disaggregation are:

1. the greenhouse sector as a whole (including all components);
2. vegetable and flower operations separately (where these sum to the GHS and where flower operations include greenhouse growers of cut flowers, potted plants, bedding plants & cuttings); and
3. each component (i.e. tomatoes, peppers, cucumbers, cut flowers and potted plants, bedding plants & cuttings) separately (where these five categories sum to the GHS).

Figure 46: Provincial Impact Summary, 2003 and 2004, GHS and Components in Ontario

2004	***Total Value***			
	Sales	***Impact (including induced)***	***Impact (including direct & induced effects only)***	***Labour Income Effect***
Greenhouse Industry (as a whole)	$1,102,803,725	$3,811,551,799.49	$2,219,236,654.30	$712,903,463.50
Vegetable Production (Greenhouse)	$368,817,425	$1,297,948,066.79	$737,824,681.14	$250,775,871.38
Flower & Potted Plants (Greenhouse)	$733,986,300	$2,695,831,582.47	$1,462,567,194.32	$552,151,471.44
Tomato Production (Greenhouse)	$210,245,000	$758,327,314.97	$433,365,752.11	$145,490,526.31
Pepper Production (Greenhouse)	$56,250,000	$213,319,109.61	$121,121,285.56	$41,278,450.99
Cucumber Production (Greenhouse)	$92,151,000	$310,179,639.32	$180,087,716.52	$58,244,249.41
Cut Flower Production (Greenhouse)	$110,097,945	$346,958,553.73	$200,123,584.31	$65,740,381.09
Potted Plants, Bedding Plants & Cuttings (Greenhouse)	$623,888,355	$2,222,348,821.82	$1,197,207,379.79	$458,972,337.01
2003				
Greenhouse Industry (as a whole)	$1,072,542,000	$3,706,960,084.97	$2,158,339,209.16	$693,340,881.26
Vegetable Production (Greenhouse)	$322,148,000	$1,133,708,294.34	$644,461,810.28	$219,043,190.31
Flower & Potted Plants (Greenhouse)	$750,394,000	$2,756,094,826.97	$1,495,261,760.63	$564,494,393.51
Tomato Production (Greenhouse)	$188,274,000	$679,080,676.82	$388,078,211.67	$130,286,491.24
Pepper Production (Greenhouse)	$40,935,000	$155,239,426.70	$88,143,996.88	$30,039,704.74
Cucumber Production (Greenhouse)	$79,633,000	$268,044,136.45	$155,624,194.31	$50,332,219.01
Cut Flower Production (Greenhouse)	$112,559,100	$354,714,545.72	$204,597,193.33	$67,209,956.82
Potted Plants, Bedding Plants & Cuttings (Greenhouse)	$637,834,900	$2,272,027,722.86	$1,223,970,031.25	$469,232,311.09

Most notable in **Figure 46** is the total economic impact of the greenhouse sector in Ontario. Specifically, in generating $1.1 Billion in gross sales in 2004, the greenhouse sector generates a total provincial economic impact of nearly $3.9 Billion. Likewise in 2003, just over $1.0 Billion in gross sales translated into more than $3.70 Billion in total economic impact province-wide. In other words, in 2004, $1.1 Billion in greenhouse sector sales generated an additional $3.9 Billion worth of industrial output and labour income in the province. This is a very substantial economic impact.

Also noteworthy, is the fact that in producing its $1.1 Billion in sales, the greenhouse sector was responsible for generating a total labour income effect in excess of $770 Million province-wide in 2004, with a similar impact in 2003. The labour income result shown in Figure 46 is the dollar value of the total output of the household sector in response to all rounds of spending initiated by the greenhouse sector (i.e. inclusive of direct, indirect and induced labour income effects).

Figure 46 shows the degree to which the economic impact of the greenhouse industry and its components is exaggerated by the induced effects in 2003 and 2004. By ignoring this important feedback, the induced effect, the total economic impact of the greenhouse industry in Ontario would be reduced by more than $1.0 Billion in 2003 and 2004.

Figure 46 also shows that each of the commodity groups which make up the greenhouse industry generates a sizeable economic impact in the Province of Ontario. The component of the greenhouse industry which generates the largest economic impact is the "Potted Plants, Bedding Plants & Cuttings" category. This category has the largest impact not because it is significantly different from other components structurally, but rather because it simply reports the highest level of output of all components in the greenhouse industry, followed by tomatoes, cut flowers, cucumbers, and peppers.

3.7.4 The Sectoral Distribution of Total Impacts in Ontario

Figure 47 presents information on the distribution of the total impact of the greenhouse sector across industries in Ontario. This pattern of impacts across sectors is a reflection of the input requirements of the greenhouse sector as well as that of all industries in the economy which are called upon to satisfy the direct, indirect and induced demands stimulated by the activities of greenhouse sector.

Not surprisingly, that sector of the economy which captures the largest share of the total impact of the greenhouse operations in Ontario is the Household Sector. As noted earlier in this report, the "Household Sector" is the label given to the labour force of the province (i.e. it is the labour force which "sells" its output to the various industries in the economy, and "purchases inputs" in form of consumables). **Figure 47** shows that nearly 17% of the direct, indirect and induced effects of greenhouse operations in Ontario accrue to the household sector.

Following the Household sector in terms of its ability to capture spin-offs from the greenhouse industry in Ontario is the Manufacturing sector, with nearly 14% of the total impact. The Manufacturing sector subsumes hundreds of different types of secondary production activities – from the production of natural gas, plastics to fertilizers and crop protection materials. Survey information obtained from the sample of greenhouse operators indicated that many of the critical input commodities are manufactured commodities.

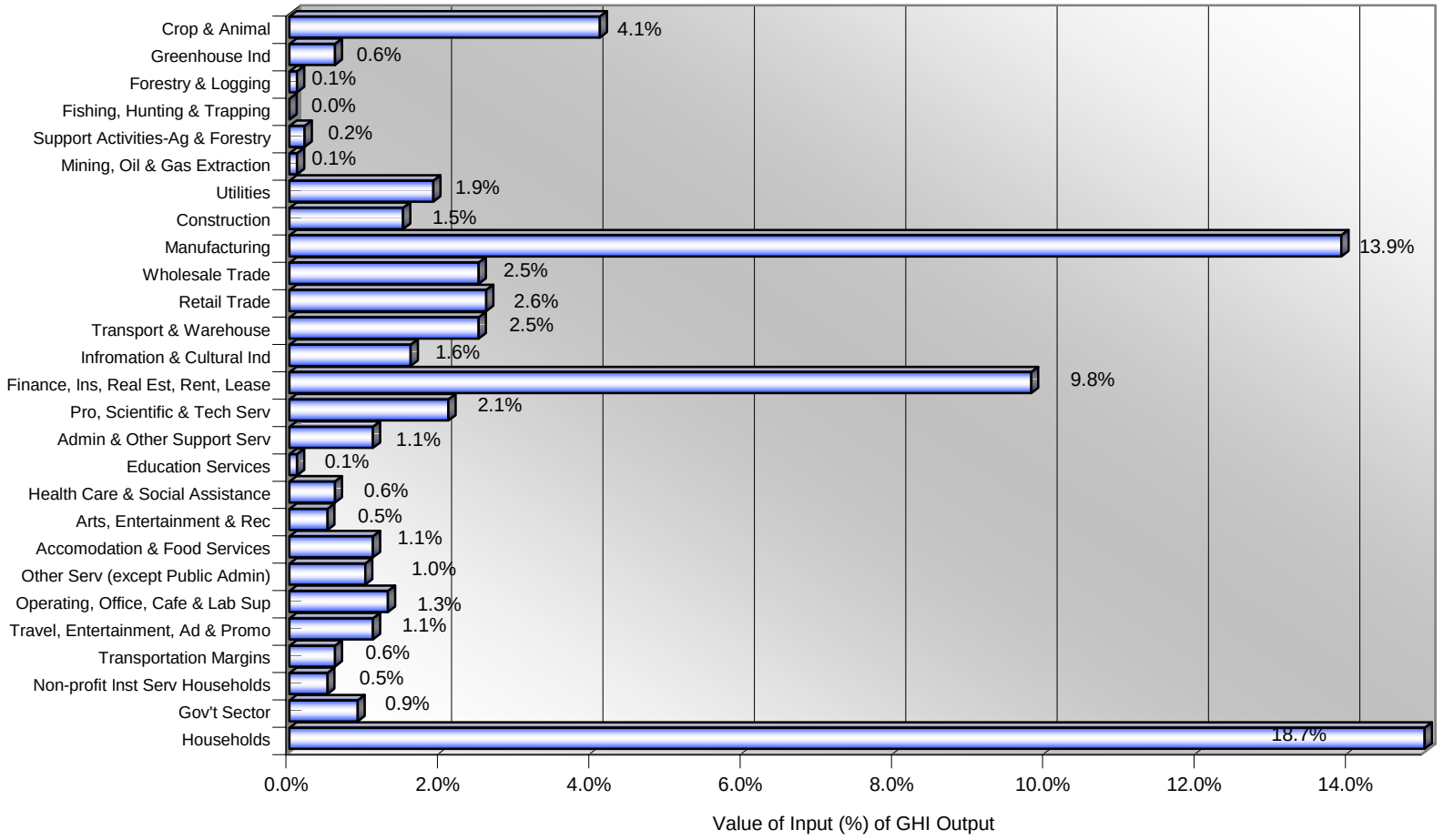
Examples of Manufactured Inputs Purchased by Sampled Greenhouse Operations:

- Plastic, plastic pipe, fittings, rubber products, tires, twine, rope, tarpaulins, covers, fabrics, nets, etc.
- Wood structures, wood barrels, particle and wafer boards, prefabricated wood structures, etc.
- Bearings, compressors, pumps, fans, conveyors, power hand tools, etc.
- Fertilizers, crop protection materials, paints & related products, adhesives, detergents, etc.

It is important to note that the pattern of inputs listed above reflects not only the inputs of the greenhouse sector but also the input requirements of all industries in Ontario that are touched via the direct, indirect and/or induced impacts of the greenhouse sector. Given that most industries draw heavily from manufacturing, this result is not surprising, and is undoubtedly largely responsible for the large total labour income effect (over $ 700 Million province-wide) associated with the operations of the greenhouse sector in Ontario.

The “Finance, Insurance, Real Estate, and Rental & Leasing” (FIRE) industry ranked third in terms of its ability to capture economic spin-offs from the greenhouse sector in Ontario. Specifically, **Figure 47** shows that this industry captured nearly 10 percent of the total impact of the greenhouse sector in Ontario. The FIRE sector includes a vast array of specialized financial and legal services which all corporations use to a significant degree, whether they like to or not (e.g., this industry includes interest payments on long-term debt which, in actuality, is a payment to a financial institution for the use of their capital). As well, all lease payments for equipment, rental fees, commissions, etc., are captured by this industrial category.

Figure 47 Sectoral Decomposition of the Total Impact of the Greenhouse Industry in Ontario



CHAPTER 4
ISSUES AND TRENDS

CHAPTER 4 ISSUES AND TRENDS

4.1 Introduction

The greenhouse sector is young, successful and evolving. While it has enjoyed considerable success over the past decade, it is not without challenges and issues. Many of these are common to those faced by other agricultural sectors; others are of specific significance to this very distinctive sector. In this chapter some of the issues and trends affecting the greenhouse sector are explored.

4.2 Labour Force Issues

The greenhouse sector offers a pleasant, indoor work environment that can be an advantage in the attraction and retention of labour. Working in a greenhouse is generally less seasonal than in other agricultural sectors and the conditions are less demanding than those experienced by workers in more traditional agricultural sectors. However, the greenhouse sector is more labour intensive than other sectors of agriculture and requires significantly more labour per acre to operate.

Industry sources indicate that it requires the equivalent of three full time workers per acre to care for a greenhouse crop,[52] with the requirements being slightly higher for floriculture operations. This ratio of worker per acre is much higher than the number of workers required for more traditional field crops. This higher labour requirement has meant that, as the sector has expanded, it has had to increase its labour force considerably, resulting in numerous challenges.

In a human resource study conducted for TOGA in May 2004[53], human resource issues that were identified included:

- High turnover rates;
- Lack of supply;
- Role of growers;
- Training needs;
- Educational programming; and
- Unionization.

High turnover rates and labour shortages can in part, be attributed to the nature of the labour required, the pay levels and the fact that the work is not year round. In predominantly rural areas or smaller communities such as Leamington or Kingsville, the smaller population base means that there is not a large pool of local labour to draw on. This problem has been partially addressed by the sector by participation in the Caribbean and Mexican Agricultural Seasonal Agricultural Program (CMASAP), which allows growers access to a supplementary source of seasonal labour.

[52] Carroll, Jack, Ontario Greenhouse Industry Issue Resolution Study, October 2001, pg 17
[53] OATI Learning Group, Human Resources Study, May 2004

The CMASAP started in 1966 as an agreement between Canada and Jamaica to allow Jamaican workers to come to Canada to work on tobacco farms[54]. Over the years, the program expanded to include Mexico and other countries in the Caribbean. Other sectors of agriculture, including horticulture and later ornamental horticulture, were granted access to the program to meet labour needs that could not be met with local supply. A study completed in 2001 estimated that at that time 2 of the 3 workers employed in greenhouses in the vegetable sector came from the CMASA Program.[55]

The off shore labour program is administered in Ontario by the Foreign Agricultural Resource Management Services (FARMS), an organization that was created as the result of a strategic alliance between Human Resources Development Canada (HRDC) and industry representatives. FARMS was set up to process requests for workers and to work with HRDC, sponsoring countries, and employers.

Over the years, the CMASA Program has served growers well. Strong relationships are formed with the workers, many of whom return to the same properties year after year. Services are developed in the local area to cater to their needs and the workers in turn make a strong contribution to the local economy. In a study conducted by FARMS in 1995, based on gross wages paid to workers of $69 million, it was determined that the impact on rural local economy from expenditures made by the participants in the CMASA Program at that time was approximately $33.6 million[56]. Over the past decade, this impact will have increased as wages increased.

Other solutions employed by greenhouse operators to deal with the labour shortage include increased mechanization and use of labour contractors. In Niagara for example, the Farm Labour Pool provides workers to agricultural operators on a part time, seasonal or full time basis. This organization maintains an inventory of workers that farmers can access on an “as needed’ basis. They specialize in matching farmers with workers, a process that often provides an entry into the industry for recent immigrants or those with no former exposure to agriculture.

A major difficulty associated with the administration of this program that was noted by the organization operating the program in Niagara, was lack of transportation for workers to get to the farm operations. Often participants in the program are new immigrants or individuals without automobiles. This is a problem that has also been identified in the Essex area where there has, from time to time, been labour available in Windsor which could not be used because of the difficulty in getting to Leamington and Kingsville[57].

The issue of labour is one that community organizations such as training boards and economic development agencies are aware of and are making efforts to address. In a study completed in the Essex area, the importance of the greenhouse sector and related agri businesses[58] was identified as an element of an economic cluster that could be built on to improve the economy and provide jobs. Recommendations came out of this study for programs to develop jobs in response to need.

[54] HRDC Agricultural Programs and Services: Overview November 23, 2004, pg 2
[55] Carroll, Jack, Ontario Greenhouse Industry Issue Resolution Study, October 2001, pg 17
[56] FARMS, The Quest for a Reliable Workforce, The Horticultural Gateway, 1995, pg 5
[57] Carroll. pg 19
[58] Trends Opportunities and Priorities Report Southwestern Ontario, October 2004, pg 7

Co-operative and apprenticeship programs geared to agriculture are also being introduced by various agencies to try and improve the participation rate in agriculture and to address labour shortages. It is helpful if these programs are available at the secondary school level so students with no connection to agriculture can be introduced to it as a career option. These programs can then be the base for development of college and university programs to train workers for the sector.

The growers in the greenhouse sector are the ones who manage the product in the greenhouses and therefore need to have an increasingly sophisticated level of technical knowledge. Finding qualified growers can be a challenge for larger organizations. In the past, many growers received on the job training or were imported from the Netherlands. Many are the descendents of existing growers. However, as the industry grows, a number of programs are developing at various institutions, including Ridgetown College, Mohawk College, Lambton College, Niagara College and the Niagara Parks Commission, that provide training related to the greenhouse sector. As these programs take hold, they will educate the growers who will be needed as the industry expands in the future. Unfortunately, the University of Guelph which used to have horticulture education programs has been reducing programs and not replacing them. This has reduced their role in educating future growers.

An issue identified by some growers as problematic was the pressure they were under to be managers as well as technicians. Supervising other staff and managing the business of operating a greenhouse was considered by some to be outside of the expertise required for a grower. Other growers felt that managing staff and other business related issues was an integral part of the job.

This issue is not unique to greenhouse operators. Agriculture generally is becoming more sophisticated and requires more business and administrative skills to operate. However, because greenhouses are more labour intensive and often highly mechanized, this issue can be more pressing in this sector. Larger greenhouses may have the resources to hire additional management staff to deal with personnel and administration. In smaller operations it is a skill that needs to be nurtured along with the technical skills required to grow the produce.

4.3 Land Base

In many agricultural sectors, ownership of land is an issue. Often large components of agricultural operations occur on rented land which provides an opportunity to expand operations at a lower capital cost. This option for expansion is not the case for the greenhouse sector. Because of the capital investment required to set up a greenhouse operation, developing on rented land would be difficult to structure and to finance. The need to expand on land that is owned can be a disadvantage for the sector when all costs to establish or expand an operation are upfront and significant.

Over time there has been discussion about whether the greenhouse sector needs to locate on high quality agricultural land or whether it should be encouraged to move to more marginal locations. The Region of Niagara addressed this issue in a report released in January, 2000. From a survey of growers, Niagara planning staff determined that the top ten locational requirements for a greenhouse included:

- Availability of natural gas;
- Transportation links;
- Access to a reliable, high quality water source;
- Proximity to markets;
- Climate;
- Availability of three phase power;
- Price of land;
- Links to family operations; and
- Soil quality[59].

Climate was deemed to be an important factor because of the impact on heating costs. In Niagara, greenhouses at the base of the Escarpment were found to pay approximately 5% less for heating costs than greenhouses on the top of the escarpment.[60] Greenhouses in the Essex area experience less extreme temperatures than most other parts of Ontario and therefore also enjoy an advantage.

Soil quality, although less important than in the past, is a consideration because many growers still rely on well drained loam as a growing medium or for drainage purposes. Of prime significance was the fact that many operators started in traditional farming and moved into greenhouse operations to improve productivity. Access to prime land was a critical consideration in this scenario. Many of these operators still maintain a mixed operation with some activity occurring in the field, some in the greenhouse. Over time, clusters of operations have developed along with the services and businesses that support them. This cluster of operations, combined with the service network, creates a supportive environment which, in turn, attracts other operators.

4.4 Transportation

Given the dependence of the greenhouse sector on the export market and the nature of greenhouse product, access to rapid and efficient transportation networks is critical to the health of the sector. The conglomeration of greenhouses in Niagara can be partially explained by the fact that the Queen Elizabeth Way provides high-speed access to both the American market and the large market in the Golden Horseshoe around Toronto.

The greenhouses in Essex benefit from access via the Highway 401 to Detroit and the large American market to the south. A drawback for the municipalities in Leamington and Kingsville is the circuitous route from the greenhouse locations to Highway 401. The high reliance on the American market is also reflective of its relative proximity compared to the distance from the large markets in Ontario. In Niagara, efforts by the Region to establish a greenhouse cluster on the top of the escarpment are frustrated by a lack of high-speed highway linkages to the border and other market areas. It is important when long term planning for infrastructure is done, that the needs of industries such as the greenhouse sector are considered.

[59] Regional Niagara Planning and Development Department, Niagara Greenhouse Industry, Publication 94, January 2004, pg vi
[60] Ibid., pg 3

In looking at the incidence of greenhouses across the province, the link between transportation and location is strong. With the exception of greenhouses associated with the forestry industry, greenhouses tend to locate where there is quick and easy access to market. The other areas in which there are significant numbers of greenhouse operations are all in populous areas, well served by transportation routes.

4.5 Infrastructure

As noted in conjunction with grower comments on locational requirements, access to service infrastructure is important. The infrastructure that is critical to the greenhouse industry is water, an energy supply with natural gas the preference, three phase power and a road network conducive to moving product.

The infrastructure that is required is, in fact, similar to an urban servicing infrastructure. Where municipalities have responded to this requirement or where the required mix of services has developed, such as in Leamington and Kingsville in Essex, the Town of Lincoln in Niagara, and in parts of Hamilton, the greenhouse sector has flourished.

4.6 Energy

Energy has become the single highest production cost for greenhouse operators and with recent price fluctuations, the high operating cost of energy is continuing an upward trend. The costs of heating the greenhouse, combined with the cost of transporting goods to market, cut significantly into profit margins. This is partially offset by the fact that competing product from Mexico has to face the high energy costs in transporting their product much greater relative distances to market.

Much has been written about this issue and it is one that the sector is developing and implementing alternative strategies to address. Growers are taking steps to increase energy efficiency, the production year is being shortened and changes are being made in construction techniques to reduce heat loss. Alternative forms of energy such as corn, wood, biomass, wind, coal, ethanol and geothermal options are being investigated, and in some cases, chosen as alternative or supplemental sources of energy. Discussions are ongoing about accessing the transmission grid and providing electricity to help meet peak demand and reduce grower costs as part of a co-generation strategy in which the steam and/or hot water from greenhouse boilers can be utilized as part of an electricity generating plan.

TOGA is working closely with AgEnergy Cooperative, a grower cooperative that buys energy commodities in bulk as a means of assisting growers in hedging their price risks and achieving lower rates, on a range of study projects. Although the Ontario Greenhouse sector is currently a leader in North America, the requirement for energy for the business to be successful, is one disadvantage the industry has in competing with operations in warmer climates.

In an effort to reduce energy costs and address concerns over the supply of natural gas, when the price of natural gas started fluctuating several years ago, a number of producers started exploring alternatives to natural gas. Among the factors that must be considered in assessing alternatives are issues associated with emissions, storage,

impact on product, capital investment and operating costs. Growers are sensitive to ensuring that their emissions are acceptable and are seeking clean burning fuel alternatives.

4.7 Capital Investment

As noted throughout this report, the capital cost of developing greenhouses is extremely high and getting higher. Estimates are that it can cost from $500,000 to $1,000,000 per acre. Capital intensive costs such as these represent a barrier to entry for new producers who want to get into the sector. Because of this, while there have been new grower groups emerge, there is still a strong tradition for family members to join and expand existing businesses, building on an established base and know-how.

4.8 Water Supply

A reliable, high quality water supply is absolutely essential to greenhouse operations. There are a number of different options for accessing water.

A municipal water supply is one of the most reliable and desirable sources of water. However, with municipal access there are issues related to cost and supply volumes. Restrictions on hours of use have been imposed by some utilities to enable them to respond to peak flow demand from other parts of the market. These policies, in turn, have required growers to invest in significant on-site storage capacity for water so that they can draw from the municipal system during off-peak hours and drawdown their own reservoir during peak hours. Capital costs to the utilities of building additional water treatment infrastructure are recovered through the development charges for additional greenhouse space and through ongoing user fees.

Currently in Leamington, development charges associated with developing property serviced by municipal water are $3,120.00 per acre[61] payable at the time a building permit is issued. A recent study, conducted by CN Watson, for the Union Water Supply Company that provides water to Leamington, Kingsville, Lakeside and Essex, recommended that development charges be increased to cover the cost of expanding the water supply. To determine the appropriate increase and distribution of development charges to cover expansion costs, the study projected that the greenhouse industry would expand by 900 acres to the year 2021. Using this projected expansion rate, the consultants calculated the demand for water that would be generated and indicated that the greenhouse industry should pay approximately 84% of the cost. This works out to a development charge of $42,000 per greenhouse acre[62]. Given the already high capital cost of greenhouse development, an additional charge of this magnitude would be extremely onerous for the industry.

According to municipal officials, the municipalities are aware of the barrier to expansion that this policy would place on the greenhouse sector and are willing to work with growers to reduce the burden. No decisions have been made on how to proceed. However, while the municipality has expressed a willingness to discuss the matter and

[61] Corporation of the Municipality of Leamington, By-law 540-04, August 2004, Schedule B
[62] Leamington Post, September 14, 2005

consider whether to recover the costs through up-front development charges or a user pay arrangement, the future cost of accessing the municipal water supply is an issue of concern for greenhouse operators and could be a barrier to expansion of the industry.

Other sources for water for greenhouses include ground water or storage of rainwater and snow through cisterns. Operators use both options and there have been significant gains made in conservation and recycling of water. Working with municipalities to schedule water taking at off peak hours can also address the quantity issue.

With each option there are issues. Recycling water introduces the potential to inadvertently recycle pathogens which could damage the crop. On the other hand, not all of the nutrients in solutions are absorbed by the plants during each pass through the greenhouse, and therefore recycling allows for recovery of unused nutrients. Some crops are more resilient to recycled water and others are more sensitive. Treating recycled water is another option that can be used as a preventative strategy to remove any harmful pathogens either through sterilization or filtration. Using ground water supply has new issues associated with it given the province's recent initiatives regarding source water protection and increasingly rigorous requirements for obtaining permits to take water. These issues add both cost and uncertainty to the ability to access long term water supplies.

Taking water at off peak times can necessitate the construction of large capacity storage tanks, something that can be expensive and difficult for existing operations to achieve.

At the other end of the production cycle is the issue of disposing of waste water. If the greenhouse has access to a municipal sewer system, there are issues related to the load of the waste water discharge. If there is no municipal system, then issues related to nutrient management must be addressed in disposing of water.

The issue of water is one that is critical to the health of greenhouse industry. This has not escaped notice of the municipalities who understand that the greenhouse industry is an integral part of their economy. In response, a number of them are involved in initiatives to address the problem. The Region of Niagara is currently undertaking a very comprehensive study of the feasibility of providing irrigation water for agricultural purposes. Municipal officials in Essex County have committed to work with growers to resolve the issue of water supply in a cost efficient way.

4.9 Contribution to the Local Tax Base

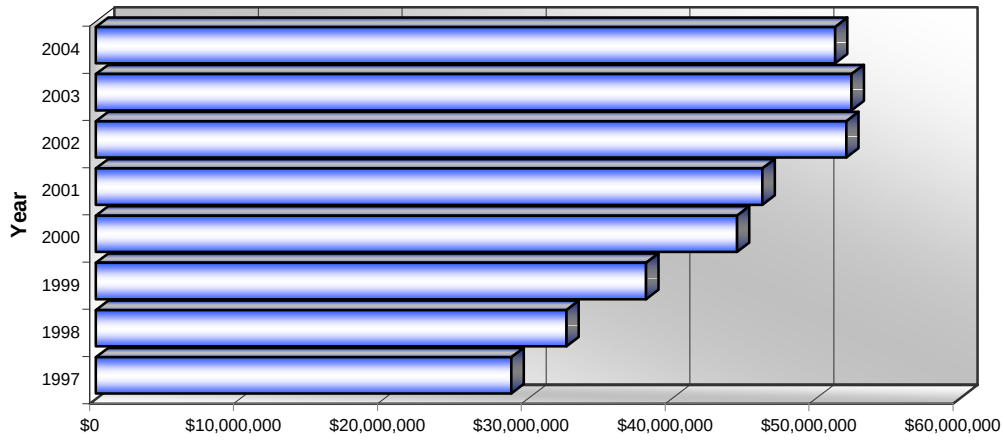
The greenhouse sector is impacted by tax issues in a variety of ways. At the municipal level, greenhouse operators pay property tax based on the type of activity that occurs on the property. Greenhouse operations are assessed under the Farm Property Class. The assessment is used as the basis for the municipal tax levies; and taxes are paid to the local municipality for local, county and education purposes. The property upon which greenhouses are located is classed as farmland and assessed and taxed at the farm rate. As with all agricultural properties, the farm dwelling and the acre of land around it will be subject to the residential rate.

Because of the capital costs of greenhouse construction, their assessment as farm related structures and the nature of the operations, this system will result in the

greenhouse operation paying a higher amount of taxes to the municipality than would be paid by a more traditional farm operation that does not include large areas of building. This higher payment is simply due to the higher value of the improvements.

Federally, ornamental horticulture is the only agricultural commodity that is subject to the Goods and Services Tax (GST) upon sale to the consumer. **Figure 48** summarizes the amount of G.S.T. generated from sale of ornamental horticulture products for the period from 1997 to 2004. These figures are based on the value of sales at the farm gate as documented by Statistics Canada. It significantly under represents the amount actually generated, because it does not include the "value added" component and the markup between retail and wholesale. Industry estimates are that G.S.T. paid on ornamental plants and flowers generates an average of $300,000,000[63] per year for the federal government. The industry has been lobbying to have a percentage of this money reinvested in publicly funded research to support the industry.

Figure 48 GST Paid on Ontario Floriculture Sales, 1997 to 2004



	1997	1998	1999	2000	2001	2002	2003	2004
G.S.T. Paid (7%)	$28,882,140	$32,708,620	$38,249,260	$44,562,000	$46,334,400	$52,153,710	$52,527,580	$51,379,041

4.10 Municipal Charges

As noted earlier, greenhouses benefit from access to infrastructure which provides required services including natural gas, three phase power, piped water and good transportation routes. The main municipal services that benefit greenhouse operations are municipal water and local transportation facilities.

In the Leamington / Kingsville area, where the largest conglomeration of greenhouses in the province is located, four municipalities including Leamington and Kingsville joined together to construct a shared water system to service the area. This water supply has been a tremendous advantage to the greenhouse operators and one of the reasons the cluster of greenhouses has grown as it has in this area.

[63] Watson, Dr Gary, Overview of the Ornamental Industry, 2005, pg 4

Where water is available, generally, greenhouses contribute to the development of the water system through payment of development charges when and if building permits are issued. If the municipal water supply is accessed there is usually a charge per acre payable at the time a building permit is issued. Additional development charges are levied for provision of other services such as roads and services on the basis of any space associated with the operation. No charges are assigned to bona fide greenhouse construction or associated building that is integrated with the growing operation[64].

Local transportation routes are important to link operators to major access routes. Overall, operators expressed satisfaction with local routes which are largely funded through property taxes.

4.11 Export Market

Although the greenhouse industry has experienced tremendous growth in the past decade, it is vulnerable to changes in the export market. Issues associated with accessing foreign markets have major implications for the industry, because a significant percentage of greenhouse product is exported, mainly to the United States.

Among the issues being faced by the industry are a rising Canadian dollar, concerns related to terrorism, bio-terrorism, safety of food supply, traceability of food and feed products from farm to mouth, quarantine, pests from abroad and issues related to country of origin[65]. The rise in the value of the Canadian dollar means that product is no longer as competitive and margins of profit are smaller. Requirements to address numerous cross border issues cut further into these reduced margins.

Coupled with these issues is the fact that foreign supply is growing. Mexico is increasing production of greenhouse vegetables, and the American industry has significant room for expansion. In 2001, American producers launched a countervail action against Canadian greenhouse tomato growers which was countered with a suit launched by the Canadian industry against US field tomatoes. These cases were ultimately dropped and the sectors in the two countries along with Mexico are now working together through the North American Tomato Trade Working Group (NATTWG). Ontario greenhouse vegetable producers face a break in the production cycle during the period between November and March. During this interval marketers must find alternative sources of product to meet their contractual obligations with the grocery retail trade. Sourcing such product provides an opportunity to work with foreign producers in supplying the market and providing more continentally integrated supply arrangements. Although research is being done on the use of artificial lights to compensate for darkness during the winter months, the cost/benefit has not yet been sufficiently demonstrated for any Ontario greenhouse vegetable growers to make the significant capital investment required to install and operate artificial lighting systems.

In floriculture there are signs that the American market has noted the dominance of Canadian product and is beginning to respond. In a paper written by Michael Carroll and Neil Reid the following comment was made:

> *Like many northwest Ohio industries, the greenhouse nursery industry is facing increasing international competition. In particular, competition from southern*

[64] Building Official, Town of Leamington, January 2006
[65] Watson, Dr Gary, Overview of the Ornamental Industry, 2005, pg 3

> *Ontario is threatening the future viability of many northwest Ohio greenhouse nursery operations.*[66]

This attitude in the United States, coupled with an increasingly competitive world market, means growers must constantly adjust to compete.

The fact that the greenhouse sector is successfully meeting all of these challenges is a tribute to the entrepreneurial skills, superior product, efficient delivery and general good management that characterizes Ontario greenhouse businesses.

4.12 Border Issues

Issues with the Canadian / American border became apparent after the September 11th, 2001 crisis that led to increased security, causing delays at the border. For product that requires rapid delivery, these delays can be catastrophic. Many efforts have been made to cooperate with American authorities to minimize disruption at the border. This issue is being managed but there continue to be uncertainties and occasional delays. The industry will require ongoing support from the federal government to ensure that access to the American market remains secure.

In addition to the rules and regulations governing border crossings, there is the issue of the physical constraints to having loads cleared. Although a load may be accompanied by all the correct paper work for quick passage, if the truck physically cannot get through on account of a long lineup, the effort is all for naught. Congestion and heavy traffic at crossings in Detroit and Niagara create ongoing problems for the industry.

4.13 Currency Rates

The rising Canadian dollar is a challenge for an industry that exports such a high percentage of product. Marketers can be tied into contracts that set a price in US dollars for at least a year, leaving them exposed to unfavourable movements in the rate of exchange. The result is that, as the dollar rises, to the extent that they have not been able to hedge their exposure through currency futures contracts, they will experience a reduced profit margin as their net returns in Canadian dollars decline.

4.14 Urban/Rural Conflict

Although generally, government agencies have accepted that greenhouse production is bona fide agriculture that should be subject to all of the rights and protections other agricultural sectors enjoy, situations still occur where there are attempts to classify greenhouse as “alternative” agriculture. These attempts are sometimes part of land use planning exercises where policies are proposed to direct greenhouses to areas outside of agricultural zones. To date, the producers have been successful in countering these attempts but they continue. Given that greenhouse operations have the highest value of per acre production of all agricultural commodities, are an integral part of the agricultural economy, often include a component of field production, rely on physical conditions that

[66] Reid, Neil. and Carroll, Michael, Using Cluster-based Economic Development to Enhance the Economic Competitiveness of the Northwest Ohio’s Greenhouse Nursery Industry, University of Toledo, 2005, pg 1

support agriculture and are operated by farmers who have well established roots in the agricultural community, policy to differentiate greenhouse agriculture is detrimental to the sector's future and disrespectful of the commitment of the growers to their businesses.

Conflict between rural and residential uses are common to all agricultural sectors but there are additional issues with greenhouses. In addition to issues such as hours of operation, moving product and general farm practices are greenhouse specific issues such as the operation of fans, lights, and the perception that greenhouses affect air movement. The industry is also concerned by the frequent reference by the media to the term "greenhouse gases," when referring to elevated levels carbon dioxide in the atmosphere as a possible cause of global warming. This term was coined because elevated levels of gases make the entire atmosphere mantling the earth like a greenhouse but in the naïve public perception, it is sometimes wrongly associated with greenhouse agriculture as the source of the global warming problem.

The industry is working to resolve these issues but on the other side there must be recognition that the greenhouse industry is a valid, viable and productive sector of agriculture and has the right to operate in its best interest. Support from government departments such as the Ontario Ministry of Agriculture, Food and Rural Affairs, Agriculture and Agri-Food Canada and local municipalities, where greenhouse operations are located, have been helpful in addressing these issues.

4.15 Agricultural Conflict

In addition to conflicts with the non-agricultural sector, there are some issues with traditional agriculture. However, these are minimal and tend to be related to site specific situations. Generally, the agricultural community recognizes and accepts greenhouse operators as a valid and important part of agriculture. Agriculture as a whole is a diverse and complex system, with greenhouse production being just one more example of this diversity.

4.16 Insurance

The greenhouse industry is currently dealing with the issue of crop insurance for greenhouse product. Historically, greenhouse agriculture has not had access to government sponsored crop insurance plans which other sectors have. Agricorp, the provincial agency which manages crop insurance programs, does not offer a product to greenhouse operators. This gap is partially because the risks are different and also because the industry has not been demanding it. At the time this study was being completed, Agricorp was undertaking a study, led by the George Morris Centre, to assess whether there is a need for a crop insurance program for greenhouse vegetables.

4.17 Waste Management

As with all agricultural production, there is waste generated by greenhouses that must be managed. However, the waste generated by greenhouse differs from that generated by traditional agricultural operations. The major types of waste generated by

greenhouses include plastic, spent vines, and growing mediums such as rockwool, and wastewater. The options available for dealing with this waste range from composting to recycling to disposal. All options have costs associated with them, both financial and environmental, and each has pros and cons.

Recycling is an effective approach for addressing wastewater, plastics and growing mediums and composting is an effective solution for vines. However, with each of these waste products, finding a firm that will remove the waste, cost effectively can be an issue for growers. As the cost of disposing of waste rises, with landfill tipping fees increasing or landfill sites refusing to accept the waste, these issues are being addressed. In response to the unique needs of the sector it is encouraging to note that recently, a new industry has arisen specifically to remove and process greenhouse waste.

4.18 Integrated Pest Management

The greenhouse industry in Ontario has made great strides in the field of integrated pest management (IPM). As recently as 1988, this program did not exist in floriculture greenhouses. Surveys done in 1998 found that the level of participation had risen to 80%.[67] The fact that the use of IPM is essential to participation in the Canadian Greenhouse Certification Program (a potted plant systems-based export program) is one incentive for adopting these techniques. In the vegetable sector, participation rates in IPM are even higher. This approach to growing product results in vegetables that are virtually free of pesticides.

With this program, growers have a unique opportunity to appeal to environmentally aware consumers who are looking for natural alternatives, both for consumption in the case of vegetables and for beautification in the case of floral products.

While great strides have been made in the use of IPM and the greenhouse industry is a leader in this field in Canada, it has fallen behind the world in use of environmentally friendly pesticides. According to Dr Garry Watson, an expert in ornamental horticulture, “Canada lags seriously behind the U.S.A. and Europe in having access to newer, safe and more environmentally friendly pesticides, a situation that impacts our global competitiveness”[68]. The industry is working with both federal and provincial departments of agriculture and the Pest Management Regulatory Agency (PMRA) to expedite approvals for newer products to make them available to growers.

4.19 Education and Research

The greenhouse industry is well served by the organizations that represent it. The Ontario Greenhouse Vegetable Growers, Flowers Canada (Ontario) and The Ontario Greenhouse Alliance have informed staff who understand industry issues and seek to communicate and influence the development of appropriate public policy to further the interests of greenhouse agriculture.

[67] Ontario Ministry of Agriculture and Food, A Profile of the Ontario Greenhouse Floriculture Industry, October 2004, pg. 5
[68] Watson, Dr. Garry, Overview of the Ornamental Industry, 2005, pg 4

There are a number of research facilities and educational institutions which service the sector. The Greenhouse and Processing Crops Research Centre operated by Agriculture and Agri-Food Canada at Harrow is a strong and valuable resource for the vegetable growers. The Ontario Ministry of Agriculture and Rural Affairs also run programs from this facility. Its location in proximity to the large concentration of greenhouses in southwestern Ontario has undeniably contributed to the development of the cluster in that region.

Other institutions including Ridgetown College, Mohawk College, Lambton College, Niagara College and the Niagara Parks Commission have programs that are related to the industry. Niagara College, in particular, has recently constructed greenhouses and introduced a course to train growers for the industry.

Despite these initiatives there appears to be a lack of coordination in research associated with the greenhouse industry. The programs are diverse, succession plans for the researchers who approach retirement are not in place and there are gaps in the research. The result is that all of the needs of the industry are not being met. The floriculture industry does not have a research facility committed to support this successful and flourishing industry. While the industry works to keep up with international competitors, technology and improved pesticide products that could benefit the industry are not available and much expertise has to be acquired elsewhere. The need for research is correlated to issues such as accessing the border. There is a need for qualified entomologists who can readily identify insects and determine whether their presence, in a shipment of imported cut flowers for example, represents a threat.

There are indications that this issue may be addressed. The Federal government has established a national agricultural policy and, as part of this, is holding round table discussions to address issues facing the industry. At the Horticulture Value Chain Round Table held in Toronto in November of 2005, industry research needs and issues associated with branding of product, increasing market share, accessing funding for capital investment, pesticide regulation and others were discussed. Similar discussions regarding vegetables and other aspects of the industry were discussed at sessions held earlier in the year.

In 2006, the Province transferred ownership of its research centres to the Agricultural Research Institute of Ontario and has asked for submissions on what should occur at the various properties. There is growing interest from various sectors in revitalizing the research and industry support functions at Vineland Station. This large and potentially valuable property still has remnants of what used to be a leading research facility for the horticultural industry. Both Agriculture and Agri Food Canada and the Ontario Ministry of Agriculture and Food have a continuing, albeit reduced presence.

Flowers Canada (Ontario) has made a submission regarding development of a research function to support ornamental horticulture at Vineland and has proposed potential funding mechanisms. The Wine Council of Ontario is also working to establish a committee with representatives of the wine, grape and tender fruit sectors to work for improvements to Vineland. The Regional Agriculture Task Force in Niagara has identified re-establishing the research function at Vineland as one of the six pillars of an action plan to support agriculture in Niagara. There appears to be a unique opportunity here with interest at all levels of government and a vision from growers that may result in

a renewed commitment to positioning Vineland as a leading research centre providing much needed support to the horticultural sector specifically.

Overall, there needs to be a coordination of education and research programs fully supported by the sector. Integration of practical and educational programs supported by research and technical support will be beneficial to the long term health and development of the greenhouse sector.

4.20 Greenhouse Clusters

There is a body of economic theory that supports the development of clusters as the key to sustaining the health of sectors of the economy. This theory is based on the work of Michael E. Porter, an economist at Harvard University. Porter defines clusters as "*critical masses in one place of linked industries and institutions – from suppliers to universities to government agencies – that enjoy unusual success in a particular field*."[69] The theory is that the existence of a cluster will support the growth and evolution of the industry.

While it was not within the mandate of this study to conduct a detailed cluster analysis of the greenhouse sector in Ontario, it became apparent as research proceeded, that there is evidence of a cluster of greenhouse activities in Ontario. While this could be defined as two distinct clusters, one in Essex County and one in the Niagara Peninsula, it is more likely that the two areas are part of the same cluster. As Porter states:

> *A cluster's boundaries are defined by linkages and complementarities across industries and institutions that are more important to competition. Although clusters often fit within political boundaries, they may cross state or even national boundaries.*[70]

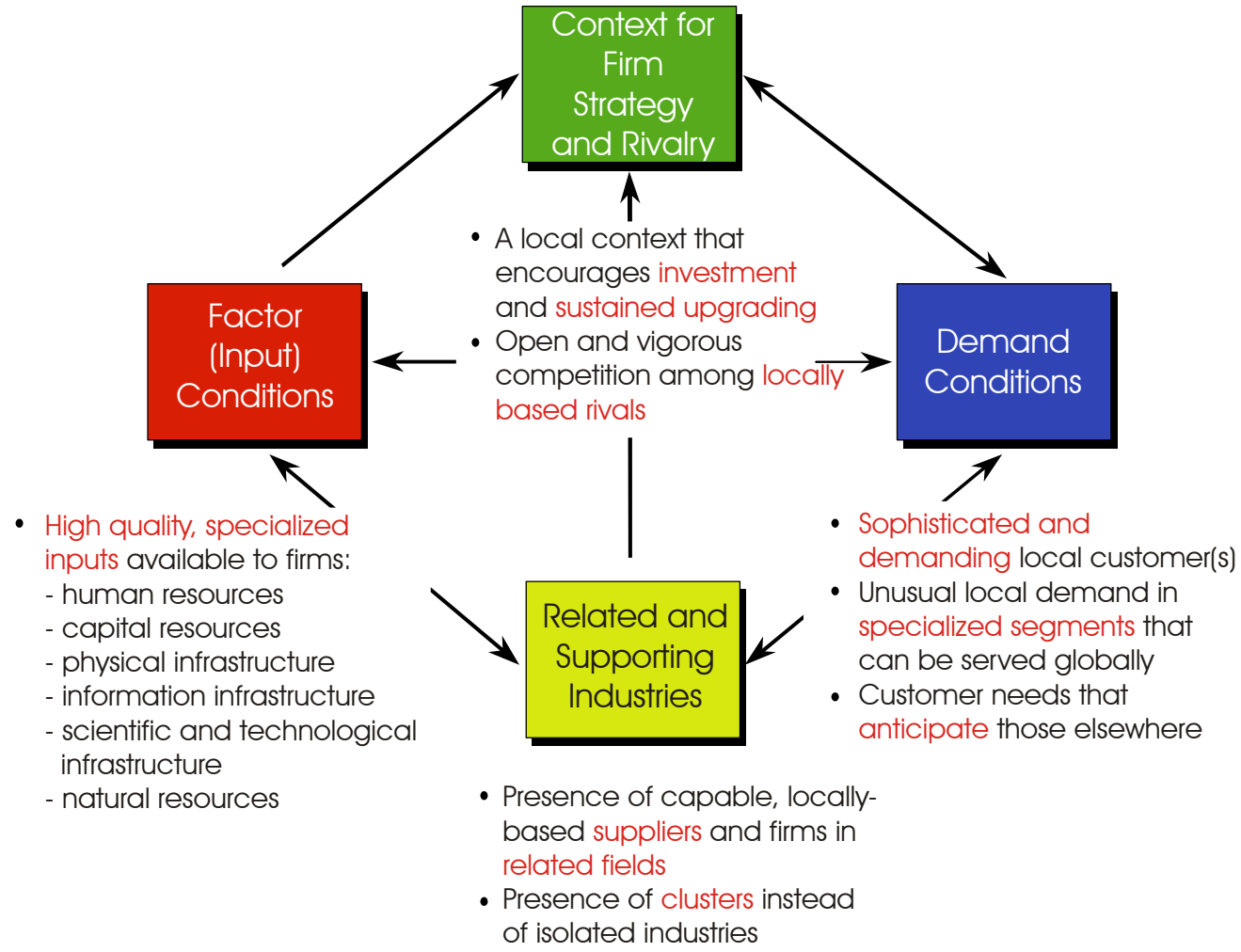
The elements that are required for a cluster to grow and flourish include the activity itself and all of the support activities required for it to operate. As an illustration, Figure 49 illustrates the components normally found in a cluster. Many of the components noted on this figure have developed in Ontario, in support of the greenhouse industry.

It would appear from the work done for this report that the main components of the cluster have developed in Niagara where the support industry including those who build, service and supply greenhouses are located. However there is no question that the Leamington – Kingsville area is a very strong component of this cluster with other elements such as the research centre at Harrow, educational programs in Guelph and Niagara and government initiatives such as the economic development programs in the Region of Niagara and Essex County forming an integral part.

Although a detailed cluster analysis of the greenhouse industry has not been done, it is apparent the structure of a flourishing cluster certainly exists. Given the findings of this study and the size of the economic impact the greenhouse industry has on the Ontario economy, further work could be done on understanding the cluster dynamics and what has contributed to its success, so it can be built on for the future.

[69] Porter, Michael E., Clusters and New Economics of Competition, Harvard Business Review, December 1998, pg 1.
[70] Ibid., pg3

Figure 49 Productivity and the Microeconomic Business Environment



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4.21 Industry Profile

As a final comment on the industry, it is notable that despite a very successful history and rapid growth in the past two decades, the greenhouse industry in Ontario has a relatively low profile. The sector's low profile is undoubtedly due to the independent mindset of the growers, the relatively short time the industry has been in existence and the fact that much of the product is exported.

The proponents of this study intend that it will be one tool for raising the profile of the sector in a positive way so that residents of Ontario and the governments they elect appreciate what an important asset this agricultural sector is to Ontario's economy.

Source: Ontario Flower Growers Inc. http://www.ontarioflowers.com/

CHAPTER 5
CONCLUSIONS

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5.1 Present and Future Contributions to the Ontario Economy

This study has confirmed that the greenhouse sector is a significant component of Ontario agriculture. Specifically, the greenhouse industry had a $3.9 billion total impact on the Ontario economy in 2004; $1.1 billion in gross sales resulted in $3.1 billion of additional industrial output, part of that due to $770 million in labour induced effects. In studies done of regional agricultural economies, it ranks as one of the highest in terms of gross farm receipts generated, even though it is one of the smallest in terms of area farmed. In 2001, the greenhouse sector contributed 11% of the gross farm receipts generated in Ontario.

The greenhouse sector has seen constant growth since inception and an accelerated growth since the turn of the century. However, it is currently experiencing the double burden of rising energy costs and depressed prices for exports as a result of a rising Canadian dollar. These two factors appear to be responsible for a recent slow down in the rate of expansion. Between 1997 and 2004 the industry grew by 49%; between 2001 and 2004 that growth slowed to 10%, with the years 2003 and 2004 experiencing the slowest growth.

While the slow down in growth experienced in the industry is a concern, it must be kept in perspective. This is not a decline, just a decrease in what has been a very rapid rate of expansion. Compared to other sectors in the agricultural economy, the greenhouse industry is, and continues to be, a leading and expanding sector.

It is anticipated that the greenhouse sector's role in the Ontario economy will continue to be strong. It is a very young industry that is still establishing market and negotiating the circumstances under which it will develop. As that occurs, the potential exists, particularly in the vegetable sector, for new markets and new products to develop. For the floriculture sector, its flexibility in adjusting to global competition bodes well for the industry. Both sectors exhibit a strong understanding of the areas where market development is possible and are putting programs in place to support expansion.

In looking forward 20 years, the expectation is that growth will continue but at a slower pace. The 10% rate of growth is more sustainable than the much higher growth rates experienced at the turn of the century.

This growth will depend on a combination of factors including the sector's ability to offer new product, to adjust to the changing demands of mass merchandisers, to access the higher volume area of sales (such as fast food outlets and large-scale retailers), to overcome trade issues and to stay at the forefront of emerging technology.

The evolution of a greenhouse cluster in Ontario is a very positive indication that the industry has a healthy future. During the course of this study it became apparent the economic development officers and politicians in areas with a strong greenhouse sector are aware of the importance of the industry and work hard to encourage it. It would be appropriate for all areas that are part of, or could benefit from enhancement of the cluster, to ignore political boundaries and work together to build and strengthen this

cluster. Support from the provincial and federal governments would further enhance growth potential.

5.2 Role in the Canadian Economy

The Ontario greenhouse industry dominates the national scene. Consistently, Ontario has been home to more than 50% of production and greenhouse acreage. In 2003, it accounted for 52% of national floriculture production and 58% of national acreage for greenhouse vegetables. In terms of value, the floriculture sector, which is made up of approximately 68% greenhouse production, was third in generation of gross farm receipts nationally, behind wheat and canola.

Ontario is in a good position to continue to lead in national production. Area is available for expansion and the environment is supportive. Issues do exist, but there appears to be a willingness on the part of governments to work with the industry to overcome these.

Most significantly, Ontario is well positioned with respect to market. Not only is there a large and sophisticated market in southern Ontario, the much larger markets in the United States are in close proximity and greenhouse producers have proven themselves to be very effective in accessing that market.

5.3 Global Trends

In terms of the global market, although Ontario is a relatively small player in terms of greenhouse area, it has the potential to assume a larger role. There are strong links between Ontario and the Netherlands, the world leader in greenhouse production. The technology and knowledge that flows from these connections bodes well for the sector.

Greenhouse production in Europe is currently much more intensive than production in Canada. With a smaller land base to work from, high production per acre is a priority there. Innovators in Canada can look to the European example for guidance in reducing cost of production, increasing yields, developing new product and developing a cluster that supports the industry.

Within North America there is evidence that the American greenhouse industry is aware of the competition from Ontario growers and monitoring it. However with cycles in production there is potential to address these concerns by forming strategic alliances and systems that complement, rather than compete.

Mexico and other South American producers have the potential to make inroads into the North American market. This has occurred in a significant way with respect to cut flowers in the past 15 years and there is increasing competition in tomato production. Ontario cannot compete on the basis of climate and must find alternative ways to compensate for issues of lower heat and radiation. This is happening as growers focus on technology and on cultivating product that is harder to transport. Additional factors such as the superior quality of the Ontario product, its low pesticide use and the proximity to market need to be promoted to counter the competition.

5.4 Future of the Industry

Although the greenhouse industry is young, growing and vibrant, there are issues to be faced.

Education and research are critical requirements of this industry. Programs to train growers and provide ongoing skills and training, need support and expansion. Coordination and strengthening of research is critical for the industry to stay ahead of, and be competitive in the international market. There are elements of this support network already in place, however, they need to be strengthened, supported and expanded. The floriculture sector is actively pursuing establishment of a research component at Vineland Station. At the same time the government is considering options for the facility. Other agricultural sectors with similar research requirements have identified a need for additional support. There seems to be a unique opportunity at Vineland to develop a research facility that can become a world leader and support the greenhouse sector into the 21st century.

As the industry has grown, so has its reliance on foreign workers to satisfy labour requirements. Reliance on offshore labour makes the industry vulnerable to international events that could impact the supply. It would be prudent for the industry to address this issue either through increased mechanization or the development of programs to attract a local workforce.

Agencies and educational institutions are aware of the potential of the greenhouse industry and initiatives have been introduced to link jobs to the industry. The growers should support these initiatives.

Infrastructure is another critical requirement for the greenhouse industry. Access to water, three phase power, natural gas and efficient transportation routes is essential. Government at all levels should be encouraged to consider the needs of the greenhouse sector when planning for infrastructure. Where initiatives, such as the study of providing irrigation water for agriculture in Niagara, are introduced, the industry needs to actively participate.

Greenhouse growers need to do a more effective job in promoting product. The implementation of the Integrated Pest Management (IPM) program that allows many products to be grown free of pesticides should be a huge promotional factor and one that the market will respond to favourably.

The greenhouse sector has evolved with very little government support. However, as the industry moves forward, participation by all levels of government is critical to support the industry. This support should come at all levels, and be in the form of supportive development regulations, infrastructure planning, resolution of trade issues, improved border access and research and development programs. This industry makes a very significant contribution to the provincial and national economies and could increase this contribution, with support.

Finally, it is important for the greenhouse industry to speak with a united voice. Organizations such as TOGA speaking for the industry as a whole are vital to its success.

5.5 Conclusion

The greenhouse industry is a prosperous and growing sector of the Ontario economy that is both an agricultural success story and an opportunity for growth and leadership on the international stage. It is also an agricultural sector that needs to raise its profile.

Source: Ontario Greenhouse Vegetable Growers

The Ontario greenhouse agriculture sector is competitive and successful in international markets, generates a healthy balance of trade, is on the cutting edge of advanced technology and has a critical mass unparalleled in North America. The remarkable growth of Ontario greenhouse agriculture is a story well worth broadcasting.

As the greenhouse sector is increasingly subjected to currency pressure, escalating costs, border issues and international trade issues, governments at all levels need to be familiar with the industry and ready to assist in solving problems. To grow, new entrepreneurs need training and access to capital. To keep up with competitors, access to evolving technology, improved pest control and leading edge research is required. Porous borders and reduced bureaucracy are crucial.

It is hoped that this study, by documenting the very significant contribution the greenhouse industry in Ontario makes at the provincial, national and international levels, will aid in raising the industry's profile and securing for it, a healthy future.

Bibliography

Bibliography

"84% water need for greenhouses. Development fee at $42,000 per acre". Leamington Post. www.leamingtonpostandshopper.com/story.php?id=183950 Wednesday, September 14, 2005.

Agriculture and Agri-Food Canada. Exports – Agri-Food for January to November 2005. Monthly Statistical Report. Ottawa. 2005.

Agriculture and Agri-Food Canada. Canadian Ornamental Situation and Trends (2004). Ottawa. December, 2005.

Agriculture and Agri-Food Canada. Leveraging Consumer Interest in Health and Nutrition to Increase the Market for Canadian-grown Fruits and Vegetables. Executive Summary of Phases, One, Two & Three. Power Point Presentation. Ottawa. November, 2005.

Agriculture and Agri-Food Canada. Profile of the 2000 Farm Financial Survey. Strategic Policy Branch, April 2001.

Agriculture and Agri-Food Canada. Profile of the Canadian Greenhouse Tomato Industry. Ottawa. Revised. 2005.

Agriculture and Agri-Food Canada. Profile of the Preliminary 2000 Taxfiler Data. December 2001.

Agriculture and Agri-Food Canada and Statistics Canada. Economic Overview of Farm Incomes Vol. 2, No. 1, December 2001

Bauder, Harald and Margot Corbin. Foreign Farm Workers in Ontario: Representations in the Newsprint Media. University of Guelph: 2002.

Brown, Wayne (OMAFRA). A Profile of the Ontario Greenhouse Floriculture Industry. Toronto: Queen's Printer. 2004.

Bryant, C. and T. Johnston. Agriculture in the City's Countryside. Toronto: University of Toronto Press. 1992.

Butrik, S. M. The Input-Output Structure of The Niagara Region. August, 1979.

Calvin, Linda and Roberta Cook. North American Greenhouse Tomatoes Emerge as a Major Market Force. Vol. 3. Issue 2. California. 2005.

Canadian Innovation Centre. A Customized Market Preview Plus Report for the: Ontario Greenhouse Vegetable Growers. Waterloo. 2002.

Carpenter, J. The Cost of Community Services in Frederick County, Maryland. Frederick, Maryland, American Farmland Trust. 1997.

Carroll, Jack. Ontario Greenhouse Industry Issues Resolution Study. Guelph: 2001.

Dick, Phi (OMAFRA)l. Wet Industry: An Opportunity for Strategic Municipal Water Demand Management. Guelph.

Diven, E. and J. McKay. Consumer Trends Analysis for Canada's Agri-food Industry. Guelph, University of Guelph Department of Agri-Economics and Business. 1992.

Economic Development Department (Municipality of Leamington). "Green Energy for Greenhouses Conference Draws Crowd". Leamington on the Grow. Summer 2005. Leamington. 2005.

Economic Development Department (Municipality of Leamington). "Mexican Consulate Office Slated to Open". Leamington on the Grow. Summer 2005. Leamington. 2005.

Economic Strategic Planning Committee. Prosperity 2000 – Offering World-Class Competitiveness and Jobs for Windsor-Essex in the Nineties. Windsor. 1990.

Flowers Canada (Ontario). FLORNAMENTECH. Proceedings of the National Strategic Planning Workshop on Floriculture and Ornamental Horticulture Research. August 23-24, 2001, Toronto, ON. Guelph. 2001.

Foreign Agricultural Resource Management Services. The Quest for A Reliable Workforce in the Horticulture Industry. 1995 and Annexes.

Foreign Agricultural Resource Management Services. 1996 Field Study – A Follow up to The Quest for A Reliable Workforce in the Horticulture Industry. 1996.

Found, W. C. Agriculture in a World of Subsidies. Canada and the Global Economy: the Geography of Structural and Technological Change. J. Britton. London, McGill-Queen's University Press. 1996.

Freedgood, J. Does Farmland Protection Pay? Washington, D.C., American Farmland Trust. 1992.

Freedgood, J. Is Farmland Protection a Community Investment? Washington, D.C., American Farmland Trust. 1997.

George Morris Centre. Draft – Managing Responsible Trace in Ontario Greenhouse Tomatoes, Cucumbers, and Peppers. A Confidential Study prepared for the Ontario Greenhouse Vegetables Growers. Guelph. Revised. 2004.

George Morris Centre. Draft – Executive Summary, Possible Incremental Measures to Address Horticulture Sector Concerns with Pesticide Regulation in Canada. Guelph. 2005.

Greenhouse and Processing Crops Research Centre. Introduction to the Greenhouse Industry. Ottawa. Revised 2004.

Greenwood, J. K. W., Jennifer A. Property Tax Treatment of Agricultural and Forest Land in Canada: Implications for Land Use Policy. Cambridge, Mass., Government of British Columbia. 1991.

Groves, Fred. "'First' greenhouse class tours local operations". Leamington Post. www.leamingtonpostandshopper.com/story.php?id=155670 Wednesday, April 20, 2005.

Groves, Fred. "Mexico moves closer to its many seasonal workers". Leamington Post. www.leamingtonpostandshopper.com/story.php?id=166636 Wednesday, June 15, 2005.

Growing Strong Communities. The Ontario Liberal Plan for Clean, Safe Communities that Work. Liberal Brochure 2 Strong Communities. November, 2002.

HRDC (Government of Canada). Agriculture Programs and Services Overview – Caribbean & Mexican Seasonal Agricultural Workers Program – Overview. Ottawa. Modified 2004.

HRDC (Government of Canada). HRSDC Assessment Under the Seasonal Agricultural Worker Program. Ottawa. Modified 2003.

Haakman, Peter. Haakman Greenhouses Limited, Beamsville, Ontario. Interview: September 24, 2002

Hardaker, J. B. Guidelines for the Integration of Sustainable Agriculture and Rural Development into Agricultural Policies. FAQ. 1997.

Hilts, S. "Countryside in Ontario". Environments 24(3): 11-16. 1997.

Hughes, John (OMAFRA). Starting a Commercial Greenhouse Business. Fact Sheet. Toronto: Queen's Printer. 2003.

Irving, Elizabeth (Statistics Canada). "The Canadian greenhouse industry: a growing concern". Excerpts from Canadian Agriculture at a Glance 1999. Ottawa, 1999.

JRG Consulting Group. A Profile of the Horticulture Sector and Associated Economic Contribution. Various Power Point Presentations. Ottawa. October, 2005.

JRG Consulting Group. Marketing Ontario Greenhouse Vegetables in the Evolving North American Market. Guelph. 2003.

Jeffery's Greenhouses Inc. Fact Sheet. St. Catharines. 2003.

Jeffrey, Jim. Jeffrey's Greenhouses Inc. Interview: September 11, 2002.

Kamenz, G., Ontario Federation of Agriculture. "Kyoto and Ontario Farmers." Weekender 20 Sept. 2002.

Leontief, W. Quantitative Input-Output Relations in the Economic System of the United States. Review of Economic and Statistics. 18. No. 3. 1936.

Lindsay, D. A Road Map to Prosperity Ontario Jobs & Investment Board, Toronto. 1999.

Llewellyn. 2002 Profile of the Ontario Nursery Industry. OMAF Report. 2002.

Mailvaganam, Siva (OMAFRA). Farm Value and Harvested Area of Vegetables Crops, Ontario 1979-2004. Stats Sheets. Toronto, Queen's Printer. 2005.

Mailvaganam, Siva (OMAFRA). Farm Value of Major Greenhouse Vegetables, Ontario, 1979-2003. Stats Sheet. Toronto, Queen's Printer. 2004.

Mailvaganam, Siva (OMAFRA). Fresh Market Sales and Sales to Processors of Specified Commercial Vegetable Crops, Ontario 1998 to 2004. Stats Sheets. Toronto, Queen's Printer. 2005.

Mailvaganam, Siva (OMAFRA). Greenhouse Flower and Plant Production, by Type and Total Value, Ontario and Canada, 2002 to 2004. Stats Sheet. Toronto, Queen's Printer. 2005.

Mailvaganam, Siva (OMAFRA). Greenhouse Industry Statistics, Ontario and Canada, 2002 to 2004. Stats Sheet. Toronto, Queen's Printer. 2005.

Mailvaganam, Siva (OMAFRA). Marketed Production of Major Greenhouse Vegetables, Ontario, 1979-2003. Stats Sheets. Toronto, Queen's Printer. 2004.

Mailvaganam, Siva (OMAFRA). Nursery Trades Industry Statistics, Ontario and Canada, 2002 to 2004. Stats Sheet. Toronto, Queen's Printer. 2005.

Municipal Property Assessment Corporation (MPAC). Guide to Property Assessment in Ontario. Toronto. 2003.

McLaren, E. A. W., C.D. Vision of the Countryside. Toronto, Rural GTA Working Group for the GTCC. 1999.

Mid Peninsula Transportation Corridor EA Terms of Reference. Public Information Centre #1 and #2. Summer 2002.

Municipality of Leamington. Demographics Profile Fact Sheet. Leamington. 2001.

Municipality of Leamington. Development Charges Fact Sheet. Leamington. 2006.

National Round Table on the Environment and the Economy. Urban Sustainability Program, Multistakeholder Workshop: September 26-27, 2002.

Nelson, R. R. National Innovation Systems: a comparative analysis. Oxford, Oxford University Press. 1993.

Net Success Inc. Trends, Opportunities and Priorities Report – Workforce Development – A Community Priority in Southwestern Ontario. Windsor. 1994.

Niagara Economic & Tourism Corporation. Niagara's Growing Power: The Advantage is Yours. Niagara. 2005.

Niagara Economic & Tourism Corporation. Ontario Greenhouse Floriculture Markets in the United States. Niagara. 2004.

Niagara Economic & Tourism Corporation. Ontario's Growing Power: Profit By It! Niagara. 2005.

Niagara Economic Development Corporation. Ontario's Floriculture Industry. Niagara. 2005.

Niagara Economic Development Corporation. Ontario Greenhouse Vegetable Markets in the United States. Niagara. 2005.

Niagara Economic Development Corporation. Ontario Greenhouse Vegetable Markets in the United States – Executive Summary. Niagara. 2005.

Niagara Economic Development Corporation. Ontario's Growing Power: Profit With It! Niagara. 2005.

Niagara Economic Development Corporation. TOGA – Supplementary Statistical Data 1994-2004. Niagara. 2005.

Niagara Fruit and Vegetable Growers Association & Ontario Horticulture Crops Committee. "Growing Together." 2003 Ontario Fruit & Vegetable Convention & Trade Show Guide. Brock University: St. Catharines. February 18 & 19, 2003.

Niagara Training & Adjustment Board, The. Annual Report 2000-2001. June 19, 2001.

Niagara Training & Adjustment Board, The. Environmental Scan Update, Community Report Niagara Region. 2002-2003.

Niagara Training & Adjustment Board, The. Local Area Action Plan for the Niagara Region. December 2001.

Niagara Training & Adjustment Board. The Niagara Training Review Newsletter. Volume 6. June, 2001.

OATI Learning Group. The Ontario Greenhouse Alliance Human Resources Survey. Guelph. 2004.

OMAFRA. A Profile of the Ontario Greenhouse Floriculture Industry. November, 1999.

OMAFRA. Agricultural Statistics for Ontario 1941-1978. Publication 20. Toronto: Queen's Printer. 1979.

OMAFRA. Agricultural Statistics for Ontario 1971. Publication 20. Toronto: Queen's Printer. 1972.

OMAFRA. Agricultural Statistics for Ontario 1976. Publication 20. Toronto: Queen's Printer. 1977.

OMAFRA. Agricultural Statistics for Ontario 1981. Publication 20. Toronto: Queen's Printer. 1982.

OMAFRA. Agricultural Statistics for Ontario 1986. Publication 20. Toronto: Queen's Printer. 1987.

OMAFRA. Agricultural Statistics for Ontario 1991. Publication 20. Toronto: Queen's Printer. 1992.

OMAFRA. Agricultural Statistics for Ontario 1995. Publication 20. Toronto: Queen's Printer. 1996.

OMAFRA. Growing Greenhouse Vegetables. Publication 371. Toronto: Queen's Printer. 2005.

OGVG. General Regulations 2004-2005. Leamington. 2004.

OGVG. Ontario Greenhouse Vegetable Growers Annual Report 2003. 2003.

OGVG. The Grower. Horticulture Publication. Vol. 56. Number 1. Guelph. January, 2006.

Ontario Farm Environmental Coalition. Ontario Environmental Farm Plan. Revised, 1999.

Ontario Federation of Agriculture: The Property Tax Treatment of On-Farm Value-Added Activities. Discussion Paper. June 2000.

Ontario Horticultural Crops Research and Services Committee. Report Given At Annual General Meeting of the Ontario Agricultural Services Co-ordinating Committee Report. Guelph, ON. December, 2004.

Peters, Doug (AAFC). "Greenhouse Exports Figures to the US 2003 to 2005". Ottawa. 2005.

PLANSCAPE. City of Hamilton – Agricultural Economic Impact & Development Study. Bracebridge: ON. August, 2003.

PLANSCAPE. NEPTIS – Agriculture in South Central Ontario – It's Status, It's Future,. Draft Report. Bracebridge: ON. January, 2005.

PLANSCAPE. Regional Municipality of Niagara – Regional Agricultural Economic Impact Study. Bracebridge: ON. June, 2003.

Porter, M. E. "Clusters and the New Economies of Competition." Harvard Business Review (Nov-Dec.): 77-90. 1998.

Porter, M.E. Innovation: Work in Progress. Lecture Notes. Netherlands. 2001.

Putting Canada First, An Architecture for Agricultural Policy in the 21st Century. A Federal-Provincial-Territorial Initiative. July, 2002.

Purdy, Jake. "High-tech vegetables: Canada's booming greenhouse vegetable industry". VISTA on the Agri-Food Industry and the Farm Community. Catalogue No.21-004-XIE. Ottawa. March, 2005.

Random interviews with select sampling of greenhouse producers (names withheld for confidentiality). January, 2005 to August, 2006.

Rees, W. Why Urban Agriculture? Notes for the IDRC Development Forum on Cities Feeding People: A Growth Industry. University of British Columbia. 1997.

Regional Economic Development Team (OMAFRA – Chatham Div). Leamington's Vegetable Greenhouse Cluster. Pamphlet. Toronto: Queen's Printer. 2001.

Reid, Neil and Michael C. Carroll. Using Cluster Based Economic Development to Enhance the Economic Competitiveness of Northwest Ohio's Greenhouse Nursery Industry. Ohio. 2005.

Resource Jump Team. Leamington-Kingsville – An Assessment of the Dynamic Greenhouse Industry Cluster. 2002.

Ridgetown College (University of Guelph). Food Industry Growth Trends in Ontario's Southwest Region. Ridgetown. September, 2003.

Rose, Cindy. Niagara Economic and Tourism Corporation. Interview: February 1, 2006.

Sinclair, Barry (OMAFRA). 2005 Farm Property Class Tax Rate. Fact Sheet. Toronto: Queen's Printer. 2005.

Sinclair, Barry (OMAFRA). The Farm Property Class Tax Rate Program Questions and Answers. Fact Sheet. Toronto: Queen's Printer. 2005.

Smith, Dr. Irwin. "Flowers Canada (Ontario) seeks registration as designated group for provincial producers". Greenhouse Canada. July, 2005.

Smith, Dr. I., Flowers Canada (Ontario). Floriculture Industry. Economic Impact Report Submitted to the Regional Municipality of Niagara, Planning and Development Department. March 2002.

Sommers, P. and J. Smith. Promoting Urban Agriculture: A Strategy Framework for Planners in North America, Europe and Asia, The Urban Agriculture Network. Presentation to Habitat 94. Edmonton: 20 September 1994.

Staciwa, Anna, Siva (OMAFRA). Ontario Agri-food Trade by Commodity Group, 1999 to 2005. Stats Sheets. Toronto, Queen's Printer. 2005.

Statistics Canada. Canada Agricultural Census. Ottawa. 1996.

Statistics Canada. "Farm population: bucking the trend in a country shaped by immigrants". 2001 Census of Agriculture. www.Statcan.ca/English/agcensus2001/first/socio/immigration.htm . Ottawa. 2003.

Statistics Canada. Niagara and Hamilton: 11-TDP-Tax, Operating Revenues & Expenses; 42-June Crops Survey; 43-July Livestock Survey; 36-FFS, Financial Structure. 11 March 2002.

TOGA. Greenhouse Tours. Interviews. Leamington and area. August 18, 2005.

UNDP. Urban Agriculture: Food, Jobs and Sustainable Cities. New York. 1996.

Van der May, Albert and others. Floral Passion. St. Catharines: Vanwell Publishing Limited. 2004.

Veale, Alan and others. Regional Niagara, Two Alternatives for Revising the Agricultural Land Base Map – A Discussion Paper for Good General Agricultural Areas. Pub. 87-1. Planning and Development Department. October 1993.

Walton & Hunter Planning Associates. Greater Toronto Area – Agricultural Economic Impact Study. November, 1999.

Warnock, J. "Industrial Agriculture in the Era of Free Trade." Canadian Dimensions 22 (No.142): 12-13. 1998.

Watson, Garry R. "Overview of the Canadian Ornamental Industry". Flowers Canada (Ontario). Guelph.

Whatmore, S. From Farming to Agribusiness: The Global Agro-Food System. Geographies of Global Change. R. J. Johnston, Taylor, P.J. and Watts, M.J. Oxford, Blackwell. 1995.

Wolfe, Christian. (Statistics Canada). "What exactly is "value added" anyway? Excerpts from Canadian Agriculture at a Glance 1999. Ottawa, 1999.

Women of the National Farmers Union. The Employment Practices of Farm Families in the Year 2001-2002: A Research Project Proposal. Revised March 16, 2001.

Municipal Plans, Catalogues, Directories

Agriculture and Agri-Food Canada. An Overview of the Canadian Agriculture and Agri-Food System. Research and Analysis Directorate, Strategic Policy Branch. Publication 10066E. Catalogue A38-1/1-2005E-PDF. Ottawa. May, 2005.

Agriculture and Agri-Food Canada. Agri-Food Network: Directory to Ontario's Agri-Food Industry. 1995. Ottawa. 1995.

Municipal Tax Equity (MTE) Consultants Inc. Appendix "A" The Town of Lincoln Fiscal Impacts of the Greenbelt Protection Act, 2004. Georgetown. 2004.

Municipality of Leamington. By-Law No. 540-04 – Development Charges.

Niagara Economic Development Corporation. Ontario Greenhouse Growers' Directory & Buyer's Guide. Niagara: Thorold. 2006.

Niagara Economic and Tourism Corporation. Ontario Greenhouse Growers' Directory and Buyers' Guide 2005. Thorold. 2005.

OMAFRA. Consultation on Nutrient Management Regulations. August 2002.

OMAFRA. Nutrient Management Act. Information Sheet. December, 2002.

OMAFRA. Export Directory Agriculture and Food Products Ontario Canada. Toronto: Queen's Printer. 1981.

Planning Services Committee of Regional Niagara Council, The. An Agricultural Land Protection Program for Ontario. Submission to OMAFRA. June 15, 1992.

Regional Municipality of Niagara. The Southeast Niagara Agricultural Study. Planning & Development Department. Pub. No. 98. January, 2002.

Regional Niagara. An Update on the Nutrient Management Act. Report to Planning Services Committee. November 13, 2002.

Regional Niagara. Agriculture, Land Use and Agri-tourism: Information on Activities and Current Policies. Report to Planning Services Committee. April 12, 2000.

Regional Niagara. A Summary of the Responses to the Brief: Preserving Niagara's Agricultural Industry. Pub. 78 Planning and Development Department.

Regional Niagara. Choices for Agricultural Areas. Pub. 75 Planning and Development Department. October, 1990.

Regional Niagara. Comparison of Agricultural Land Use in 1980 and 1993 in General Agricultural and Rural Areas. Report to Planning Services Committee. August 11, 1993.

Regional Niagara. Farming in the Niagara Region: Structure, Trends and Land Use Policies. Pub. 75-8 Planning and Development Department. October, 1989.

Regional Niagara. Findings of the Inquiry into the Competitiveness of Canada's Fruit and Vegetable Industry. March 25, 1992.

Regional Niagara. Free Trade and Niagara Region's Agricultural Industry, A Digest of Assessments and Views. Pub. 75. Planning and Development Department.

Regional Niagara. Memorandum to Regional Niagara Agricultural Land Use Subcommittee re: Possible Policy Plan Amendments for Modified Land Use Regulations to assist the Niagara Agricultural Industry.

Regional Niagara. Niagara's Greenhouse Industry. Publication 94 Planning and Development Department. January, 2000.

Regional Niagara. Niagara Water Quality Protection Strategy, Background Report. April 2002.

Regional Niagara. Policy Plan. September, 2001.

Regional Niagara. Preserving Niagara's Agricultural Industry, Initiatives By All Four Levels of Government for Today's Farmers, Competing in the Nineties. Pub. 77. Planning and Development Department.

Regional Niagara. QEW Corridor Study: Land Use Changes. Report to Planning Services Committee. February 13, 2002.

Regional Niagara. Responses to Choices for Agricultural Areas. Pub. 75-12. Planning and Development Department. February, 1991.

Regional Municipality of Niagara. Smarter Niagara Summit. November 20, 2002.

Regional Niagara. Where Next? A Look to the Future. Pub. 75. Planning and Development Department.

Statistics Canada. 2001 Census Dictionary, Reference. Catalogue No. 92-378-XIE. Ottawa. revised edition. December, 2004.

Statistics Canada. 2001 Census Handbook, Reference. Catalogue No. 92-379-XIE. Ottawa. February 2003.

Statistics Canada. Agriculture Profile of Ontario. Catalogue No. 95-177-XPB. Ottawa. 1996.

Statistics Canada. Canadian Agriculture at a Glance – Little Bees, Big Potential. Catalogue No. 96-325-XPB. Ottawa. 1996.

Statistics Canada. Canadian Agriculture at a Glance – What's Growing Under Glass. Catalogue No. 96-325-XPB. Ottawa. 1996.

Statistics Canada. Farm Financial Survey. Catalogue No. 21F0008XIB. Ottawa. 2004.

Statistics Canada. Food Statistics. Vol. 4, No. 2. Catalogue No. 21-020-XIE. Ottawa. 2004

Statistics Canada. Fruit and Vegetable Production. Catalogue No. 22-003-XIB. Ottawa. June, 2005.

Statistics Canada. Greenhouse, Sod and Nursery Industries. Catalogue No. 22-202-XIB. Ottawa. 1998.

Statistics Canada. Greenhouse, Sod and Nursery Industries. Catalogue No. 22-202-XIB. Ottawa. 1999.

Statistics Canada. Greenhouse, Sod and Nursery Industries. Catalogue No. 22-202-XIB. Ottawa. 2000.

Statistics Canada. Greenhouse, Sod and Nursery Industries. Catalogue No. 22-202-XIB. Ottawa. 2001.

Statistics Canada. Greenhouse, Sod and Nursery Industries. Catalogue No. 22-202-XIB. Ottawa. 2002.

Statistics Canada. Greenhouse, Sod and Nursery Industries. Catalogue No. 22-202-XIB. Ottawa. 2003.

Statistics Canada. Greenhouse, Sod and Nursery Industries. Catalogue No. 22-202-XIB. Ottawa. 2004.

Statistics Canada. People, Products and Services. Agriculture Division. Catalogue No. 21F0003GIE. Ottawa. 2005

Statistics Canada. Your Guide to the Consumer Price Index. Catalogue No. 62-557-XPB. 1996.

Town of Lincoln. By-Law No. 04-40 – Development Charges.

Town of Lincoln. Bill 135 – Greenbelt Act, 2004. Position Paper. 2004.

University of Guelph. E-Learning Catalogue 2002 – Independent Study. 2002.

Electronic Sources

999 Greenhouse http://www.999greenhouse.com/news/

Adduci, Mastriani & Schaumberg, L.L.P.
http://www.adduci.com/publications_trade_detail.asp?ReportID=61

Agriculture and Agri-Food Canada. CANSIS. <http://www.res.agr.ca/cansis>

Alkema Greenhouses. 4March 2003. <http://www.alkema.com/>

American Farmland Trust. Why Save Farmland and Farmland Protection Toolbox.
<http://www.farmland.org/Farmland/files/protect/why.html>

Canadian Agricultural Colleges. Rural Living Canada – Agriculture Education. 2003.
<http://members.attcanada.ca/~kenruss/Pag00161.htm>

Colasanti Tropical Gardens http://www.colasanti.com/

County of Essex http://www.countyofessex.on.ca/general/home.asp

County of Essex Library http://www.essex.county.library.on.ca/

Double Diamond Acres http://www.doublediamondacres.com/index.shtml

Erie James Limited. http://www.eriejames.com/history.shtml

Farming & Food Production Protection Act.
<http://192.75.156.68/DBLaws/Statutes/English/98f01_e.htm>

Flavour Pict Produce http://www.flavourpict.com/

Flowers Canada (Ontario) <http://www.flowerscanada.ca/>

Forest Care Website. Wawa Nursery and St. Williams Nursery.
http://www.forestcare.com/nurseries.htm

Fresh PackProduce CA Ltd. http://www.freshpack.ca/

Fresh Plaza – Global Fresh Produce & Banana News
http://www.freshplaza.com/2005/14jun/2_ca_greenhousetech.htm

George Morris Centre. http://www.georgemorris.org/GMC/Home.aspx

Greenhouse and Processing Crops Research Centre (GPCRC)
http://res2.agr.ca/harrow/junior/greenhouse-serre_e_htm

Greenhouse Industry Trade Show On-Line http://www.greenhouse-bbs.com/bbs/grower.htm

Grower Flowers.com http://www.growerflowers.com/affiliate/misc.asp?page=mitech

Growing Tomatoes Hydroponically. http://ag.arizona.edu/hydroponictomatoes/history.htm

H & A Mastronardi Farms http://www.annasflowers.ca/fall.htm

Hendriks Greenhouses Home Page. About Us. 2003. http://www.hendriksgreenhouses.com/

Lakeside Produce http://www.laksideproduce.com/en/index.cfm

Mastronardi Produce Ltd – Sunset http://www.sunsetproduce.com/

Municipality of Leamington http://www.leamington.ca/general/home.asp

Niagara Commercial Properties. http://www.niagaracp.com/

Niagara Economic & Tourism Corporation. Agri-Business – North America's Third Largest Greenhouse Floral Producing Region. 4 March. 2003. <http://www.niagaracanada.com/agri-bus/>

Niagara Economic & Tourism Corporation. The Greenhouse Industry – A Profile – Niagara Region. <http://www.niagaracanada.com>

Niagara Economic & Tourism Corporation. Niagara Canada: North America's Third Largest Greenhouse Floral Producing Region, 2003. <http://www.niagaracanada.com/agri-bus/index.cfm>

Ontario Fruit and Vegetable Growers' Association. http://www.ofvga.org/communications.php

OMAFRA. Agri-Food Research Magazine. <http://www.gov.on.ca/OMAF/english/index.html>

OMAFRA. Introduction to Agri-food Education in Ontario. 2003. <http://www.gov.on.ca/OMAFRA/english/research/education/index.htm>

OMAFRA. Statistics. <http://www.gov.on.ca/OMAF/english/index.html>

OMAFRA – Ontario Agri-food Trade
http://www.gov.on.ca/OMAFRA/english/stats/trade/agrifoodtrade.html

Ontario Agricultural Training Institute. The Canadian Farm Business Management Program. 2003. <http://www.oati.com/web/>

Ontario Farm Products Marketing Act. 2003. <http://192.75.156.68/DBLaws/Statutes/English/90f09_e.htm>

Ontario Greenhouse Vegetable Growers http://www.ontariogreenhouse.com/nutrition.cfm

Red Zoo Marketing http://www.redzoo.com/html/history.shtml

Regional Municipality of Niagara Home Page. 2003. http://www.regional.niagara.on.ca>

Statistics Canada. 2003. <http://www.statcan.ca/subscription/>

Statistics Canada. Population counts for Canada, Provinces and Territories, and Census Divisions by Urban and Rural, 2001 Census. 2003. <http://www12.statcan.ca/English/census01/products/standard/popdwell/P>

Sunrise Greenhouse Mfg. Inc. http://www.sunrisegreenhouse.com/?p=testimonials&sid=11582058KY

Suntastic Hothouse Inc. http://www.suntastic.ca/

The Royal Agricultural Winter Fair, Royal Agricultural Winter Fair. 2005. <http://www.royalfair.org>

The Ontario Greenhouse Alliance http://www.theontariogreenhousealliance.com/consumerinfo.htm

Town of Lincoln. Area Greenhouses – Greenhouses located in the Town of Lincoln. 4 March 2003. <http://www.townoflincoln.co/information/greenhouses/>

Vermeer's Garden Centre & Flower Shop http://www.vermeers.ca/index.html

Yoder Brothers, Inc. http://www.yoder.com/about_yoder_intter.asp

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