The North American Greenhouse Vegetable Industry

Updated by Zbeetnoff Agro-Environmental Consulting, August 13, 2006
Is the market ripe for vegetables?

Remember when Mom used to say, "Eat your vegetables, they’re good for you?" You might have turned up your nose at the broccoli, nibbled away at the carrots and watched while the peas rolled around on your plate. And cooked beets had no appeal, whatsoever.

Enter the age of health-conscious consumers who pay attention to what they eat. Suddenly, they’re fresh, they’re healthy and they’re everywhere! Every variety, shape and size of vegetable you can possibly imagine grows in Canadian greenhouses, marking the success of an industry that has dramatically expanded over the past 15 years.

According to the Statistics Canada 2006 agriculture census, in the last five years greenhouse growing space has increased by 21 per cent across the country. And vegetables surpassed flowers as the main product being grown under glass.

Given the Canadian climate, knowledgeable producers grow a wide array of blemish-free, delicious and aesthetically pleasing vegetables under glass. Greenhouse operators have 22.2 million square metres under production across the country.

Sweet corn is the top vegetable grown in Canada, followed by green peas, beans and carrots.

When it comes to fruit, the blueberry leads all others in popularity with Quebec producing more than any other province, followed by Nova Scotia and New Brunswick.

Ontario and B.C. account for some 90 per cent of all Canadian production with Ontario contributing 66 per cent and B.C. contributing 24 per cent.

There has been broad market penetration by Canadian products throughout North America. Although there is significant competition with domestic producers, Mexico and Europe, the U.S. still accounts for approximately 75 per cent of all product sales.

With sophisticated, demanding palates, consumers want fresh peppers, tomatoes and cucumbers no matter how cold the weather is in February. And they’re willing to pay for it. In part, it is this demand that drives the greenhouse industry.

In 2006, Farm Credit Canada commissioned Zheitnoff Agro-Environmental Consulting to update a study of the North American greenhouse vegetable industry. While some of the information contained in the study may be dated as the industry has evolved, many of the findings are as relevant today as they were when they were first written.

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1 British Columbia Ministry of Agriculture, Food and Fisheries- An overview of the B.C. Greenhouse Vegetable Industry Factsheet
Executive Summary

1.0 North American Greenhouse (GH) production

1.1 Area
In 2006, Mexico was the largest supplier to the North American market, possessing about 60 per cent of production area.

Since 2002, Mexican production area has continued to increase at a rate of about 20 per cent per year meaning that its total area has doubled in the period. Growth in greenhouse production area has also increased in Canada and the U.S. since 2002, however, more modestly at 39 per cent and 25 per cent, respectively. There is no indication that rate of growth in Mexico will ease in the near term, although there is speculation that a financial shakeout is inevitable.

1.2 Production dynamics
The seasonality of Canadian production has been called the Achilles heel of the Canadian GH industry. Technically, this seasonality could be counteracted except for the economic infeasibility of year-round production, especially with recent spikes in GH energy costs. The U.S. advantage is related to its ability to produce year-round and in the southern states, to take advantage of lower energy requirements, Mexican labour and ample sunlight. Mexico has traditionally produced for the U.S. winter season, however has a wide variety of climes and altitudes that permit year-round production. Mexico faces challenges related to the higher cost of capital, energy and infrastructure.

1.3 Value of production
The value of GH vegetable production in Ontario and B.C. in 2005 was actually below the value of production in 2002.

1.4 North American crop mix
Mexico dominates each of the three main GH crops in terms of area of production. In the North American industry, tomatoes represent about 67 per cent of area, followed by peppers at 17 per cent and cucumbers at 17 per cent. Since 2002, there has been an incremental drop in the proportion of tomato and pepper area and an increase in cucumber area.
However, the area of all crops has continued to increase. While new GH crops are being considered, most developments have been related to:

- specialty GH tomatoes, peppers and cucumbers for niche markets
- licensing of new proprietary varieties
- organic GH vegetables

2.0 Market dynamics

The market for GH vegetables has become even more continental. About 80 per cent of Canadian production enters the U.S. during the northern hemisphere growing season. While most Mexican GH production used to enter the U.S. and Canada counter-seasonally, now rapidly increasing volumes are appearing in the shoulder seasons, where price have traditionally been higher. Since 2002, price peaks have become lower as year-round supply becomes more readily available and in-season prices have declined.

2.1 GH tomato markets

Following trends noted in 2002, beefsteak tomato volume has dropped and tomatoes on the vine (TOV) and specialty tomatoes have increased in significance. The GH tomato market is maturing, meaning that most growth is being created through continued displacement of field-grown varieties by competing on price and development of new varieties. A significant challenge to GH product market expansion is that the food service market, representing 50 per cent of the total fresh market, continues to be largely inaccessible to GH varieties. However, newer GH varieties, with improved firmness and slicing characteristics, have potential to enter this market. In 2006, GH tomatoes accounted for about 37 per cent of the U.S. fresh tomato market. Canadian consumption of GH tomatoes accounts for 54 per cent of the retail fresh market.

2.2 GH bell pepper markets

GH bell pepper imports into the U.S. increased by 62 per cent between 2002 and 2005. The volume of European-origin GH peppers has continued to decline due to market displacement by improved Canadian production and the increased cost of transportation to access North American markets. In 2004, Canadian exports of GH bell peppers to the U.S. exceeded the volume of European pepper exports for the first time and, in 2005, Mexican exports to the U.S. also exceeded European exports for the first time. Nonetheless, European GH pepper exports to the U.S. and Canada are still substantial. GH pepper consumption rose to 31 per cent and 18 per cent of fresh bell pepper retail sales in Canada and the U.S., respectively.

2.3 GH cucumber markets

GH cucumber imports into the U.S. increased by 2.3 per cent between 2002 and 2005. While the volume of European-origin GH cucumbers imported into the U.S. and Canada is negligible, European and U.S. exports to Canada are increasing in the December to January period. While Mexican exports to the U.S. and Canada dominate trade in the December to April period, Canadian export volume of GH cucumbers to the U.S. continues to exceed that of Mexico. GH cucumber consumption rose to 61 per cent and 11 per cent of fresh cucumber retail sales in Canada and the
U.S., respectively. As such, the potential of the U.S. GH cucumber market remains essentially untapped.

3.0 Market pricing
With the increasing production originating out of Mexico, the U.S. and Canada, several supply dynamics are affecting GH vegetable pricing.

- Mexican investment in higher-technology facilities is resulting in the growth of supply in periods when Canadian products are used to obtaining price premiums. Shoulder-season price premiums have dissolved as seasonality is no longer a market factor and adequate supplies are available to the North American GH vegetable markets year round.
- Mexican supply is also appearing when Canadian production comes on stream, resulting in lower lows in the northern hemisphere crop season.
- European GH peppers continue to hold their premiums in relation to Mexican and Canadian products in both Canadian and U.S. markets. This indicates there’s room for growers targeting high-end peppers to displace European product.
- With the exception of TOV tomatoes, average annual prices have trended lower since 2002 for all GH vegetables.
- However, prices are responding to year-to-year changes in crop area, indicating that demand and supply are growing in lock-step.
- Ontario grower pricing is not transparent and there is a suggestion that, since 2002, shippers are competing very aggressively for market share.

4.0 Industry developments
Since 2002, the B.C. greenhouse sector is considering significant changes to its regulatory structure. The net impact will be to make market entry easier for new marketing agencies in the province. Nevertheless, the regulatory agency is making a strong case for continued regulation of quota expansion and quota transfers. In 2004, the B.C. Vegetable Marketing Commission (BCVMC) issued a minimum price for tomatoes in order to protect grower returns.

Marketing alliances between growers and distributors have increased for at least three reasons: a) to develop the supply capacity and mix to access large retailers, b) to market exclusive new products, and c) to develop year-round supply.

Retailers continue to grow in size and are making more demands on suppliers. Category management is an important service provided. Scanning technology is providing the means to monitor and manage returns by the stock keeping unit (SKU) category.

5.0 Competitive factors
Labour and energy comprise upwards of two-thirds of total operating costs for greenhouse operations.

5.1 Labour
Because of the booming economy, labour availability in Canada and Western Canada have ramifications for the GH vegetable industry. Since 2004, a Mexican Seasonal Agricultural Workers
Program has operated in B.C. This is an unskilled foreign-worker recruiting program modeled on the Ontario program that has been in operation for at least 25 years. The program is widely used in the Ontario GH industry and is being rapidly adopted in B.C. A large scale GH feasibility study in Alberta is finding that labour availability will be a critical factor there as well. Alberta farmers have used the Caribbean Commonwealth and Mexican Seasonal Agricultural Workers Program for some time.

Most recently, a tight labour market has led to the recruitment of foreign workers, not only to fill vacant positions of Canadian farm workers drawn to the oil patch, but also for temporary foreign skilled and semi-skilled positions in various other industries in western Canada’s strong economy.

There are suggestions that Mexico as a source of GH labour may be tapping out, in part because of the demand within its own GH sector. There is discussion about whether foreign worker programs to access workers from other countries, such as India and China, should be developed.

5.2 Energy

The cost of energy is of paramount concern to Canadian GH operators. Continental natural gas policy has lead to spikes in Canadian natural gas costs that are related to consumption events in the U.S.

A number of wood waste fired boilers are being installed in B.C. While fuel quality wood waste is available in northern B.C. and northern Alberta, the conversion of energy systems to biomass in industries other than GH has put a strain on wood waste supply. Ontario wood waste supply may not be adequate to meet existing demand. Wood pellet availability and pricing is being determined by demand for wood pellets in Europe. B.C’s harvesting program for pine beetle infested wood will increase supplies. The ability to recover carbon dioxide from wood waste flue gas would bode well for the GH industry.

While Canada has ample supplies of coal, coal prices are rising rapidly in the international marketplace as the Chinese economy continues to sizzle. The technology to burn coal without environmental impacts is available. The demonstrated ability to derive carbon dioxide from flue gas would provide a significant boost to coal-fired GH boiler systems.

Ontario has created an alternative energy policy to promote independent green energy production. This program allows for facilities to be constructed for the sale of power to the grid, with the opportunity for the waste heat to be used in greenhouse operations. Similarly, Alberta oil and gas field facilities hold the potential to attract GH operations utilizing the waste heat.

5.3 Exchange rates

The Canadian dollar has appreciated against the Mexican peso and the U.S. dollar since 2002. This exchange rate effect has been shared in the U.S. GH vegetable markets, meaning that Canadian GH products are price-takers and that price slippage has occurred. Continued strengthening of the Canadian dollar will force operators to consider larger scale operations, cost-cutting practices, new technology to reduce energy input costs, new crops and varieties and labour-saving techniques just to maintain competitiveness with Mexico.

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1. In 1997, Alberta used approximately 150 temporary Mexican workers and a larger contingency (over 900 workers) of seasonal Mexican Mennonites, many of whom were Canadian citizens or landed immigrants. See article by Smart, J. 1997. Borrowed men on borrowed time: Globalization, labour migration and local economies in Alberta. Prairie Centre of Excellence for Research on Immigration and Integration.
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1.0 Configuration of the Greenhouse Vegetable Industry

1.1 Production area

The configuration of the greenhouse (GH) vegetable sector has continued to change according to trends identified in 2002. In 2006, Mexico at 60 per cent is now clearly the largest production area in North America (NA), followed by Canada at 28 per cent and the U.S. at 12 per cent.

Figure 1: North American GH Production Area by Country, 2002 to 2006

Overall, NA production area grew by 70 per cent between 2002 and 2006. This growth was not evenly distributed among producing countries. Mexico increased production area by 105 per cent in the period, while Canada increased by 39 per cent and the U.S. by 25 per cent.

Table 1: Production Area, North America, 2002 to 2006

<table>
<thead>
<tr>
<th>Year</th>
<th>Canada</th>
<th>USA</th>
<th>Mexico</th>
<th>Total</th>
<th>Growth Rate Canada</th>
<th>USA</th>
<th>Mexico</th>
<th>Total</th>
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<tr>
<td>2002</td>
<td>787</td>
<td>355</td>
<td>1,139</td>
<td>2,282</td>
<td>-0.2%</td>
<td>5.6%</td>
<td>18.6%</td>
<td>10.1%</td>
</tr>
<tr>
<td>2003</td>
<td>941</td>
<td>400</td>
<td>1,351</td>
<td>2,512</td>
<td>19.7%</td>
<td>6.6%</td>
<td>20.0%</td>
<td>17.9%</td>
</tr>
<tr>
<td>2004</td>
<td>1,043</td>
<td>410</td>
<td>1,945</td>
<td>3,398</td>
<td>10.8%</td>
<td>2.5%</td>
<td>20.0%</td>
<td>14.7%</td>
</tr>
<tr>
<td>2005</td>
<td>1,092</td>
<td>445</td>
<td>2,334</td>
<td>3,871</td>
<td>4.7%</td>
<td>8.6%</td>
<td>20.0%</td>
<td>13.9%</td>
</tr>
<tr>
<td>Change</td>
<td>304</td>
<td>90</td>
<td>1,194</td>
<td>1,589</td>
<td>38.7%</td>
<td>25.3%</td>
<td>104.8%</td>
<td>69.6%</td>
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</table>

Source: Solymosi, A. 2006. B.C. Vegetable Marketing Commission
New B.C. facilities are all glasshouses. In 2004, about 47 per cent of new Ontario facilities were glasshouses. It is unclear whether glasshouses will become the construction trend in Ontario in light of several factors:

- pressure on the industry to extend production into the winter months
- rising energy costs
- effectiveness of energy curtains to conserve energy
- innovative developments in greenhouse plastic covers.

About 94 per cent of Mexican GH area is covered in plastic and only 4 per cent in glass. The growth of Mexican GH area is anticipated to continue to at 20 per cent annually, and the bulk of this will consist of higher technology facilities. The current overall level of technological adoption in Mexican GH facilities has been estimated at about 40 per cent.

Because GH production area in B.C. is regulated through quota allocation and transfers, future growth in production is determined through a process that coordinates B.C. production and crop mix with agency demands for product, grower returns and assessment of competitors. As such, future growth depends on applications for new production and annual assessments of market demand for products. Decisions on expansions in any given year are made two years previous. For example, while the Ontario sector grew by 110 acres in 2006, the BCVMC denied expansions and transfers in 2006 crop allocations in 2004.

Growth in Ontario GH area is not regulated and new production area is not subject to regulatory approval except that all production facilities must be licensed with the Ontario Vegetable Greenhouse Growers (OVGG). As such, production area may respond more aggressively than B.C. in response to perceived market opportunities.

Figure 2: Percent of North American GH production area by country, 2002 to 2006

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4. See http://www.fcc-fac.ca/newsletters/en/express/articles/20041029_e.asp#5
1.2 Crop mix

In 2002, GH tomatoes accounted for almost 68 per cent of the total NA production area, followed by peppers at 17 per cent and cucumbers at 14 per cent. In 2006, crop mix has adjusted slightly to consist of proportionately less tomato and peppers area and more cucumbers. About 5 per cent of Mexican GH area is used for herb production and other crops.

Figure 4: Change in North American GH crop mix, 2002 to 2006
1.3 Crop mix by producing area

The dominant crop in all producing areas continues to be tomatoes. The U.S. has relatively small areas of GH peppers and cucumbers. Between 2002 and 2006, the strongest growth in production area occurred for peppers in Canada, tomatoes in the U.S. and cucumbers in Mexico.
Figure 7: North American GH crop mix, 2006

North American GH Crop Mix, 2006

<table>
<thead>
<tr>
<th>Crop</th>
<th>Canada</th>
<th>USA</th>
<th>Mexico</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tomatoes</td>
<td>587</td>
<td>400</td>
<td>1,834</td>
</tr>
<tr>
<td>Peppers</td>
<td>278</td>
<td>20</td>
<td>350</td>
</tr>
<tr>
<td>Cucumbers</td>
<td>227</td>
<td>25</td>
<td>350</td>
</tr>
</tbody>
</table>

Figure 8: North American change in GH crop mix, 2002 - 2006

Change in North American GH Crop Mix, 2002 to 2006

<table>
<thead>
<tr>
<th>Crop</th>
<th>% Change</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tomatoes</td>
<td>21.7%</td>
</tr>
<tr>
<td>Peppers</td>
<td>60.1%</td>
</tr>
<tr>
<td>Cucumbers</td>
<td>13.9%</td>
</tr>
<tr>
<td>USA</td>
<td>14.3%</td>
</tr>
<tr>
<td>-0.8%</td>
<td></td>
</tr>
<tr>
<td>Mexico</td>
<td>106.8%</td>
</tr>
<tr>
<td>66.8%</td>
<td></td>
</tr>
<tr>
<td>196.8%</td>
<td></td>
</tr>
</tbody>
</table>
Canadian growers are growing new varieties of tomatoes, peppers and cucumbers and using different production protocols in an effort to access market niches and to differentiate their products from mainstream products. These products include organic, Campari tomato, strawberry tomato, sweet chili pepper, yellow cherry tomatoes, yellow and orange cluster tomatoes, yellow beefsteak tomatoes, Zebra and Amorosa cocktail tomatoes and mini- and midi-cucumbers. Nonetheless, specialty GH products represent only a small proportion of total production and marketing alliances are especially important in gaining market access.

1.4 Location of new development
The location of the Canadian greenhouse sector remains in Ontario, B.C., Quebec and Alberta, in that order of size. Alberta is currently undertaking a study to determine if it has a competitive advantage in pursuing the NA GH vegetable market. A favourable outcome of this study would lead to efforts to attract a potential investor.

Canadian growth in production area was relatively stagnant in 2003 to 2004, before increasing in 2005 and 2006. Growth is expected to be marginal in 2007.

New U.S. GH vegetable production area has grown modestly near the locations of existing southern operations, like Eurofresh in Arizona. Location considerations that have pushed the sector south have included the availability of labour, which tends to be of Mexican origin, increased light and reduced energy costs.

Mexican production has expanded aggressively out of coastal, sea-level locations into higher elevations, where temperatures are less extreme. This has entailed the greater use of technology to build facilities that provide a protected environment for vegetable production in more variable climates. At the same time, low technology, including shade cloth operations, are adopting technology to maintain their access to export markets.
2.0 Markets

Essentially, the NA GH vegetable market continues as a continental market with the U.S. as the dominant consumer market. GH production from Mexico, the U.S. and Canada compete in the Canadian and U.S. markets. Although Mexican GH vegetable consumption is increasing, it does not present an opportunity for either Canadian or U.S. greenhouse growers at this time. European production enters North America during periods when supply drops or is unavailable, as in the winter and shoulder months of crop seasons. The North American consumer expects year-round availability of high quality tomatoes, peppers and cucumbers.

The North American greenhouse industry continues to mature with steady growth in market demand. Since 2002, growth of the markets for North American-grown GH products is being created through:

• continued replacement of U.S. field grown fresh produce
• displacement of European imports
• increasing population
• production of specialty products
• increased per capita consumption of vegetables

Overall, most of the Canadian greenhouse industry participants feel that their industry has good opportunities. They agree that the markets have matured over the past few years with slow, steady market growth being experienced in both Canada and the U.S. The growth appears to be coming from both increases in fresh product consumption with current emphasis on healthier eating combined with some further movement from field to greenhouse products.

2.1 Continued displacement of field-grown varieties

2.1.1 Tomatoes

Greenhouse tomatoes account for about 37 per cent of the quantity sold of fresh tomatoes. Its main competitor, the green tomato, is now more important in the food service market than in the fresh market. The field tomato is preferred in food service because of its greater firmness and better slicing characteristics, although GH varieties with less juiciness are being developed. Even with the improved quality of field grown products through the cultivation of vine-ripe and extended shelf life varieties, GH tomatoes have continued to increase market share through the development of new varieties, colours, shapes and tastes.

A substantial portion of Florida field tomato production has shifted to Mexico and other states. While total U.S. fresh field tomato production has increased due to increasing yields, the area of fresh tomatoes has declined since 2000. The U.S. mature green tomato has experienced significant competition from other field varieties, such as the extended shelf life (ESL) vine ripe varieties, romas and specialty. All field varieties have been confronted with an expanding supply of GH tomatoes.

The pricing for tomatoes has changed over the past three years with TOV production increasing along with the specialty product while production of beefsteak declined to some extent. The result is that the beefsteak market is in equilibrium with pricing very similar to TOV pricing, sometimes

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6. Ibid.
higher and sometimes lower. Industry members feel that 2006 will produce pricing similar to 2005 although it could be slightly lower.

The Amarosa tomato is a patented product similar to campari that is licensed to selected growers, as is campari. These varieties are showing market growth along with a strawberry tomato and grape tomatoes on the vine that are proving popular. Cherry tomatoes are being forced out of the market by the new types.

2.1.2 Peppers

The quality of GH peppers exceeds that of field grown peppers and GH production provides a much wider season of availability compared to field grown. In addition, the consumer demand for high-quality red, orange and yellow bell peppers has been increasing dramatically over the past decade.

The loss of methyl bromide for use as a soil fumigant for field grown crops including peppers, is considered a market opportunity for growers of greenhouse peppers in Florida.

2.1.3 Cucumbers

The market penetration of GH cucumbers in the U.S. continues to be well below the Canadian market share. Nonetheless, that share is increasing due to the superior quality of the GH cucumber and the availability of new varieties.

The Canadian industry has conducted numerous in-store demos and has educated some U.S. consumers as to the benefits of the long English cucumber. Some of the producers believe that where the industry has fallen down is in not putting money into advertising in order to keep the long English in front of the consumers and continue the education as to their value. Long English cucumbers do not have the same exposure at retail in the U.S. as they do in Canada and retailers need to be educated as to how regular specializing can assist in moving the volumes.

2.1.4 New crops

Canadian growers are concerned about the increasing market power of Mexico in GH crops that are becoming commodities such as beefsteak and TOV tomatoes where lowest price is the main determinant of market success.

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7. Use of methyl bromide by developed countries was phased out as of January 1, 2005. The U.S. Clean Air Act and the Montreal Protocol have determined that methyl bromide damages the stratospheric ozone.

Other greenhouse crops that are starting to show up are eggplant, a product that was tried a few years ago and is coming back, along with the mini-sweet-bell peppers. Mini-cucumbers, although a small market overall, are very popular this year with demand currently outstripping supply. It appears that the trend toward mini-products continues to build in virtually all crops.

Other growers are looking for new crops and technologies that will give them competitive advantages longer than just the current year, after which new entrants will flood the market. These approaches tend to consider exclusive licensing agreements respecting patented varieties, proprietary production protocols, adoption of new technologies and grower funded research.

### 2.2 Volume of production
The total volume of GH production increased in both Ontario and B.C. between 2002 and 2005. The volume of GH tomato production in B.C. declined marginally and dropped by 18 per cent in Ontario.

The volume of pepper production in Ontario increased 22 per cent, while in B.C. volume increased by 13 per cent.

The volume of cucumber production increased in both GH vegetable growing regions: by 31 per cent in Ontario and by 62 per cent in B.C.

### 2.3 Value of production
The value of B.C. greenhouse vegetable production in 2005 was $225 million, actually lower than 2002 at $231 million by 2.6 per cent. In the same period, Ontario value of production decreased by 10 per cent from $431 million to $387 million. This situation mostly reflected significant switches in crops in both provinces. Ontario switched to peppers and B.C. switched to cucumbers.

In both regions, the value of tomato production dropped about the same percentage. However, Ontario showed increases in farm gate revenues from GH pepper production while B.C. revenues declined marginally. B.C. increased its value of GH cucumber production because of a significant increase in production area.

### 2.4 Returns per kilogram
The table below presents average annual returns per kilogram in Ontario and B.C.

Ontario growers experienced an increase in tomato revenues per kg between 2002 and 2005, while per kg revenues for B.C. growers dropped. However, B.C. returns were
Table 2: Value and volume of B.C. and Ontario GH products, 2002 to 2005

<table>
<thead>
<tr>
<th></th>
<th>Value of production (millions CDN$)</th>
<th>Volume of production (000 tonnes)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>D.C.</td>
<td>Ontario</td>
</tr>
<tr>
<td></td>
<td>Tomato</td>
<td>Pepper</td>
</tr>
<tr>
<td>2002</td>
<td>141</td>
<td>65</td>
</tr>
<tr>
<td>2003</td>
<td>164</td>
<td>64</td>
</tr>
<tr>
<td>% Change</td>
<td>-12.1%</td>
<td>-1.8%</td>
</tr>
</tbody>
</table>

Pepper returns for growers in both provinces were comparable and dropped over 10 per cent in the period.

Cucumber returns dropped about the same percentage in both regions, but B.C. returns continue to be higher than Ontario returns, probably due to the characteristics of the different markets they are sold in.

2.5 Supplying the U.S. market

Imports of GH vegetables have only been consistently monitored by the U.S. since June 2002. As such, earlier estimates of product flows included assumptions about which customs codes were GH products. More recent estimates are much more accurate, although there are still outstanding issues of whether low-tech production facilities in Mexico such as shade houses are classified as greenhouses.

The Central American Free Trade Agreement was negotiated between the U.S. and six Central American countries in 2004. This agreement has the potential to increase access of GH vegetables from several Central American countries to the U.S.

2.5.1 U.S. GH Tomato Imports

U.S. GH tomato imports have grown from about 177,000 tonnes in 2002 to 297,000 tonnes in 2005.

The imported supply of GH tomatoes to the U.S. market continues to be cyclic, with the bulk of Canadian exports arriving in the April to November period. Mexican exports peak in the December to March period, but the volume of product appearing in the spring months from April to June, has increased considerably. As technology adoption in Mexico increases, more capital is being invested and owners are extending their production to expand the use of their facilities.

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9. DR-CAFTA is a trade agreement among Costa Rica, the Dominican Republic, El Salvador, Guatemala, Honduras, Nicaragua, and the United States. As of March 2006, all but Costa Rica had implemented the agreement. See http://www.fas.usda.gov/itp/CAFTA/cafta.html
Nonetheless, the U.S. market for GH tomatoes has continued to grow. Mexican GH production is taking a growing share of the U.S. market and in 2004, surpassed Canada as the primary GH tomato supplier.

The volume of European GH tomatoes entering the U.S. market has continued to decline. This is due to a variety of factors:

- increased availability of GH production from Mexico
- improved North American quality
- higher air fuel costs from Europe

The Dominican Republic has developed a small presence in the U.S. GH tomato market, as an outcome of the implementation of the Central American Free Trade Agreement (CAFTA).

**Figure 10: Seasonal pattern of U.S. imports of GH tomatoes, 2003 to April 2006**
(Source: USITC Trade Database)
2.5.2 U.S. GH bell pepper imports

GH bell pepper imports have grown from about 58,000 tonnes in 2002 to 94,000 tonnes in 2005.

The imported supply of GH peppers to the U.S. market continues to be cyclic, with the bulk of Canadian exports arriving in April to November period. Mexican exports peak in the December to March period, but the volume of product appearing in the spring months from April to June has increased considerably. Nonetheless, the U.S. market for GH peppers has continued to grow. In 2006, Mexican exports of GH peppers to the U.S. have increased significantly over previous years, with uncertain implications for Canadian and European competitors.

The volume of European GH peppers entering the U.S. market has declined since 2002. This is due to similar factors noted for GH tomatoes in 2.4.1, above. The Netherlands is the main supplier of European product to the U.S. and competes during the Canadian growing season.

The Dominican Republic has a small presence in the U.S. GH pepper market.
2.5.3 U.S. GH cucumber imports

GH cucumber imports have grown from about 43,000 tonnes in 2002 to 44,000 tonnes in 2005. The imported supply of GH cucumbers to the U.S. market continues to be cyclic, with the bulk of Canadian exports arriving in the May to October period. Mexican exports to the U.S. peak in the November to February shoulder-season months of the Canadian export season. The U.S. market for
GH cucumbers has continued to grow slowly and Mexican exports are capturing most of that increase. Canadian exports of GH cucumbers to the U.S. declined marginally in 2005.

The volume of European GH cucumbers entering the U.S. market has remained relatively static since 2002. Israel is the main supplier of European product to the U.S. when Canadian and Mexican supply is limited.

Dominican Republic and Honduras have developed a limited presence in the U.S. GH cucumber market since 2002.

Figure 14: Seasonal pattern of U.S. imports of GH cucumbers, 2003 to April 2006 (Source: USITC Trade Database)

Figure 15: U.S. imports of GH cucumbers, 2003 to 2005 (Source: USITC Trade Database)
2.6 Supplying the Canadian market

2.6.1 Canadian GH tomato imports

Canada is facing increasing competition in its domestic markets for GH vegetables. Mexico has developed a major presence in the Canadian GH tomato market. Since 2003, this presence has increased in volume as well as the length of season in which Mexican products are available.

U.S. exports to Canada have remained relatively static in the 2003 to 2005 period and a proportion consists of product from the Oxnard operation in California that is allied with B.C. Hot House Foods Inc.

Spain has the largest presence in the Canadian GH tomato market in the winter season. The Netherlands no longer has a significant position in the in-season Canadian GH tomato market. In 2005, GH tomato imports from Europe and Israel were at the lowest levels in the 2003-2005 period.

Figure 16: Seasonal pattern of CDN imports of GH tomatoes, 2003 to April 2006 (Statistics Canada, International Trade Statistics)
2.6.2 Canadian GH bell pepper imports

Canadian imports of GH peppers from Mexico increased rapidly since 2002.

European GH peppers still dominate Canadian imports. The Netherlands is a significant exporter to Canada during Canadian peak production. Spanish production enters in the winter season.

U.S. exports to Canada are losing ground to imports from other locations. A small quantity of Central American GH tomato production is starting to appear in Canada in the winter season.
2.6.3 Canadian GH cucumber imports

Canadian imports of GH cucumbers from Mexico dominate imports, but the amounts imported are small relative to the Canadian market and remain strictly a winter season product.

European GH cucumbers still dominate Canadian imports. The Netherlands is a significant exporter to Canada during Canadian peak production. Spanish production enters in the winter season. Small quantities of U.S. and Spanish GH cucumber production enter Canada in the winter season.

Figure 20: Seasonal pattern of CDN imports of GH cucumbers, 2003 to April 2006
(Statistics Canada, International Trade Statistics)
2.7 Per capita vegetable consumption

Per capita fresh vegetable consumption has levelled off in the last four years in both the U.S. and Canada. In Canada, consumption of fresh tomatoes may have declined since 2002. Cucumber and pepper consumption has shown only the most modest of increases.

While U.S. consumption of fresh tomatoes exceeds Canadian per capita consumption, U.S. consumption of fresh cucumbers and peppers continues to lag behind Canadian per capita consumption.

A recent report\(^\text{10}\) on Canadian consumer trends to 2020 suggests that fresh vegetable consumption in Canada will increase 3 per cent over the next 15 years. This would suggest that opportunities for GH market share expansion in Canada will be highly dependent on displacement of field grown production and imports and natural increase in population.

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Table 3: Per capita consumption of selected fresh vegetables, Canada and the U.S., 2002 to 2006

<table>
<thead>
<tr>
<th></th>
<th>Cucumber</th>
<th>USA Pepper</th>
<th>Tomato</th>
<th>Canada Cucumber</th>
<th>Pepper</th>
<th>Tomato</th>
</tr>
</thead>
<tbody>
<tr>
<td>2002</td>
<td>2.9</td>
<td>3.1</td>
<td>9.2</td>
<td>3.35</td>
<td>3.38</td>
<td>8.26</td>
</tr>
<tr>
<td>2003</td>
<td>2.8</td>
<td>3.1</td>
<td>8.8</td>
<td>3.15</td>
<td>3.36</td>
<td>7.45</td>
</tr>
<tr>
<td>2004</td>
<td>2.9</td>
<td>3.2</td>
<td>9.1</td>
<td>3.41</td>
<td>3.44</td>
<td>7.37</td>
</tr>
<tr>
<td>2005p</td>
<td>2.9</td>
<td>3.0</td>
<td>9.3</td>
<td>3.1</td>
<td>n/a</td>
<td>n/a</td>
</tr>
<tr>
<td>2005f</td>
<td>2.9</td>
<td>3.1</td>
<td>9.2</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
</tr>
</tbody>
</table>


2.8 GH products market share

Based on retail sales information, GH vegetable consumption continues to steadily increase, but at different rates in Canada and the U.S. GH products hold larger shares of the vegetable markets in Canada in all categories, raising the ever-present question of “Why?” in light of the culinary similarities between the two countries.

GH beefsteak tomatoes retain a significantly large share of the retail market in Canada, while in the U.S. market share was low to start with and has been slowly declining. In contrast, TOV large tomato market share is substantial in both countries. It should be noted that specialty GH tomatoes which are not indicated also contribute to overall GH tomato market share.

While GH bell peppers hold almost twice the market share in Canada as compared to the U.S., GH market share has grown faster in Canada than the U.S.

GH cucumber retail market share in Canada is the highest among all categories at 61 per cent of retail sales. In contrast, GH cucumber market share in the U.S. has increased to a modest 11 per cent, indicating potential for significant growth with effective marketing.

The fresh market is about evenly split between the retail and food service markets. While GH tomatoes have made significant inroads into the fresh retail market\(^1\), the food service market remains almost completely dominated by mature green field tomatoes. There continues to be more opportunity for GH peppers and cucumbers in the food service markets.

The maturing North American GH tomato market may be a good indicator of how the markets for other GH products will evolve. The North American GH tomato industry may be characterized in terms of three factors\(^2\):

- seasonality
- product differentiation
- rapid growth in production and decline in prices

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Ability to provide year round supply continues to be a significant factor in accessing retailers and growing market share. This is one of the key strengths of the U.S. GH industry. Canadian and Mexican suppliers must establish alliances to accomplish this goal.

Ability to differentiate products for the fresh tomato market is fuelling growth. Product differentiation consists of shape, size, colour, degree of ripeness and variety. These attributes are enhanced by capability to address consistency, food safety and pesticide-free concerns.

Mainstream GH tomatoes have become commoditized products in that competitive position is now primarily determined by price. This means that only the most efficient growers are likely to survive. Specialty product growers will command higher prices until competitors follow into the marketplace.

While GH tomato value has continued to grow, there is indication that its share is declining as overall growth in value was lower than for field tomatoes. This is what would be expected in a market that is maturing and needs “...continuing product innovation to maintain consumer excitement and consumer support”.

### Table 4: Retail market share of GH vegetables, Canada and the U.S., 2003 to 2005

<table>
<thead>
<tr>
<th>Canadian retail sales of GH vegetables</th>
<th>Quarter and Year</th>
<th>2003</th>
<th>2004</th>
<th>2005</th>
<th>2006</th>
<th>2007</th>
</tr>
</thead>
<tbody>
<tr>
<td>All GH Tomatoes</td>
<td>Q1</td>
<td>36%</td>
<td>45%</td>
<td>46%</td>
<td>47%</td>
<td>46%</td>
</tr>
<tr>
<td></td>
<td>Q2</td>
<td>29%</td>
<td>33%</td>
<td>32%</td>
<td>31%</td>
<td>29%</td>
</tr>
<tr>
<td></td>
<td>Q3</td>
<td>9%</td>
<td>11%</td>
<td>13%</td>
<td>15%</td>
<td>17%</td>
</tr>
<tr>
<td></td>
<td>Q4</td>
<td>20%</td>
<td>23%</td>
<td>22%</td>
<td>24%</td>
<td>23%</td>
</tr>
<tr>
<td>TCV Large</td>
<td>Q1</td>
<td>55%</td>
<td>55%</td>
<td>50%</td>
<td>53%</td>
<td>54%</td>
</tr>
<tr>
<td></td>
<td>Q2</td>
<td>52%</td>
<td>50%</td>
<td>50%</td>
<td>51%</td>
<td>52%</td>
</tr>
<tr>
<td></td>
<td>Q3</td>
<td>57%</td>
<td>55%</td>
<td>53%</td>
<td>54%</td>
<td>56%</td>
</tr>
<tr>
<td></td>
<td>Q4</td>
<td>59%</td>
<td>57%</td>
<td>59%</td>
<td>59%</td>
<td>61%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>US retail sales of GH vegetables</th>
<th>Quarter and Year</th>
<th>2003</th>
<th>2004</th>
<th>2005</th>
<th>2006</th>
<th>2007</th>
</tr>
</thead>
<tbody>
<tr>
<td>All GH Tomatoes</td>
<td>Q1</td>
<td>32%</td>
<td>34%</td>
<td>33%</td>
<td>35%</td>
<td>36%</td>
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<tr>
<td></td>
<td>Q2</td>
<td>12%</td>
<td>12%</td>
<td>11%</td>
<td>11%</td>
<td>10%</td>
</tr>
<tr>
<td></td>
<td>Q3</td>
<td>20%</td>
<td>21%</td>
<td>22%</td>
<td>22%</td>
<td>23%</td>
</tr>
<tr>
<td></td>
<td>Q4</td>
<td>12%</td>
<td>15%</td>
<td>14%</td>
<td>13%</td>
<td>14%</td>
</tr>
<tr>
<td>TCV Large</td>
<td>Q1</td>
<td>7%</td>
<td>8%</td>
<td>6%</td>
<td>6%</td>
<td>8%</td>
</tr>
<tr>
<td></td>
<td>Q2</td>
<td>7%</td>
<td>8%</td>
<td>6%</td>
<td>8%</td>
<td>9%</td>
</tr>
</tbody>
</table>

Source: ACNeilson & Perishables Group Market Data. Compiled by A. Solymosi, BCVMC.

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3.0 Canadian GH vegetable values

GH vegetable pricing is essentially continental, responsive to North American supply with differentials attributable to location and access. As such, average annual BCVMC prices are presented below as proxies for price behaviour over the last six years.

In B.C., weighted average monthly FOB pricing is calculated by the BCVMC from information submitted by B.C. marketing agencies. In Ontario, there are no FOB prices for domestic GH vegetables available.

In response to very low GH vegetable prices in July of 2004, the BCVMC instituted a minimum price order for tomatoes in August 2004. The purpose was multifold: a) to protect returns to growers, b) to prevent disruptive competition in the marketplace and c) to eliminate the chance that product would be sold below its cost of production in the U.S., creating the basis for new trade action. In Ontario, the Ontario Greenhouse Vegetable Growers (OGVG) began generating weekly benchmark prices in mid-2005 to assist smaller growers trying to determine the value of their production. However, the OGVG does not set minimum prices.

In general, it appears that Ontario grower prices have been subject to more pressure than B.C. grower prices. This observation may indicate increased competition. More aggressive marketing or some other factor was beyond the scope of this report to investigate.

Table 5: Average monthly FOB pricing, B.C., 2000 to 2005

<table>
<thead>
<tr>
<th>Year</th>
<th>Beefsteak Tons</th>
<th>BC Acres</th>
<th>TOV Tons</th>
<th>BC Acres</th>
<th>All Tomatoes</th>
<th>BC Acres</th>
<th>Peppers</th>
<th>BC Acres</th>
<th>Cucumbers</th>
<th>BC Acres</th>
</tr>
</thead>
<tbody>
<tr>
<td>2000</td>
<td>$1.67</td>
<td>122</td>
<td>$2.26</td>
<td>113</td>
<td>$2.05</td>
<td>235</td>
<td>$3.03</td>
<td>194</td>
<td>$1.60</td>
<td>59</td>
</tr>
<tr>
<td>2001</td>
<td>$1.66</td>
<td>142</td>
<td>$2.16</td>
<td>110</td>
<td>$1.87</td>
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</table>

Source: Solynosi, A., 2006. BCVMC

3.1 Canadian GH tomato value

B.C. GH beefsteak tomatoes have declined in area and marginally in price in the period. Ontario beefsteak prices, basis Chicago Terminal in U.S. dollars, show a similar but more pronounced decline in prices in the period. Prices in 2006 are the lowest since 2002.
Figure 22: Beefsteak GH tomato production area and FOB prices, B.C., 2000 to 2006
(Source: B.C. Vegetable Marketing Commission)

Figure 23: Monthly average GH beefsteak tomato prices, FOB, B.C., 2004-2005
(Source: BC Vegetable Marketing Commission)
B.C. TOV large tomatoes have retained their value as area of production has risen. Prices have risen from lows in 2004.

Figure 25: TOV GH tomato production area and FOB prices, B.C., 2000 to 2006
(Source: B.C. Vegetable Marketing Commission)
Ontario TOV prices, basis Chicago terminal, indicate similar price recovery in 2005. However, in 2006, prices have returned to 2004 levels.
3.2 Canadian GH bell pepper value

While B.C. GH bell peppers have undergone a significant increase in production area, average price has declined modestly over the period. Nevertheless, average prices in 2005 were lower in every month in comparison to 2004.

Ontario GH red bell peppers, basis Chicago terminal, also exhibited severe price declines from 2004. In the first part of 2006, prices are much improved.

Higher priced European GH peppers are imported into Canada, particularly in the spring and early summer of the Canadian growing season. Lower priced Mexican imports are also targeting the winter and spring seasons, in competition with European products.

Figure 28: GH bell pepper production area and FOB prices, B.C., 2000 to 2006
(Source: B.C. Vegetable Marketing Commission)
Figure 29: Monthly average GH bell pepper prices, FOB, B.C., 2004-2005
(Source: B.C. Vegetable Marketing Commission)

Figure 30: Monthly average Ontario GH red bell pepper prices, Chicago Terminal, 2003 to 2006
(Source: USDA Agricultural Marketing Service, Market News Service Reports)
3.3 Canadian GH cucumber value

Average monthly cucumber prices to growers have trended downwards since 2001, at the same time as Canadian production has increased significantly. In addition, more Mexican product is present in Canadian markets. The price trend is also reflected in the customs value of imports. However, the volume of imported GH cucumbers is small, relative to the total Canadian market.
Ontario grower returns for GH cucumbers are lower in relation to Canadian imports and have been dropping throughout the period, particularly during the summer when production peaks. The current information does not explain why the Ontario grower-shipper series is so much lower than imports, but it may be attributable to difficulty for some shippers to price their products in the marketplace. In 2006, however, Chicago terminal prices have been significantly improved over previous years.

Figure 34: CDN imports of GH cucumbers – average monthly customs value, 2003 to April 2006 (Statistics Canada, International Trade Statistics)
Figure 35: Monthly average GH cucumber prices, FOB, B.C., 2004-2005
(Source: B.C. Vegetable Marketing Commission)

![Monthly Average GH Cucumber Prices, FOB, BC, 2004 to 2005](image)

Figure 36: Ontario shipper price of cucumbers in relation to Canadian import values, 2003 to 2005 (Source: Confidential)

![Ontario Shipper Price of Cucumbers, 2003 to 2006](image)
4.0 U.S. GH vegetable values

U.S. GH vegetable pricing has been derived from the USITC database, which contains the landed value of GH vegetables from various countries. There are still some problems in identifying GH products in the database but significant improvements have been made since 2002.

4.1 U.S. GH tomato value

In the period, GH tomato prices have shown typical seasonality with highest prices occurring in the northern hemisphere winter. Netherlands imports continue to command a premium in the market. Average monthly customs value of Canadian GH tomato product has retained its level in the period. Mexican product is valued most cheaply and is discounted to Canadian production.

Canadian prices have lost most of their differential as a result of the more favourable Canadian exchange rate in relation to American currency.
4.2 U.S. GH bell pepper value

In-season Canadian GH bell peppers values were comparable to those of the Netherlands in customs value. Mexican GH peppers are valued at point of entry considerably below Canadian product, especially on the April to July. Pepper values are cyclical but do not indicate erosion of price between 2002 and 2005.
4.3 U.S. GH cucumber value

Imported cucumber customs value fluctuates considerably through the year. Canadian values in the winter are strongest, while mid-summer values are weakest. Canadian cucumbers have a clear quality advantage and command the highest prices throughout the year.
5.0 Competitive factors

The major change in the market over the past three years has been the reduction in seasonality. If not for the cost of energy, virtually all Canadian producers would be producing year round. As it is, Canadian cucumber producers are in the market over 11 months of the year and tomato production is extending at both ends of the season. Mexico is also producing much further into the summer as facilities come into operation that are located in areas where it is possible to produce into the northern hemisphere shoulder seasons. As a consequence, early season and late season price premiums are shrinking and are less able to financially bail out less efficient main season operations. Net returns to the Canadian grower have levelled out considerably over the past three years with most growers continuing to be profitable, but some of the less efficient starting to fall by the wayside.

The biggest challenge for the industry today is increased and rising energy costs.

A bright side to the energy situation is that these rising energy costs also increase the cost of transportation of product to retail markets. Canadian, primarily Ontario, production is much closer to the large U.S. markets than Mexico or Europe so there is some comparative cost benefit there.

5.1 Industry developments

5.1.1. British Columbia

The B.C. sector has changed significantly since 2002. Although the BCVMC continues to regulate quota transfers and quota expansion in the province, the number of agencies has grown from one (B.C. Hot House Foods Inc. [BCHHFI]) to four in 2006 (BCHHFI, Global Greenhouse Produce, Gourmet Greenhouse Foods and Country Fresh Produce).

The Farm Industry Review Board has been active in the sector in its supervisory role for various reasons including:

• litigation associated with the administration of the Commission, including dispute over the allocation of levies charged to growers to pay for legal costs related to the anti-dumping action of the U.S.
• claims of excessive administration charges
• challenges to Commission authority
• dissatisfaction with decisions relating to expansion and new crops
• denial of agency status to new applicants
In September 2005, the BCVMC initiated a review of the regulatory structure of the greenhouse industry. In May 2006, the FIRB issued a directive for the Commission to amend its general orders by focusing on the following changes:

- lift the moratorium on new agency applications
- examine more streamlined and business-supportive processes for approving agency applications
- re-classify producers currently exempt from shipping through an agency as producer-shippers
- provide greater freedom for producers to move between agencies based on commercial contract obligations
- retain the authority to direct product but only use these powers in exceptional circumstances
- provide that crop changes within a commodity such as tomatoes only require reporting not Commission approval
- retain the requirement to obtain Commission approval to change between commodities, such as tomatoes and cucumbers, but remove time constraints and establish effective criteria to assess applications
- remove timing restrictions and change the criteria for issuing new or additional production allocations or quota to the ability to demonstrate a business plan
- remove the requirement for agency sponsorship of crop mix changes and new production area.

By January 2007, the BCVMC must complete any additional measures that would make its operation more market responsive.

5.1.2 Ontario

In 2003, the Ontario Greenhouse Vegetable Growers commissioned a study to evaluate the position of the Ontario GH vegetable sector and to make recommendations on how to improve its competitiveness. The study was in direct response to turmoil in the aftermath of the anti-dumping trade action and the rapid development of Mexico as a major presence in the continental marketplace. The report recommends several strategies:

- develop capacity to provide 12 month supply, through technologies, alliances or joint ventures
- develop new greenhouse products
- reduce rivalry between shippers
- utilize the potential market power available to Ontario industry
- develop a more complete industry cluster in Ontario
- minimize the threat of future trade action
- position Ontario product relative to Mexican production

In 2003, the Ontario Greenhouse Alliance (TOGA) was formed between GH vegetable, pepper and flower growers in an effort to integrate greenhouse stakeholders into a community and international marketplace cluster to be a world leader in greenhouse operations. The new alliance will focus on barriers to greenhouse growth, new skills training opportunities and a best practices program to monitor enhanced standards of excellence for greenhouse products.

Released in June 2006, the first major order of business has been to produce a report on the economic contribution of the greenhouse industry to the economy of Ontario.

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14. See letter from Mr. Leroux, Chair of the BCVMC to Mr. Bullock, BC Farm Industry Review Board, May 06, 2006.
16. See www.theontariogreenhousealliance.com
5.1.3 Alberta

The Alberta government has engaged a consultant to explore the business opportunity for a large scale vegetable greenhouse in the province. Alberta currently has about 92 acres in GH vegetable production. If a large-scale greenhouse is indicated to have competitive advantages in Alberta, there is the likelihood that investors will be encouraged to locate in the province.

5.2 Continuing changes in marketing

Forward contracting and pricing for greenhouse products continues to grow with a number of chain stores joining Costco and Wal-Mart in using this method. Although most distributors will price this way if necessary, many prefer the old method of spot pricing, moving with the daily supply and demand. This is also true for many of the chain stores that feel they can get price deals buying this way. When forward contracting and pricing are employed, the retails are looking for the absolute top quality for the price.

5.2.1 Alliances

Strategic alliances among major shippers and distributors were developing in 2002. In 2006, many of these alliances have continued, others have formed and others have collapsed. It is a characteristic of strategic alliances that they often outlast their usefulness or end up with one partner taking over the other.

Various producers and handlers of greenhouse products have developed international marketing alliances with large distributors and wholesalers to improve access to consolidated retailers and secure a 12 month supply to retain their customers.

- Hot House Growers Income Fund accounts for 35 per cent of B.C’s product volume. In June 2006, Village Farms (Agro-Power Development Inc.-APDI) entered into a non-binding term sheet agreement with Hot House Growers Income (HHGI) Fund to acquire a majority interest in the fund, that will create a production and marketing unit with 10 production centres located in B.C., Texas and Pennsylvania. The fund and APDI have also entered into a marketing agreement under which Village Farms will market the greenhouse vegetables produced by HHGI following expiration of its 2006 arrangement with B.C. Hot House Foods Inc. Village Farms also has exclusive marketing arrangements with greenhouse producers in Mexico, under its Village Farms® and Home Choice® brand names, primarily to retail supermarkets and dedicated fresh food distribution companies. Village Farms distributes throughout the U.S., Canada and Mexico, and operates five distribution centres located across the U.S.

- Global Greenhouse Produce Inc. has licensed a proprietary variety of tomato from Enza Zaden B.V., one of Holland’s largest vegetable seed producers and is marketing the product through Dole Food Company.

- In 2004, B.C. Hot House Food Inc. formed a marketing alliance with a major Nogales, Arizona greenhouse grower-shipper, whose produce accounts for over 15 per cent of BCHHFI’s business.

- Mastronardi Produce Ltd., with distribution facilities in the U.S. and joint ventures tried in Mexico, Quebec operations with ventures in Mexico, to secure 12 month supply.

- Mastronardi Produce Inc. and BCHHFI have rights to produce the proprietary variety, Campari tomato.
• Silver Brands Partners and Swander Pace Capital have investments in Market Fare, Desert Glory, Nonni’s Biscuits and Orval Kent Food Co. Inc., offering fresh and frozen hand-held convenience prepared foods.

• South Alder Greenhouses, Delta, B.C. grows the O-Sardinia cocktail tomato, O-tomato, O-pepper and O-cucumber Japanese style midi under certified organic protocols. In 2005, they started marketing its product through Oppenheimer Group, an international food marketer. South Alder uses a proprietary organic fertilizer and microbial and nutrient enhanced soil media. The theory related to the O-Sardinia variety is that reproducing the soil nutrient conditions of Sardinia will re-create the taste of the tomato in that country. In addition, agricultural waste is processed on site and 100 per cent compostable Earthcycle Packaging back the company’s claim that it is environmentally friendly and sustainable.

• Grupo Batiz, with 115 hectares of greenhouses in production, had a joint marketing agreement with the failed Colorado Greenhouses in the late 1990s and is now one of the few Mexican greenhouse producers that market its product in the U.S. through its own company, Wilson Batiz.

5.2.2 Consolidations

Retail consolidations and mega-trends continue. Most notably:

• In January 2006, Supervalu, the third-largest food retailing company in the United States, CVS/pharmacy and an investment group led by Cerberus Capital Management announced they had agreed to acquire Albertsons for $17.4 billion in cash, stock and debt assumption.

• Wal-Mart is now the largest grocery chain in the U.S., with 14 percent of all grocery sales, nearly twice the sales of Kroger. Wal-Mart sells $95 billion to Kroger’s $51 billion.

• In September 2005, Wal-Mart acquired 33.3 per cent of the Central American Retail Holding Company (CARHCO) and in March 2006, increased its holdings to 51 per cent. Wal-Mart Central America was formed from the 375 supermarkets and other store formats, operating in five Central American countries: Guatemala, El Salvador, Honduras, Nicaragua and Costa Rica.

• In 2004, Wal-Mart de Mexico reported sales of $139.8 billion pesos (U.S. $12.5 billion), a 15.8 per cent increase over the previous year. Comparable stores sales registered an increase of 8.7 per cent. In 2005, Wal-Mart de Mexico will open 70 units with an expected investment of U.S. $736 million.

• As of April 2006, Costco has 473 locations: 346 in the United States and Puerto Rico, 68 in Canada, 28 in Mexico, 17 in the United Kingdom, five in South Korea, five in Japan, and four in Taiwan.

17. Some information from Wikipedia http://en.wikipedia.org/wiki/Main_Page
• Safeway Inc., a Fortune 500 company, is North America’s third largest supermarket chain with over 1,800 stores located throughout the central and western United States and Canada. It also operates some stores in the mid-Atlantic region of the eastern seaboard. On April 18, 2005, Safeway began a $100 million brand re-positioning campaign labeled Ingredients for Life. This was done in an attempt to differentiate itself from its competitors and to increase brand involvement.

5.2.3 Changing purchasing policies
In February 2006, McDonald’s decided not to purchase tomatoes from suppliers that do not pay their growers directly, following the lead of Socially Accountable Farm Employers (SAFE), a group in Florida.

5.3 Labour Issues

5.3.1 Mexico
Despite the size of labour market in Mexico, recruitment of workers for technological greenhouses is not easy, as the range of skills needed to carry out functions must be taught. As such, the Mexican industry as a whole is characterized by significant variation in production protocols and management with implications for GH vegetable standards, food safety and quality. For example, Mexican greenhouse produce is routinely stopped at the U.S. border for the presence of pesticide residues.

The demand for Mexican GH agricultural labour is generated, not only by Mexican GH operations, but also American and Canadian foreign seasonal worker programs. U.S. and Canadian minimum wage rates are enticing. For example, an unskilled Mexican can earn one year’s Mexican salary in Canada in three months.

5.3.2 U.S.
As an outcome of homeland security issues and desire to control illegal immigration, the U.S. is considering fencing the entire 2,000-mile U.S.-Mexico border and stationing border guards to prevent illegal entry. The impact of immigration developments on future labour supply for American greenhouse businesses is uncertain. About 15 per cent of Mexico’s total labour force works in the U.S., and Mexicans make up almost four per cent of the total U.S. labour force and about 30 per cent of America’s agricultural labour force. Much of the labour requirement of American agriculture has been based on access to immigrant labour for at least the last 50 years.

The U.S. H-2A program is a guest worker program that allows agricultural employers to import foreign workers on a temporary basis when labour shortage can be demonstrated. This program has become more popular in recent years as illegal immigrants, who used to

work on farms, are now taking non-agricultural jobs. As a result, the supply of domestic migrant agricultural labour has been tightening up.

Most temporary agricultural workers to the U.S. now come from Mexico. In fiscal year 2005, requests were made for over 50,000 workers under the program, of which 98 per cent were approved. Although it is not known what portion of the temporary labour force may be used in the greenhouse sector, clearly U.S. agriculture is a significant competitor for foreign agricultural workers in the North American unskilled labour pool.

5.3.3 Canada

Provincial greenhouse associations have ongoing initiatives to maintain and develop relationships with various government departments and agencies to further initiatives in the secondary schools, colleges and universities to maintain a continuous supply of quality personnel for the industry. More problematic has been the recruitment of low and unskilled labourers in the sector.

Ontario

In 2005, the Ontario vegetable greenhouse operators employed almost 3,000 foreign seasonal workers, an increase of 25 per cent over 2004. The vegetable greenhouse sector accounted for about 19.4 per cent of all migrant workers brought to Ontario in 2005 and 73 per cent of the operators utilize foreign seasonal labour. The minimum wage has been set at $8.30 per hour in 2006.

British Columbia

Traditionally, agricultural labourers have been obtained from recent immigrants, notably the Indo-Canadian community, but this supply has been steadily dwindling in B.C. In 2004, B.C. introduced the Mexican Seasonal Agricultural Worker Program (SWAP) in coordination with the Mexican government and HRSDC. SWAP functions in a way similar to the Mexican component of the program in Ontario except that B.C. has not established a central agency to manage the program.

The 2004 program was a pilot. In 2005, the industry attempted to establish an agency similar to Foreign Agricultural Resource Management Services (FARMS) in Ontario, but implementation problems have been experienced as operators in various sectors have pursued their labour needs directly with the Mexican Consulate. Demand for Mexican seasonal workers has increased rapidly in all agricultural sectors, including vegetable greenhouse operations and there is an expectation that in due course, B.C. will have its own FARMS-type organization to administer its foreign labour needs. The absence of a central agency structure has contributed to some disparity in living and working conditions for workers. The B.C. agriculture industry is hopeful that an agreement will be negotiated that would allow seasonal agricultural workers into the province from places such as India and the Caribbean, as occurs in Ontario. There is growing concern that:

- it may be unwise to source all workers from one country, such as Mexico, as it can lead to over-dependence
- the supply of the type of workers needed from Mexico is depleting
- workers available elsewhere may not speak English which has human resource management implications that could potentially be solved by hiring multilingual managers or team leads

Alberta

Alberta is experiencing a shortage of unskilled labourers, where there is neither a supply of recent immigrants nor an adequate population of local labour. Foreign guest workers have been recruited from

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21. The Ontario program is managed by the agricultural industry under the sanction of Human Resources and Skill Development Canada (HRSDC) by an agency called Foreign Agricultural Resource Management Services (FARMS).
various countries such as Mexico and Thailand, in small numbers for farming labour, including greenhouses. B.C. is interested in providing recruitment and travel services to western Canadian provinces once their program is up and running. A regional "FARMS-type" organization would be anticipated to reduce per-employee costs to growers.

5.4 Energy issues
Elevated natural gas costs have driven Canadian growers to seek lower cost energy alternatives in order to maintain their competitiveness in the continental market. U.S. growers have expanded in the southern U.S. to take advantage of a warmer climate, more intense sunshine and less intense heat (at higher elevations). Mexican growers are expanding into higher elevation locations that have advantages in terms of more moderate heat, but with an increased need for temperature supplementation.

Alternatives to natural gas for energy include coal, wood pellets, wood waste, wind power, solar and geothermal energy. However, the concomitant need for CO₂ in vegetable greenhouses means that another source of CO₂ must be provided, unless natural gas boilers are retained. For existing facilities this is feasible, but for new operations, liquid CO₂, CO₂ generators or the adoption of technology to extract CO₂ from exhaust gases is necessary.

A typical greenhouse in B.C. uses about 18,500 and 22,500 GJ per hectare per year for heat and CO₂, depending on crop and need for CO₂. Natural gas combustion for CO₂ can exceed 40 per cent of total use in B.C. In Ontario, with a harsher climate, a typical greenhouse would be expected to use more, although poly greenhouse structures are more effective at retaining heat. A direct comparison is complicated since the yield and length of growing season need to be taken into account to determine a useful energy cost parameter, such as energy cost per kilogram.

5.4.1 Coal pricing
The price of thermal coal is set at the world market. After a long decline in prices, the prices have been increasing rapidly since 2003. This increase is mainly due to the high demand in Asia. The Japan-Australia Thermal Coal prices reflect the increase.

Figure 42: Japan – Australia contract thermal coal price trends

22. A gigajoule of natural gas is about 25.5 cubic metres at standard conditions. One gigajoule of natural gas is equal to 27 litres of fuel oil, 39 litres of propane and 26 litres of gasoline or 277 kilowatt hours of electricity.
The 2006 export values for Australia have risen by 14 per cent and the values for 2007 are expected to rise by 8.3 per cent. Canadian suppliers have followed this trend. The 2006 price for thermal coal rose to US$52.50/tonne. Current prices appear to have stabilized somewhat due to higher supply.

Burning coal does not generate usable CO2 needed for a greenhouse vegetable operation. In 2006, the unit price of coal delivered to greenhouses in the Fraser Valley of B.C. is about CDN$3.50/GJ.

### 5.4.2 Natural gas pricing

Natural gas is the fuel of choice for the greenhouse industry. It has low pollution potential and natural gas can be burned to generate CO2 for crop requirements. Natural gas prices have come down recently from a high of around US$14 and are currently below US$6. Natural gas prices had been rising from an average level of $2 pre-2000 to around $8 in mid-2005, then spiked to $14 in the winter of 2005. While the latest price trend is still declining, the futures market indicates higher prices during the winter time with futures of around $10 for December 2006 and January 2007 contracts. Future summer deliveries are priced around $8.50. The long term outlook for summer deliveries trends downwards to $6.60 in 2011. Although natural gas is traded North America wide, there may be some differences in prices between the Sumas Hub and the Henry Hub quoted below. These prices are commodity prices only and do not include a delivery charge of $1.50/GJ. The total cost is approximately CDN$8.50/GJ delivered.

Figure 43: Weekly natural gas prices in 2005 and 2006

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23. Fording Coal prices have risen from US$55 per ton in 2004 to US$107 per ton in 2006. www.fording.ca/data/2/2/rec_docs/2505_2006/GMFINAL.pdf
5.4.3 Wood pellets pricing

Wood pellets can be used to heat greenhouses. However, burning wood pellets does not presently generate CO₂ for use in greenhouses and this is a critical consideration if a new facility is being constructed. In 2006, a test will be conducted in B.C. to test whether the recovery of CO₂ from wood pellets flue gases is feasible. Flue gases of both fuels contain CO₂, but wood pellet flue gas also contains other harmful gases.

Wood pellets are derived from waste wood in the form of fine sawdust and shaving from mills. As B.C. has an increased harvesting program for pine beetle infected wood, there will be a large supply of raw materials lasting for at least 15 years, if not longer. Several saw mills dedicated to processing pine beetle wood have been constructed in the two years²⁹.

The supply of wood pellets is market driven. With an improvement in prices and an ample supply, the investment climate is positive to allow construction of new pellet mills. It is expected that new pellet mills will be operational in early 2007. The main market for wood pellets is in Europe, with an apparent deficit of one million tonnes of pellets. The eastern seaboard of the U.S. also appears to have a deficit of 250,000 tonnes. Prices FOB Vancouver are $140/tonne and prices in Rotterdam are $180–$200/tonne over the last two years.

Currently approximately 15,000 tonnes of wood pellets are sold to greenhouses in B.C. Virtually no sales take place in Alberta or Ontario. The delivered price in B.C. is the equivalent of $7.50/GJ, the delivered price in Alberta is $7/GJ and in Ontario, $8.50/GJ.

5.4.4 Wood waste pricing

Wood waste, consisting of hogged bark and hogged white wood, is currently used as a fuel in the greenhouse industry in B.C. Wood waste has a low caloric value compared to coal and wood pellets, due to its moisture content. The use of wood waste as a fuel requires sophisticated burning technology and a large wood waste storage facility.

Only limited quantities of fuel quality wood waste or hog fuel, is available in the Lower Mainland and Alberta. In the agricultural areas, good quality wood waste is used in the horse sector called shavings, the berry sector and greenhouses as growing medium such as sawdust and the pulp and paper industry which uses chips. Cedar hog fuel and log yard debris is still available.

Low quality wood waste is provided within the Lower Mainland for trucking costs, the equivalent of $20 per unit (200 cubic feet), likely on the basis of a two-hour round trip. Better quality materials are sold for $30–$40 per unit. It is expected that the prices will increase by 10 per cent this year due to low availability, high transportation costs and high demand for fuel.

Ample supply of wood waste may be available in Northern B.C. and Northern Alberta. Conversion of power boilers to biofuels in many parts of B.C. has put a strain on the wood waste supply. The closure of many sawmills in Northern Ontario during the last five years has greatly diminished the supply of wood waste in the area. Currently, demand for biofuels of all kinds outstrips the supply. Other opportunities are being developed which will attract wood waste, such as the ethanol plants near Hearst, Ontario, competing with the use of wood waste as boiler fuel.

5.4.5 Alternative energy programs

Ontario recently created a new alternative energy policy offering incentives to permit independents to produce green energy. This is the first jurisdiction in Canada to allow the sale of alternative power to the grid, from wind, photovoltaic, biomass and small run-of-the-river hydro. The following conditions apply:

- Ontario’s Standard Offer program will offer $0.11/kWh (kilowatt-hour) to producers of wind, biomass and small hydro energy.
- It will offer $0.42/kWh for solar photovoltaic energy.
- The term of the contracts will be 20 years, and there will be an inflation adjustment.

The residential retail price for electricity in Ontario is under $0.06/kWh.

There is no limit to the number of projects that may apply for a contract, but the size of each project is capped at 10 MW. The contracts are available to anyone, including homeowners, businesses and commercial energy producers. The electricity produced would be fed into the electricity grid. The contracts are expected to be available by June 2006.

This would allow Ontario greenhouse operators to install biomass boilers as co-gen facilities, generating electricity for the grid while using all waste heat in the greenhouse as a source of heat. It would also allow the installation of natural gas fired CHP units.

B.C. allows sale of power to the grid in minimum quantities of one MW. Such sales must compete on a tender and will be allowed for the lowest price. Power sales to the B.C. grid are approximately $0.065/kWh. The 2006 call for projects yielded 53 different projects, the majority being hydro-based, four biomass projects based on wood waste, and three wind power with a total of 1,600 MW capacity.

Alberta buys electricity from independent power producers. In 2007, approximately 4,000 MW will come on stream. The 2005 pool price was $0.054/kWh.

5.4.6 Energy summary

Currently, natural gas prices are at a short-term low, well-head price of US$6/mmbtu[^34] not including delivery costs. Wood pellets price is stabilized at around CDN$7.50/GJ delivered. Coal has increased in price significantly due to strong Asian demand and wood waste and hog fuel is becoming scarce as large co-generation facilities are being built in B.C. and Alberta. It appears that in the near future, natural gas and pellets could be the fuels of choice. Natural gas would deliver CO\textsubscript{2} from flue gases, a process not yet tested for wood pellets. Should the generation of CO\textsubscript{2} from wood pellet flue gases be feasible, wood pellets would be more competitive than natural gas at current gas prices.

In B.C., several greenhouse operations have converted to wood-fired systems, even with the more restrictive air emission standards in the Greater Vancouver Regional District.

The new alternative energy regulations in Ontario could encourage Ontario greenhouse growers to install biomass and natural gas power plants, generating electricity for sale to the grid. Generation of electricity from biomass would yield a revenue of $0.11/kWh for electricity sent to the grid. This could benefit the greenhouse growers. In either instance, the greenhouse would use the waste heat from the power generation for space heating.

5.5 Impact of exchange rate changes

The Canadian dollar has strengthened against the U.S. dollar, the Euro and the Mexican peso in the last three years. As Figure 39 above shows, most of the increase in GH tomato product value caused by the increase in Canadian dollar appears to have been lost to growers due to price slippage in the American market. This suggests that Canada is a price sharer for tomatoes in the U.S. market[^35]. In addition, the stronger Canadian dollar is attracting U.S., European and Mexican imports of GH vegetables, as noted by increase in imports in earlier sections.

Figure 45: Value of selected North American currencies in CDN dollars

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[^34]: 1 mmbtu = 1.055 gigajoule (GJ).

[^35]: It has been estimated that, for Canadian GH tomatoes, the exchange rate effect will be roughly shared by importer and exporter through the price for the product. See JRG Consulting Group. 2003. Marketing Ontario Greenhouse Vegetables in the Evolving North American Market. Report prepared for Ontario Greenhouse Vegetable Growers. September.
In the longer term, a stronger Canadian dollar will make inputs sourced from Canada cheaper to Canadian producers. This will include energy where, even with continental pricing policy, delivered costs to growers will be less in Canada than elsewhere in North America. Greenhouse inputs sourced outside of Canada would be less expensive.

A stronger Canadian dollar could also lead to lucrative labour rates for foreign workers working in Canada under seasonal agricultural worker programs, as their wages are pegged in relation to what domestic labour in similar jobs earns. This situation could be problematic if Canadian GH products in the U.S. market face extreme price pressure from competitors before structural changes in the North American industry occur. Recent commentary notes that there is the likelihood of a major shakeout in the Mexican GH vegetable sector as it has been growing with a highly dubious rate of financial return.

Figure 46: Value of the Euro and U.S. dollar in CDN dollars

5.6 GH crop yields and quality

Canadian GH crops have continued to improve in yield. Over the last eight to 10 years in Ontario, tomato yields are reported to have increased 120-150 per cent and cucumber yields by 80-100 per cent.

While Mexican yields are improving, productivity is below Canadian levels and since mid-level technology predominates, quality and consistency of product are generally lower. In addition, pesticide use is more widespread in Mexico with implications for perceived food safety.

The North American Greenhouse Vegetable Industry

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