

U.S. Greenhouse Tomato Industry

The U.S. greenhouse tomato industry is the second largest in North America, after Canada, but imports still exceed domestic production. In 2003, four large firms dominated the industry, operating high-technology greenhouses and producing on a year-round basis. The ability to produce year-round is a key strength of the U.S. industry. Remaining profitable with more winter competition from Mexico as well as summer competition from Canada will be a challenge.

The U.S. greenhouse industry has gone through a period of adjustment, with firms looking for the most profitable business model. Firms have changed locations, production seasons, marketing alliances, and product lines. Most of the large firms that do their own marketing are now looking further afield to Canada and/or Mexico to acquire additional production to achieve more year-round consistency in production volumes or to expand product lines. Firms are juggling greenhouse assets, alliances, and distribution strategies to improve profitability.

Area and Production

In 2003, U.S. greenhouse tomato growers produced an estimated 159,664 metric tons on 330 ha of greenhouses (table 8).¹³ In that year, the U.S. greenhouse industry comprised four large firms with production ranging from 34 to 67 ha each, a small number of medium-size greenhouses ranging from 3-16 ha each, and a large number of very small greenhouses.

In 2003, the four large U.S. firms—Eurofresh, Inc., Village Farms, Houweling Nurseries, and SunBlest (which now owns most of the former Colorado Greenhouse operations), produced greenhouse tomatoes on 203 ha.¹⁴ In 2002, these four firms accounted for 67 percent of total U.S. greenhouse tomato output. In 2003, Village Farms had a total of 53 ha in Marfa and nearby Ft. Davis, Texas, and in Ringgold, Pennsylvania. Eurofresh had 67 ha in Willcox and Snowflake, Arizona.¹⁵ SunBlest operated 32 ha in Colorado and a 17-ha greenhouse in Virginia. Houweling operated a 34-ha greenhouse in coastal

Table 8—Estimated U.S. greenhouse tomato production and area

Item	1998	1999	2000	2001	2002	2003
<i>Metric tons</i>						
Production						
Total	106,594	129,727	123,831	131,995	149,912	159,664
<i>Hectares</i>						
Area						
Total	257	308	299	294	310	330
Large (17 hectares +)	166	210	198	193	187	203
Medium (3-16 hectares)	16	30	23	23	45	49
Small (less than 3 hectares)	76	67	78	78	78	78

Sources: U.S. International Trade Commission for total area and production from 1998-2000; area by firm size, all years, and all data after 2000 are estimates by Cook and Calvin.

¹³ There are only two government sources of published data providing information for 1998-2000. The U.S. Census of Horticultural Specialties (USDA, National Agricultural Statistics Service, 1998) reported 161 ha of greenhouse tomato production in 1998, although this appears to be low, apparently because at least one large firm did not report its area. The next census will cover production in 2008. The only other public estimates on area and production, for 1998-2000, come from the ITC's antidumping investigation against Canadian greenhouse growers. The ITC published industry estimates for 1998-2000, with an estimate of 299 ha of greenhouse tomatoes in the United States in 2000 and production of 123,831 metric tons (U.S. ITC, 2001). This is fairly consistent with another estimate of 304 ha for 1999 (Snyder, 1999).

¹⁴ In 2004 a new firm, Sun Valley, took over the Virginia greenhouse operated by SunBlest in 2003, increasing the number of large greenhouse operations to five. Eurofresh expanded production in 2004 to bring its area up to 87 ha.

¹⁵ Eurofresh built its first greenhouse without a cooling system but soon recognized that would be a problem. All subsequent greenhouses were built with cooling systems, and, in 2003, the original greenhouse was retrofitted with cooling, expanding North American summer supply without any growth in area for this firm.

Oxnard, California. Eurofresh was started by Dutch greenhouse growers and investors. Houweling Nurseries is owned by a Canadian greenhouse grower. Three of the four firms both grow and market their own production; Houweling markets through firms located in British Columbia.

A group of seven medium-size firms produced on 49 ha in 2003. These firms produced an estimated 11 percent of total U.S. greenhouse volume in 2002. The medium-sized firms were located throughout the United States—New York (two firms), Minnesota, Nebraska, New Mexico, Arizona, and Nevada. Some of these firms market their own production in local or regional markets, and some sell via larger U.S. and Canadian marketers.

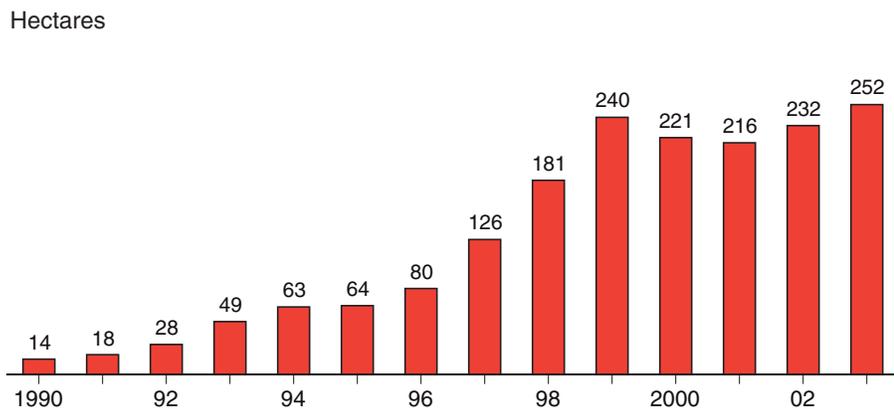
Small greenhouse production totaled an estimated 78 ha 2003. This group produced an estimated 22 percent of greenhouse tomatoes in 2002.¹⁶ These growers are assumed to be spread throughout the United States; the 1998 Census of Horticultural Specialties reported tomato greenhouse operations in every State. Small producers usually concentrate on local sales to farmers' markets and retailers interested in offering local produce to their customers (Snyder, 1999). Because of the focus on local sales, these small growers can harvest at a very ripe stage and still get their tomatoes to market at their peak. Very little is known about these small greenhouse growers.

Change in Greenhouse Area Over Time

Between 1996 and 1999, medium- and large-size greenhouse area increased about 200 percent, from 80 to 240 ha (fig. 8). The four largest U.S. firms increased area by 213 percent. The larger firms expanded due to strong retail demand and to facilitate selling directly to retail chains, which prefer to concentrate their purchases with a few large, year-round suppliers for a particular product. While U.S. production was increasing, so, too, was production in the rest of North America. Prices fell to levels that made repaying heavy debt load difficult (ITC, 2001). Two of the large U.S. firms experienced serious economic difficulties. One firm, which had a number of

¹⁶ We assume that the area for small firms in 2003 is equal to the number in 2000 when ITC published estimates of total area and production. The number of ha for small producers comes from the ITC estimate of 299 ha in total in 2000 minus our estimates, based on interviews, for large and medium-size greenhouses in that year. A similar procedure was used to estimate production. Using the U.S. Census of Horticulture for 1998, which provides some information on area in greenhouses by State, gives a point of comparison. After eliminating States where no area was reported because of disclosure problems and States where large and medium-size farms were located, to avoid the possibility of counting them as small farms, there were 39 ha in 32 States. So 78 ha for 50 States seems plausible. With 501 operations and 39 ha in 32 States, the average operation was very small—only 0.07 ha. If this group has been growing since 2000, our estimate of total area is low. Very little information is available about small greenhouse operations over time. A Florida survey shows substantial variation over a decade (Hochmuth and Hochmuth, 2004). In 1991, Florida had 9 ha in greenhouse tomatoes, but this number declined to 2 ha in 1996 before increasing to 7 ha in 2001.

Figure 8
U.S. greenhouse tomato area for firms with at least 3 hectares



Source: Interviews by Cook and Calvin.

problems in addition to low prices, was finally liquidated and another greenhouse firm acquired most of its assets.

Low prices affected both existing and new or expanding greenhouses. After 1999, several large firms sold greenhouses or took them out of production. One firm increased production in other areas more suited to its business plan, while discontinuing operations in other areas. Some of the greenhouses that were sold continued producing tomatoes while others were put to different uses such as bedding plant production. Several were torn down. In 2003, the total area for the medium- and large-size firms increased to 252 ha, topping the previous high of 240 ha in 1999. Some of the medium- and large-size greenhouses planned expansions for late 2004 and 2005, although low summer prices in 2004 may have put these plans on hold.

Change in Greenhouse Locations

Over time, there has been a major shift in location for the largest U.S. greenhouse firms as owners tried to align production with the most profitable market windows. Many of the early greenhouses targeted the summer months, the traditional Canadian season. Firms found their volumes winding down just as prices started to go up in the fall. Over time, U.S. firms began to focus more on opportunities in the winter.

Colorado Greenhouse was the first large U.S. greenhouse operation, starting back in the late 1980s. Initially, all its production was in Colorado. Village Farms began production in 1991 and Eurofresh began in 1992, both in Pennsylvania. All of these early greenhouses were cogeneration operations with powerhouses. Power plants could gain exemptions from some Federal regulations by producing heat to be used in another business activity such as greenhouse production. Greenhouses received heat at a lower cost than available from other sources. Typically, the power plant owned the greenhouse and leased it to the greenhouse operator. As a result, the locations were not necessarily selected with greenhouse objectives in mind.

The early northeastern U.S. greenhouses had the advantage of being near urban centers, minimizing transportation costs to market and maximizing retail shelf-life potential; however, they could not produce profitably year-round. While strong seasonal firms still operate in the Northeast, firms that decided to target the year-round market moved to States with warmer winter climates.

Colorado Greenhouse, Eurofresh, and Village Farms all turned to the Southwest for expansion. None of their new greenhouse operations is a cogeneration facility tied to a powerhouse. Each was selected solely for agronomic and economic reasons—the right environmental conditions for the market windows the firms wanted to target.¹⁷ The new locations maximize production during the high-priced winter season. The desert Southwest provides strong light levels, low humidity, high altitude (that gives warm days and cool nights), good water, and natural gas. On the negative side, high summer heat may require greenhouse cooling, and adapting Dutch technology to new environmental conditions can be a challenge. Also, these areas are far from major population centers east of the Mississippi River, increasing transportation costs to market. In addition, since these greenhouses are often

¹⁷ A similar phenomenon may occur in Mexico. Some field tomato producers currently experimenting with greenhouses near their field operations, which is convenient, may eventually shift to areas that are selected for maximizing production and profits.

in relatively isolated locations, far from major horticultural production areas, attracting labor, at all levels, can be difficult.

Eurofresh was the first to relocate, moving to Arizona in 1992. In 1997, Village Farms began production and harvesting from new greenhouses in Texas, gradually shedding most of its northeastern operations. Colorado Greenhouse also went further south, opening two greenhouses in Estancia and Grants, New Mexico, in 1998 and 1999. Canadian operations also opened in the southern and western United States. Some firms went further south. One U.S. grower of cherry TOVs started out in Texas and then built greenhouses in Mexico to augment winter production. This firm eventually dropped its U.S. production and expanded its Mexican production; in terms of area, it now operates the largest greenhouse in North America.

New Building Declines and More Complicated Business Relationships Increase

As greenhouse tomato prices have fallen in recent years, construction of new greenhouses has slowed in the United States. Firms have been buying and selling existing greenhouses, with known characteristics, in an effort to achieve the correct balance of supply throughout the year. There is also more emphasis on alliances, joint ventures, and marketing agreements between firms in different locations to achieve the same results.

In 1999, Colorado Greenhouse was the first of the large U.S. producers to attempt a joint venture with a Mexican grower to supplement its winter volume. According to industry experts, differences in technology and quality levels appear to have caused this joint venture to fail (ITC, 2001). Other joint ventures have been more successful. For example, in 2003, Village Farms announced a joint supply venture with BC Hot House that will provide the Canadian firm with more winter supplies from the United States and vice versa. U.S. and Canadian firms also market for Mexican firms.

Technology

The technology of the medium- and large-size U.S. firms is relatively uniform—glass greenhouses with active climate control and hydroponics. This is the same technology used in the Netherlands and British Columbia, Canada. Some of the earliest Colorado Greenhouse operations were plastic but they are no longer in tomato production. A glass greenhouse is an advantage when trying to maximize winter sun reaching the plants and controlling the environment if it is necessary to cool in the summer. Average yields for the large firms are high, 534 metric tons per ha (with top yields reaching about 700). Small-size greenhouses use a range of technologies, with some using low- or medium-technology greenhouses.

Product Mix

In 2000, large-scale greenhouse tomato production in the United States comprised 58 percent beefsteak production and 42 percent TOV production (ITC, 2001). In 2003, production for the four largest producers was esti-

mated at 36 percent beefsteak, 60 percent TOV, and 4 percent smaller TOV. Smaller TOVs are a rapidly growing sector of the industry. The medium-size growers had a smaller share of production in TOV than the largest firms—38 percent for TOVs in 2002. Small growers generally produce beefsteak tomatoes.

In 2003, the large- and medium-size greenhouses in the United States focused exclusively on growing tomatoes, unlike some of their Canadian and Mexican competitors who also produce greenhouse cucumbers and bell peppers. Two of the big U.S. firms experimented earlier on a small scale with peppers before deciding to specialize in tomatoes. In 2004, one large grower began producing greenhouse cucumbers on a small scale. Three of the large firms market greenhouse cucumbers and peppers, acting as agents for other growers or buying product outright. Houweling's production is marketed through two firms in British Columbia who also sell greenhouse cucumbers and peppers. Decisions on the breadth of product line are an important part of the strategic choices of greenhouse vegetable shippers, figuring into their relative competitiveness. Frequently, buyers express a preference for dealing with wider line suppliers within a category of products so that they can concentrate purchases with fewer firms and reduce sourcing transaction costs. On the other hand, risk and cost factors may discourage some greenhouse tomato firms from product diversification.

Greenhouse Tomato Organizations

U.S. greenhouse growers do not have organizations that can impose minimum prices like growers in British Columbia and Ontario, who have this authority even though they rarely use it. Nor do they have organizations that can restrict area such as in British Columbia. With four large growers located in different States, it may be difficult for the greenhouse tomato industry to band together to form organizations of the type that are common in the U.S. fresh field tomato industry. The California and Florida fresh field tomato industries have separate grower organizations with the power to impose minimum prices.¹⁸ However, difficulties in achieving grower consensus and participation have sometimes limited the use of this authority.

Marketing

Greenhouse tomato marketing practices are often distinct from those used for field tomatoes. Since mature green tomato growers often send their product to repackers, they lose control over the product and how it is marketed. Greenhouse growers do not have this problem. Greenhouse tomatoes are more of a consumer-ready product and a growing share of sales are direct to retailers, avoiding wholesale intermediaries. Most greenhouse firms have opened forward distribution centers near major markets to ensure strong customer service. Forward distribution centers in close proximity to customers enables firms to offer a high level of service, including the ability to promptly supply fill-in orders and to ensure top quality upon delivery. Some Canadian and Mexican firms are also adopting this model.

Greenhouse tomato marketing has the advantage of a more predictable supply stream and quality than field production. Both greenhouse and field

¹⁸ For example, the Florida Tomato Growers Exchange provides Capper-Volstead exemption from anti-trust laws, allowing growers to meet to discuss marketing problems and set minimum prices for their tomatoes, if they so desire.

tomato producers use contracts with buyers but the level of forward contracting appears to be higher for greenhouse tomatoes. Greater supply stability reduces cost and price uncertainty, facilitating contracts and helping to increase buyer loyalty.

Greenhouse tomato marketing is more brand-oriented than for field tomatoes. Greenhouse tomatoes are typically marked with price lookup stickers, like field tomatoes, but with the name of the company also displayed. Brand orientation requires a twelve-month supply; if a brand is only available for part of the year a valuable asset is not being maximized. However, research on consumer attitudes regarding fresh produce brands indicates a low level of awareness and loyalty, likely due in part to intra- and inter-seasonal variations in quality (Fresh Trends, 1990; 2002). Greenhouse tomato producers are not exempt from low consumer brand awareness in the fresh produce department.

Total U.S. Greenhouse Tomato Supply: The Role of Imports

Imports play an important role in U.S. supply. In 2003, estimated greenhouse tomato imports totaled 280,217 metric tons, compared with domestic production of 159,664 metric tons (table 9). Import volumes have been growing more rapidly than domestic production. In 2003, U.S. greenhouse tomato exports totaled only 3,827 metric tons, all to Canada.

Table 9—Estimated U.S. fresh tomato supply and consumption, including field-grown and estimated greenhouse tomato volume

Year	Greenhouse production	Field-grown production	Total production	Estimated greenhouse imports ¹	Estimated field imports ²	Total imports
<i>Metric tons</i>						
1998	106,594	1,492,591	1,599,185	139,683	707,637	847,320
1999	129,727	1,696,844	1,826,571	169,191	571,550	740,742
2000	123,831	1,764,020	1,887,851	191,312	538,694	730,006
2001	131,995	1,710,088	1,842,083	226,404	597,157	823,561
2002	149,912	1,795,682	1,945,594	238,756	620,746	859,502
2003	159,664	1,594,241	1,753,906	280,217	659,239	939,457
Year	Greenhouse supply ³	Total fresh supply	Fresh exports	Total fresh consumption	Fresh consumption per capita	Greenhouse share of fresh consumption
<i>Metric tons</i>				<i>Kilograms</i>		<i>Percent</i>
1998	246,277	2,446,505	129,863	2,316,642	8.4	10.6
1999	298,919	2,567,313	151,659	2,415,654	8.6	12.4
2000	315,143	2,617,857	186,133	2,431,724	8.6	13.0
2001	358,399	2,665,645	180,615	2,485,030	8.7	14.4
2002	388,668	2,805,096	150,638	2,654,458	9.2	14.6
2003	439,882	2,693,362	142,473	2,550,889	8.8	17.2

¹ Assuming all imports from the EU, Israel, Morocco and Canada are greenhouse. Imports of greenhouse tomatoes from Mexico are estimated, taking into account not only official U.S. Department of Commerce greenhouse statistics but additional volume not thought to be captured in official statistics, due to miscoding as other tomato types.

² Field-grown tomato imports estimated by subtracting estimated greenhouse tomato imports from total fresh tomato imports, as reported by the U.S. Department of Commerce.

³ Here we assume greenhouse supply is equal to consumption. We are ignoring small exports to Canada (3,827 metric tons for 2003) because of concerns regarding data reliability.

Sources: Compiled by Cook and Calvin from USDA, National Agricultural Statistics Service, U.S. Department of Commerce, and greenhouse tomato production and import estimates from Cook and Calvin.

U.S. greenhouse tomato imports by source have changed dramatically (table 10). If total estimated Mexican imports are considered, rather than official DOC numbers, in 2003, Canada represented 46 percent of the total, followed by Mexico with 45 percent. Europe, Israel, and other sources of greenhouse tomatoes accounted for much smaller shares. As late as 1997, Europe was still the largest source of U.S. greenhouse imports. Imports from Europe were overtaken by Canada in 1998 and Mexico in 1999, according to official data. If the estimates of Mexican imports are correct, Mexico may soon become the principal source of U.S. imports of greenhouse tomatoes in terms of quantity.

U.S. imports of greenhouse tomatoes from its NAFTA partners have trended upwards over time, excepting imports from Canada in 2002. In 2001, U.S. growers sued Canadian growers for dumping greenhouse tomatoes. Dumping margins, applied between October 2001 and March 2002, put a temporary damper on Canadian exports. U.S. imports of Canadian greenhouse tomatoes declined by 5 percent in 2002, relative to 2001. In April, 2002, the ITC rejected the U.S. greenhouse tomato growers' case and DOC instructed U.S. Customs and Border Protection to refund any dumping duties already collected. In 2003, U.S. imports from Canada surged 30 percent, but not all due to resolution of the dumping suit. U.S. import demand also expanded because of weather-induced subnormal U.S. production volumes of field tomatoes, causing more buyers to seek out greenhouse products.

According to official DOC statistics, the United States imported \$365.5 million worth of greenhouse tomatoes in 2003. There is no way to estimate the value of undercounted greenhouse tomato imports from Mexico, so analysis of value relies solely on DOC data. Comparing import shares of value to import shares of quantity shows that on average, Canada and non-NAFTA sources receive a price premium relative to Mexico. This is a func-

Table 10—U.S. greenhouse tomato imports, by origin¹

Year	Canada	Mexico ¹		Europe	Israel	Others	Total ¹	
		Official	Estimated				Official	Estimated
<i>Metric tons</i>								
1990	3,075			1,306	2,126		6,507	
1991	2,672			3,028	1,107		6,807	
1992	5,214			2,927	1,918	3	10,061	
1993	4,733			9,677	2,262		16,672	
1994	7,673			10,426	1,822	3	19,924	
1995	11,655			14,822	1,320		27,797	
1996	21,769			27,270	2,302	6	51,348	
1997	37,504			41,020	3,264	3	81,791	
1998	61,729		26,600	46,620	4,734		113,083	139,683
1999	79,554	3,728	43,889	41,908	3,833	7	129,030	169,191
2000	101,390	27,468	51,300	34,711	3,728	183	167,480	191,312
2001	105,680	33,398	82,128	34,798	3,723	75	177,674	226,404
2002	100,499	42,140	102,816	31,000	4,294	146	178,080	238,756
2003	130,154	58,357	125,970	19,244	4,821	28	212,604	280,217

¹ These official DOC data for imports of Mexican greenhouse tomatoes may substantially underestimate true trade levels due to misclassification of greenhouse tomatoes with other tomato tariff codes. Mexican estimates for 1998-2003 are based on industry knowledge. Official Mexican imports only begin in July 1999 when the greenhouse tomato tariff code was established. The data reported in this table include all tomato imports from the EU, Israel, Morocco and Canada, even if they were not coded as greenhouse since we know that only greenhouse tomatoes are imported from these countries.

Sources: U.S. Department of Commerce, as compiled by Cook and Calvin, and estimates by Cook and Calvin.

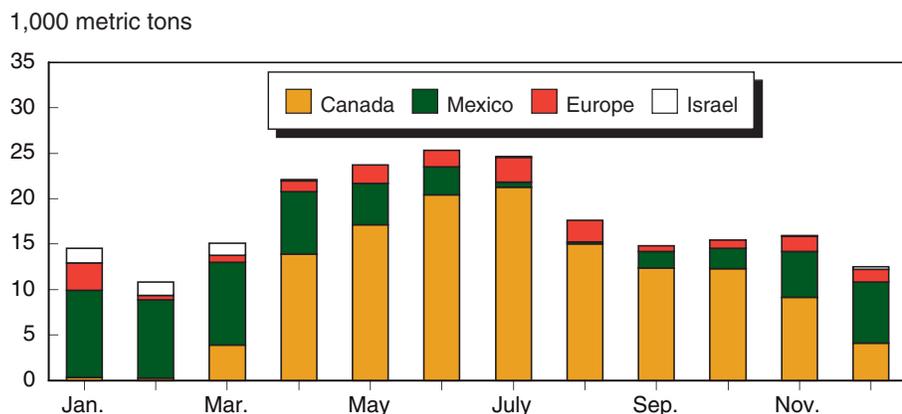
tion of two factors. Mexico has a relatively large share of lower priced beefsteak tomatoes in its exports, and Mexican greenhouse tomatoes sometimes face lower prices due to perceived or real quality problems. The industry is striving to improve its quality reputation to avoid prices being discounted relative to the competition.

Figure 9 shows DOC data on greenhouse tomato imports by month for 2003. Again, analysis relies on DOC data since it is not possible to apportion the additional estimated greenhouse tomato imports across months. In 2003, Canada's highest level of exports to the United States was during July, but they were strong throughout the year except for the December through March period. In 2003, Mexico exported greenhouse tomatoes to the United States on a year-round basis but with most shipments in the November through June period. Because there is no greenhouse tomato tariff code for the period July 15 to August 31, Mexican summer imports are undercounted. Nevertheless, despite Mexico's positioning as a winter producer, a comparison of monthly U.S. imports in 2003 and 2004 shows that much of the gain in Mexican volumes up through November 2004 came in the spring and fall, not the midwinter (fig. 10). The large increase in greenhouse tomato imports in December 2004 appear to be a harbinger of a very large increase in winter volume. In January 2005, greenhouse tomato imports were up 91 percent from the previous year. Clearly, Mexico is now becoming much more of a competitive factor for both the Canadian and U.S. greenhouse tomato industries. USDA's Agricultural Marketing Service began to publish U.S. greenhouse tomato shipments in late 2004.¹⁹ Soon it will be possible to analyze monthly patterns of total supply, not just imports.

Putting U.S. greenhouse tomato imports in context relative to total fresh tomato imports shows that in 2003, according to the DOC, greenhouse tomatoes were equivalent to 23 percent of the 939,457 metric tons of U.S. fresh tomato imports. Since greenhouse tomatoes are generally higher value than field tomatoes, they contributed 37.5 percent of the \$1.047 billion worth of U.S. fresh tomato imports in 2003. Clearly, greenhouse tomato imports are entering the U.S. market not as a low-cost foreign production option, but due to U.S. demand for what is perceived to be a premium product.

¹⁹ For the last 3 months of 2004, the U.S. share of total greenhouse supply in the United States was 22 percent in October, 38 percent in November, and 39 percent in December (USDA, AMS, 2004).

Figure 9
Monthly U.S. greenhouse tomato imports from major suppliers, 2003

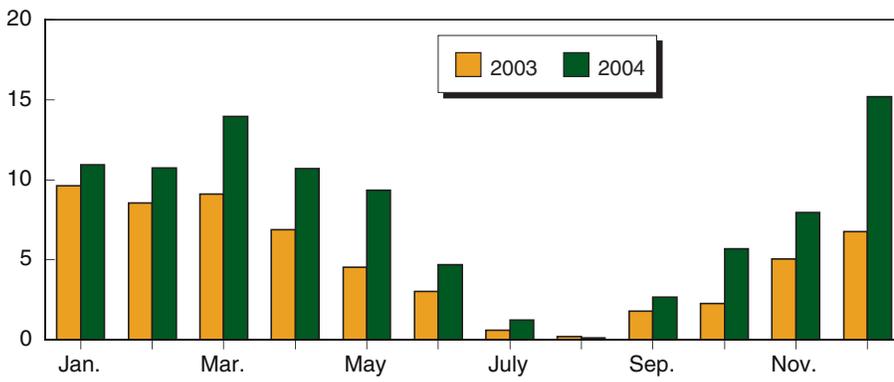


Source: U.S. Department of Commerce.

Figure 10

Growth in U.S. monthly imports of Mexican greenhouse tomatoes

1,000 metric tons



Source: U.S. Department of Commerce.