

An Overview of the BC Greenhouse Vegetable Industry

British Columbia's high-tech greenhouse vegetable industry is a highly successful sector of horticulture in the province. BC's greenhouse vegetable growers are recognized as world leaders in utilizing advanced technology in biological pest control and computerized climate control systems. An ideal growing environment and reduced pesticide use allow for the production of high-valued fresh market crops. The industry also benefits from being highly organized in the areas of marketing, production, research, and industry development.



Demographics

Global

Worldwide, the main greenhouse vegetable production areas include: Spain, the Netherlands, Mexico, Canada and the United States (see Table 1). Production in Mexico and Spain consists of a variety of production systems ranging from low to high technology greenhouses. Production in the Netherlands, Canada, and the United States consists primarily of high technology greenhouses with significantly higher yields. Table 2 shows the production area of the major greenhouse crops in North America.

Table 1: 2002 World Greenhouse Vegetable Production Area (ha)*

Country	Production Area (ha)
Canada	876
United States	395
Netherlands	4,300
Mexico*	1,520
Spain*	70,000

* Note: When comparing relative size of operations between countries the different production technologies should be taken into account. For example, production in Mexico and Spain consists of a variety of production systems ranging from low to high technology greenhouses. Spain consists mostly shade cloth production not glass production.

Source: BC Vegetable Marketing Commission.

1 ha = 2.471 acres.

FACTSHEET



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Table 2: 2002 North American Greenhouse Vegetable Production Area (ha) of Major Crops

Crop	Production Area (ha)			Total North America
	Canada	US	Mexico	
Tomatoes	482	350	790	1,622
Cucumbers	199	25	118	342
Bell Peppers	174	20	210	404
Total	855	395	1118	2,368

Source: BC Vegetable Marketing Commission.

Canada

Canadian production is concentrated in Ontario, BC, Quebec and Alberta. Ontario and BC account for 90% of Canadian production; Ontario produces 66% and BC produces 24%.

British Columbia

The greenhouse vegetable industry in British Columbia consists of approximately 85 commercial greenhouse vegetable operations. Ninety-five percent of production is located in the Lower Mainland (District I) with the balance on Vancouver Island (District II) and the Interior (District III) which includes Kamloops/Okanagan and Northern regions (See Table 3.) Greenhouse sizes range from 0.2 ha to 18 ha. The average size of operation increases each year and is estimated at 2.4 ha for Lower Mainland and 0.2 ha for the Interior regions.

Table 3: 2004 Distribution of BC Production Areas (in Square Metres*) by Geographic Region

Region	Long English Cucumber	Tomatoes-on-the-Vine (TOV)	Beefsteak Tomato	Pepper	Lettuce	Total
District I (Lower Mainland)	241,679	764,786	352,750	815,999	13,328	2,188,542
District II (Vancouver Island)	28,705	200	3,500	5,955	500	38,860
District III (Interior)	27,654	0	49,588	6,200	0	83,442
Total	298,038	764,986	405,838	828,154	13,828	2,310,844

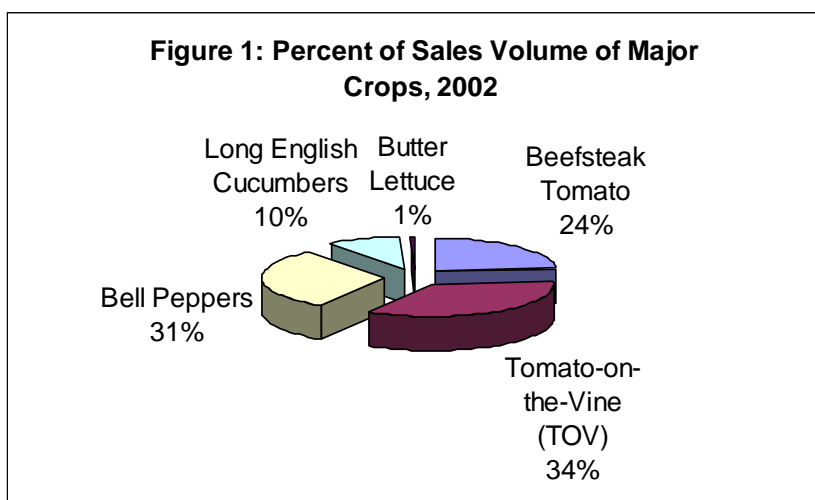
*10,000m² = 1ha = 2.471 acres

Source: BC Vegetable Marketing Commission.

Crops

The principal crops grown include tomato (beefsteak and tomato on the vine (TOV) or cluster), sweet bell peppers (red, yellow and orange), long English cucumbers and butter lettuce. Figure 1 examines the percentage of total greenhouse vegetable sales that each crop represents and Table 4 shows the volume of production for these crops. BC growers have achieved globally competitive yields per square metre of: tomatoes 73 kg/m², cucumbers 160

cucumbers/m², peppers 27 kg/m² and lettuce 200 heads/m². Table 5 shows the crop production cycle for the main crops. There is also a variety of other specialty greenhouse crops grown, including: culinary herbs, grape and cherry tomatoes, mini-peppers, and mini-cucumbers.



Data Source: BC Vegetable Marketing Commission.

Table 4: 2002 Production of Major Greenhouse Vegetable Crops in BC

Crop	Annual Volume Of Production	Value (\$ Million)
Beefsteak Tomato	3.95 million cases of 6.8 Kg (269 million Kg)	56.7
Tomato-on-the-Vine (TOV)	5.97 million cases of 5 Kg (299 million Kg)	84.4
Bell Peppers	3.86 million cases of 5 Kg (19.3 million Kg)	74.7
Long English Cucumbers	1.74 million cases of 18 (31.2 million cukes)	23.0
Butter Lettuce	104,532 cases of 24 (2.5 million head)	1.6
Total		240.4

Source: BC Vegetable Marketing Commission.

Table 5: Crop Production Cycle

Crop	Seeding Time	Harvest Time	Number Of Crops Per Year
Sweet Peppers	October/early November	March to November	1
Tomatoes	November	March to November/December	1
English Cucumbers	December & July	February to November	1 – 3
Butter Lettuce	Throughout year	All year	8 – 10

Employment

It's estimated that BC's greenhouse vegetable industry employs 2,600 people; 2,000 at the farm level and 600 at packing, distribution and marketing operations. The workforce consists mainly of year round, full-time or nearly full-time positions, due to the extended season of the crops.

Growth

The BC greenhouse vegetable industry has been at the forefront of rapid expansion since the 1990's (see Figures 2 and 3.) In 2001, BC greenhouse vegetable grower receipts were over \$204 million. This figure is more than double the sales figure of five years earlier and an increase of almost 380% since 1993, when sales were \$42.6 million (see Figure 2). During this time, rapid expansion has also occurred in Ontario, the US, Southern Europe and Mexico. Recent expansion seems to have stabilized in the US and Canada while growth is still occurring in Mexico.

Figure 2: Growth of BC Greenhouse Vegetable Sales, 1993 - 2002**

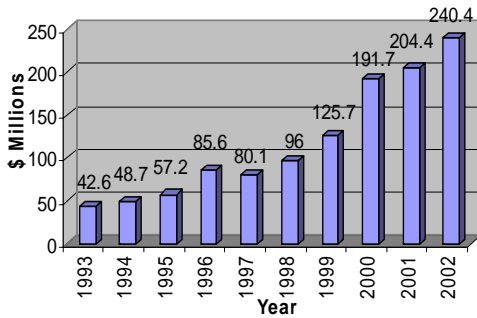
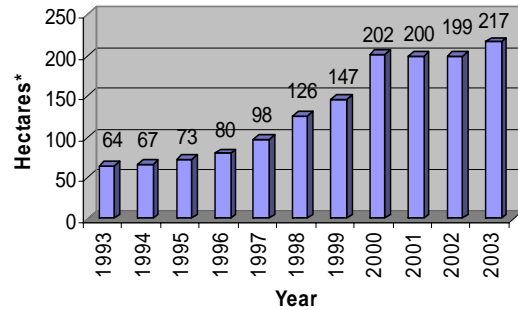


Figure 3: Growth of BC Greenhouse Vegetable Production Area, 1993 - 2003**



*1 ha = 2.471 acres

**Source: BC Ministry of Agriculture, Food and Fisheries, Horticultural Statistics.

Markets and Marketing Structure

Production of greenhouse tomatoes, peppers, cucumbers and butter lettuce are regulated under the Natural Products Marketing (BC) Act. The BC Vegetable Marketing Commission (BCVMC) administers the Act. Quota is required to grow these crops. Quota allocation is reviewed by the BC Vegetable Marketing Commission on an annual basis, usually commencing in August each year.

The application must be supported by a marketing agency, unless the producer is operating under an exemption from the requirement that they market through a designated marketing agency. Production in the Gulf Islands, the Sunshine Coast, or anywhere in District III (the interior of BC), are currently exempted from marketing through a designated agency but quota is still required.

Currently, there are four designated marketing agencies. These include: BC Hot House Foods Inc., Global Greenhouse Produce Inc., Greenhouse Grown Foods Inc. and the Interior Vegetable Marketing Agency. All producers, exempted or not, may market directly to farmer's markets or directly to consumers from the producing greenhouse (not for re-sale purposes).



Due to a structured marketing system, growers are able to focus on growing rather than marketing. They are also able to specialize in one crop rather than growing a wide range of crops in an attempt to supply the needs of every customer in the local market. This specialization allows for improved quality and decreased costs of production.

There has been broad market penetration by BC product throughout North America, and more recently, overseas into Asia. The United States is the major market, accounting for approximately 75% of all sales. In the US market, Canadian products receive significant competition from US, Mexico and Europe. Field grown products from US and Mexico also compete in the same marketplace. In recent years, Mexico's expanding high-tech, year-round greenhouse production has diminished BC's competitive advantage during the shoulder seasons of March /April and October/November.

The Canadian domestic market accounts for almost all of the remaining sales. The primary competition in this market is from the Netherlands and Ontario and in the summer months from local and imported field crops. New and emerging markets are being explored in the Pacific Rim countries.

Greenhouse Technology



The BC greenhouse vegetable industry utilizes leading edge technology to maximize yields, quality and efficiency. Modern Dutch Venlo style glass greenhouses are used primarily by the industry in the Lower Mainland and are well suited to the region's moderate climate and lower light levels. Ridge and gutter poly greenhouses predominate in the Interior, Northern and Island regions because they provide a higher insulative advantage for colder regions, and are more cost effective for the smaller growers in these areas. Larger greenhouses have sophisticated computerized climate control systems continuously monitor and regulate temperature, light, humidity, irrigation and nutrient levels to optimize plant growth. The most common form of heating is natural gas fired hot water boilers. Liquid carbon dioxide and carbon dioxide extracted from boiler flue-gas condensers are used to supplement carbon-dioxide (CO₂) levels in the crop. Crops are grown hydroponically in soilless media (mostly in sawdust growing medium) with drip fertigation systems that provide an efficient water/nutrient supply.

Integrated Pest Management

The adoption of integrated pest management (IPM) and best management practices has allowed BC growers to greatly reduce pesticide use. These practices emphasize implementing measures that help to reduce outbreaks of insects and disease such as:

- New plant varieties and growing techniques that provide increased disease resistance.
- Pest monitoring programs.
- High-tech environmental controlled systems to create ideal growing conditions for the crop and less favourable conditions for pests.
- Minimal movement of people and equipment between production areas or other operations to help reduce introduction or transmission of pests.
- Thorough greenhouse sanitation to minimize carry-over of pests to a new crop cycle.

The BC greenhouse vegetable industry is a world leader in the use of biological control agents. Growers use biological controls as an alternative to chemical pest control, for example predatory and parasitic insects are introduced into the greenhouse to kill pest insects.

Economics

The greenhouse vegetable industry is very capital intensive. In 2003 building a high-tech vegetable greenhouse operation requires 2.5 million dollars/ha in direct capital investment. This includes site preparation, utility hook up, greenhouse structure, computerized environmental control system and heating and irrigation systems. Land costs in the Lower Mainland (the main production area) are some of the highest in the province ranging from \$40,000 to \$125,000 per ha (\$16,000 to \$50,000 per acre.) The higher range values are in the Delta area and become less costly further east into the Fraser Valley. Small parcels of land less than 4 ha are generally associated with higher values. Land values in the interior's Okanagan valley range from \$37,000 to \$94,000 per ha (\$15,000 to \$38,000 per acre).



The main operating costs include: labour (25%), heating (28%) and marketing (25%). Larger production units (i.e. moving from 8000 m² to 25,000 m² size operations) may assume heating and labour advantage of 9 – 10% resulting from reduced operating costs associated with economies of scale. Extreme fluctuations in natural gas prices since 2000 have been a major challenge to the industry, significantly affecting the growers' bottom line.

The large capital investment involved in start-up presents a barrier to entry for many potential growers. High financial leverage may be required, leaving producers vulnerable to the effects of fluctuating input costs and the price they receive for their products.

Grower Associations

Producer associations play a key role in research and extension activities, and in fostering communication and information exchange between growers. In British Columbia there are two grower associations:

BC Greenhouse Growers' Association

A non-profit organization representing vegetable greenhouse producers in the Lower Mainland and Vancouver Island (Districts I and II). The association's role is to support its members' commitment to excellence by co-ordinating research and industry development projects, providing production and technology information, and working with other organizations and agencies for a dynamic and leading edge industry.

Interior Greenhouse Growers' Association

A non-profit grower organization representing all growers in the Interior region (District III) on provincial and national greenhouse vegetable issues.

BC Agriculture Council

The British Columbia Agriculture Council (BCAC) provides leadership in representing, promoting, and advocating the collective interests of all agricultural producers in the province. The Council fosters cooperation and a collective response to matters affecting the future of agriculture in the province, such as environmental and labour issues, and facilitates programs that benefit the industry.

Research, Industry Development and Technical Support

Research and industry development activities are well organized and funded which has led to BC's prominent world standing in the greenhouse vegetable industry. Recently, an *Industry Development Strategic Plan for the BC Greenhouse Vegetable Industry 2002-2006* was developed by industry and approved for funding through the Investment Agriculture Foundation of BC (IAFBC). BC project initiatives include integrated pest management, communications, new partnerships, energy efficiency, year-round production and product quality, and marketing. The BC Greenhouse Growers' Association (BCGGA) administers the projects through their Research and Industry Development Councils. The Councils are comprised of representatives of the BC Greenhouse Growers' Association; BC Ministry of Agriculture, Food and Fisheries; Agriculture and Agri-food Canada; post-secondary educational institutions, other associated industry members and grower representatives of each crop.

Research and extension programs have strong private-sector support. Projects are mostly funded through dollar inputs from grower check-offs and other outside funding sources. Partners to these programs include: the Investment Agriculture Foundation of British Columbia (IAFBC), Agriculture and Agri-food Canada, Simon Fraser University, University of British Columbia, the BC Ministry of Agriculture (BCMAFF), National Research Council Canada - Industrial Research Assistance Program and others. Research scientists at the Pacific Agri-Food Research Centre in Agassiz, Simon Fraser University and University of British Columbia provide research and technical expertise in such areas as post harvest physiology, plant physiology, pest management and plant pathology.

BCMAFF provides support in the areas of industry competitiveness, food safety and quality, plant protection (plant pathology, entomology and minor use pesticide registrations), environmental sustainability and resource development. BCMAFF also operates a Plant Diagnostic Lab that provides identification of insects, and pathogenic and non-pathogenic disorders affecting commercial crops in BC and promotes reduced pesticide use by making control recommendations which emphasize IPM (integrated pest management).

The BC Greenhouse Growers' Association co-ordinates study groups in co-operation with growers, extension and research staff. These sessions rotate among growers' greenhouses and involve discussions around climate control, product quality, labour, biological control and general production issues. Industry research priorities are also identified at the study group level.

Private sector consultants are available to provide one on one support in developing business plans and day to day production support.

Educational Programs

University College of the Fraser Valley, Chilliwack campus, offers one-year certificate, and two-year diploma programs in horticulture and IPM.

Kwantlen University College, Langley campus, offers an apprenticeship program, one-year certificate, and two-year diploma programs.

Simon Fraser University and the University of British Columbia offer a variety of agricultural or pest management degree programs.

Regulations

The greenhouse vegetable industry in BC is regulated by numerous government acts at federal, provincial and municipal levels. The regulations relate to environmental protection, health and safety, imports/exports and land use. Refer to *Farm Practices in BC – Greenhouse*, available from the Resource Management Branch of BCMAFF or online:

http://www.agf.gov.bc.ca/resmgmt/fppa/Refguide/commodity/870218-17_Greenhouse.pdf

Outlook

The BC industry has benefited significantly from being the forerunners in meeting consumer demand and adapting to modern greenhouse technology. Lately the industry has been challenged by lower prices, high energy and transportation costs, and increased competition. Greenhouse vegetable products are becoming a commodity after many years of being perceived as higher priced niche market products.

Growth of BC's greenhouse vegetable industry is expected to continue at a slower pace, but will be influenced by many factors. Overall supply and demand, and cost control, especially of energy, labour, marketing and freight, will be major factors. The US market will be influenced by US currency exchange and advancements in Mexican operations. An increase in exports to Asian markets is anticipated.

Despite challenges, opportunities still exist in many areas including production system improvements, value-added processing, value added packaging, increased consumer preferences and the development of new crops. Production trends may include continued emphasis on food safety protocol, new plant varieties and production systems that offer more efficient use of inputs, and new

technology in the areas of gutter systems, re-circulated irrigation, supplemental lighting (providing year round production) and cogeneration energy systems.

Other industry development opportunities being explored are in new crops that may have a niche market potential. These include: strawberries, raspberries, culinary herbs, medicinal herbs, watercress, wasabi, Chinese vegetables, eggplants, snap beans, hot peppers, and sugar peas.

SOURCES OF INFORMATION

Websites

InfoBasket

Portal to agri-food information on the internet. Links to information sources from around the world, including governments, universities and research institutes.

<http://infobasket.gov.bc.ca>

British Columbia Ministry of Agriculture, Food and Fisheries

Information on production, pest management, industry statistics, industry competitiveness, food safety, environmental & resource management, and numerous links to industry related sites.

<http://www.gov.bc.ca/agf>

Investment Agriculture Foundation of BC

Non-profit agricultural association that helps fosters growth in the agri-food industry.

<http://www.iafbc.ca>

Further Reading

- *Planning for Profit: Greenhouse Tomatoes, BCMAFF.*
- *Planning for Profit: Greenhouse Peppers, BCMAFF.*
- *Planning for Profit: Greenhouse Cucumbers, BCMAFF.*
- *Planning for Profit: Greenhouse Lettuce, BCMAFF.*
- *1996/97 Greenhouse Vegetable Production Guide, BCMAFF.*
- *Farm Practices in BC: Greenhouse.* Includes details on greenhouse operations and legislation affecting the greenhouse industry. BCMAFF, available online at:
<http://www.agf.gov.bc.ca/resmgmt/fppa/refguide/commodity/greenhou.htm>

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Associations

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