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U.S. Horticultural Imports From Mexico: 14 Years of Expansion From 2007–09 to 2021–23

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Abstract

This economic brief explores changes in U.S. horticultural imports from Mexico between 2007–09 and 2021–23. These imports grew significantly during the period studied, boosting U.S. per capita availability of a wide range of fresh produce. This growing trade was accompanied by shifts in U.S. horticultural production, including declines for some types of fruit and vegetables. In real terms (2023 U.S. dollars), U.S. horticultural imports from Mexico grew from an annual average of $7.3 billion during 2007–09 to $19.7 billion during 2021–23. Imports increased for all 20 of the leading horticultural imports from Mexico—with avocados, raspberries, strawberries, blueberries, and lettuce increasing the most in terms of their shares of total U.S. horticultural imports from Mexico. An expansion of Mexico's production made possible the increase in U.S. horticultural imports from Mexico, to the extent that for some products (blueberries, chile peppers, lettuce, blackberries, cauliflower, and broccoli, for example), Mexico's horticultural sector became more oriented towards the U.S. market. In the cases of avocados and blueberries, the increase in imports began when the U.S. markets for these products were just starting to undergo substantial growth, rather than when those markets were mature and growing slowly.

Keywords: Mexico, imports, avocados, raspberries, blueberries

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U.S. Horticultural Imports From Mexico: 14 Years of Expansion From 2007–09 to 2021–23

Introduction

Rafael Davidson's series of *Mexico Exporta* postage stamps from 1975 to 1993 showcased the horticultural sector's participation in Mexico's exports—with stamps depicting tomatoes, citrus fruit, and strawberries, among other agricultural products (somestamps.com, 2011; Butler, 2013). In 1993—the year when the last of these stamps were issued and the year immediately prior to the North American Free Trade Agreement's (NAFTA) implementation—Mexico's goods exports (agricultural and nonagricultural combined) to all countries totaled $30.0 billion (nominal value, i.e., not adjusted for inflation), corresponding to 5.7 percent of the country's Gross Domestic Product (GDP). In 2023, these exports totaled $593.6 billion, corresponding to 33.2 percent of GDP (calculated using data from World Bank, 2024). By contrast, goods exports accounted for only 7.3 percent of U.S. GDP in 2023 (calculated using data from U.S. Department of Commerce, Bureau of Economic Analysis, 2024).

Horticulture's share of Mexico's total exports (agricultural and nonagricultural) is still relatively small. In 2023, Mexico's exports of horticultural products—defined by the author as those products in chapters 06 (live trees and other plants), 07 (vegetables), and 08 (fruit and tree nuts) of the Harmonized Commodity Description and Coding System (HS)—totaled $18.8 billion and accounted for 3.2 percent of Mexico's total goods exports, according to the Mexican Government's trade statistics (Secretaría de Economía and Instituto Nacional de Estadística y Geografía, as compiled by Trade Data Monitor, 2024).[1] Mexico's horticultural exports (to all countries) have almost kept pace with total goods exports (to all countries). Between 1993 and 2021, Mexican horticultural exports grew at a compound annual growth rate (CAGR) of 8.3 percent, compared with 8.5 percent for all goods exports (calculated using data from Banco de México, 2024).

The United States is the main market for Mexico's horticultural exports, accounting for 93 percent of the total in 2023. During NAFTA's transition to intraregional free trade among the United States, Mexico, and Canada (January 1, 1994−January 1, 2008), U.S. horticultural imports from Mexico increased by 280.5 percent (from $1.4 billion in 1993 to $5.3 billion in 2008) when measured in nominal terms and by 177.5 percent (from $2.7 billion to $7.4 billion) when measured in real terms (2023 prices), according to the U.S. Government's trade statistics (calculated using import data compiled by USDA, Foreign Agricultural Service (FAS) (2024b) and GDP deflators from U.S. Department of Commerce, Bureau of Economic Analysis (2024)).

This economic brief explores how U.S. horticultural imports from Mexico changed in size and product composition during a more recent chapter of United States and Mexican economic history—the years 2007–09 to 2021–23. This period was selected because its beginning corresponds with a key event in the U.S.-Mexico trade relationship: the finalization of NAFTA's transition to intraregional free trade. Through this agreement, all tariffs and quotas were removed from trade among the three signatory

[1] See Gómez et al. (2021) for a more detailed explanation of the Harmonized System.

countries—other than trade restrictions implemented as the result of investigations into unfair trade practices and the handful of tariffs and quotas retained due to Canada's supply management policies in the dairy, poultry, and egg sectors. As a result, U.S. horticultural imports from Mexico did not face tariffs and quotas throughout almost all the period of analysis—meaning that any changes in these imports during that period cannot be attributed to additional changes in tariffs and quotas. The years 2021–23 were the 3 most recent years of annual trade data available at the time of writing and included the first 3 full years of NAFTA's successor agreement: the United States-Mexico-Canada Agreement (USMCA), which took effect on July 1, 2020. The USMCA generally continues NAFTA's market access provisions.[2]

Material and Methods

To explore changes in U.S. horticultural imports from Mexico, the author relied on descriptive analysis—primarily using international trade data from the U.S. Department of Commerce, Bureau of the Census, as compiled by USDA, FAS (2024b) in its *Global Agricultural Trade System* database. Agricultural trade was classified using the definition of the World Trade Organization (WTO)—which includes those products in HS chapters 1–24, less fish and fish products, plus a handful of products in other chapters, such as cotton, essential oils, and hides and skins.[3] As previously noted, this report defines horticultural products as those products in HS chapters 06, 07, and 08. Live trees and other plants (chapter 06) account for a relatively small portion of U.S. horticultural imports from Mexico—an annual average of $99 million during 2021–23 (USDA, FAS, 2024b)—so this report focuses on trade in vegetables (chapter 07) and fruit and tree nuts (chapter 08). We use 3-year averages of economic data to account for any year-to-year fluctuations, thereby providing a clearer view of long-term changes in U.S. horticultural imports from Mexico. Processed fruit and vegetable products categorized in other HS chapters—such as prepared or preserved pineapple in chapter 20 and soups and sauces in chapter 21—are outside the scope of this report.

To explore linkages between the rise in these imports and other aspects of the agri-food system, the author utilized publicly available data on agricultural production in Mexico and the United States and on U.S. per capita retail food availability. Production statistics from Mexico's Secretaría de Agricultura y Desarrollo Rural, Servicio de Información Agroalimentaria y Pesquera (SADER, SIAP) (2025) were used to show how higher levels of horticultural production in Mexico made possible the increase in U.S. horticultural imports from Mexico and how, for some products, Mexico's horticultural sector became more oriented toward the U.S. market. U.S. per capita retail food availability data from USDA, Economic Research Service (ERS) (2024a) were used to learn how increased imports led to greater availability of certain fresh fruit and vegetables to U.S. consumers. Finally, data on U.S. agricultural

[2] The period of analysis also covers an entire economic cycle in both countries. The years 2007–09 were marked by the Great Recession, a strong macroeconomic downturn in the United States that triggered a lesser recession in Mexico (Villarreal, 2010), while the years 2021–23 encompassed the recovery from the Coronavirus (COVID-19) pandemic, whose onset in late 2019 and early 2020 triggered a global economic downturn. An analysis of the trade effects of these macroeconomic events, however, is beyond the scope of this report.

[3] For the precise definition, see annex 1 of the 1994 Uruguay Round Agreement on Agriculture (World Trade Organization, 2021).

production from USDA, National Agricultural Statistics Service (NASS) were used to search for the possible impact of import competition on U.S. growers.

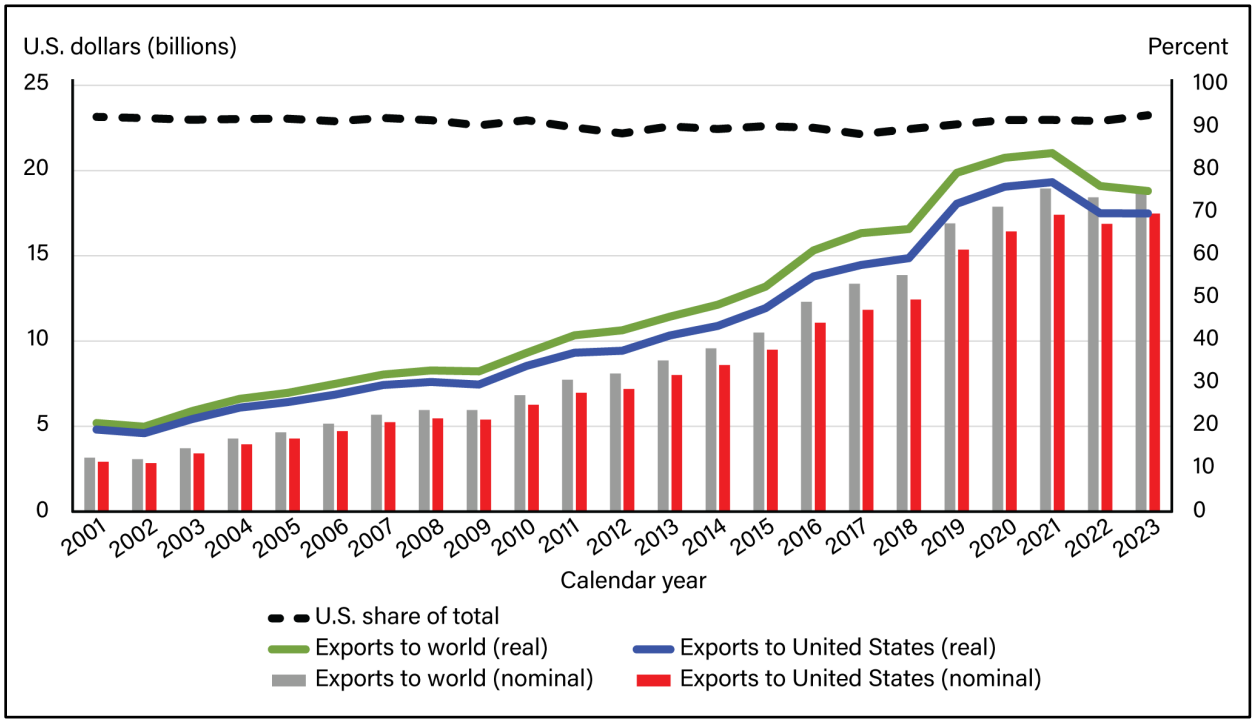
Results and Discussion

The Importance of the U.S. Market

Mexico's total horticultural exports (to all countries) experienced substantial growth between 2007–09 and 2021–23 (figure 1). According to the Mexican Government's trade statistics, the average annual value of these exports increased by 219.4 percent (from $5.9 billion to $18.7 billion) in nominal terms and by 140.1 percent (from $8.2 billion to $19.6 billion) in real terms (2023 prices). Throughout the period of analysis, the United States was the main market for Mexico's horticultural exports. During 2007–23, the share of these exports that was destined for the United States on an annual basis ranged from 88–92 percent. While this share fluctuated a little during the period studied, by the period's end, it was about the same as it was during the period's beginning. Mexico also exports horticultural products to other countries. Many of these countries, like the United States, have free-trade agreements (FTAs) with Mexico. Prominent examples include Canada, the European Union, and Central American countries.

Figure 1

Mexico's horticultural exports and the U.S. share of those exports, 2001–23



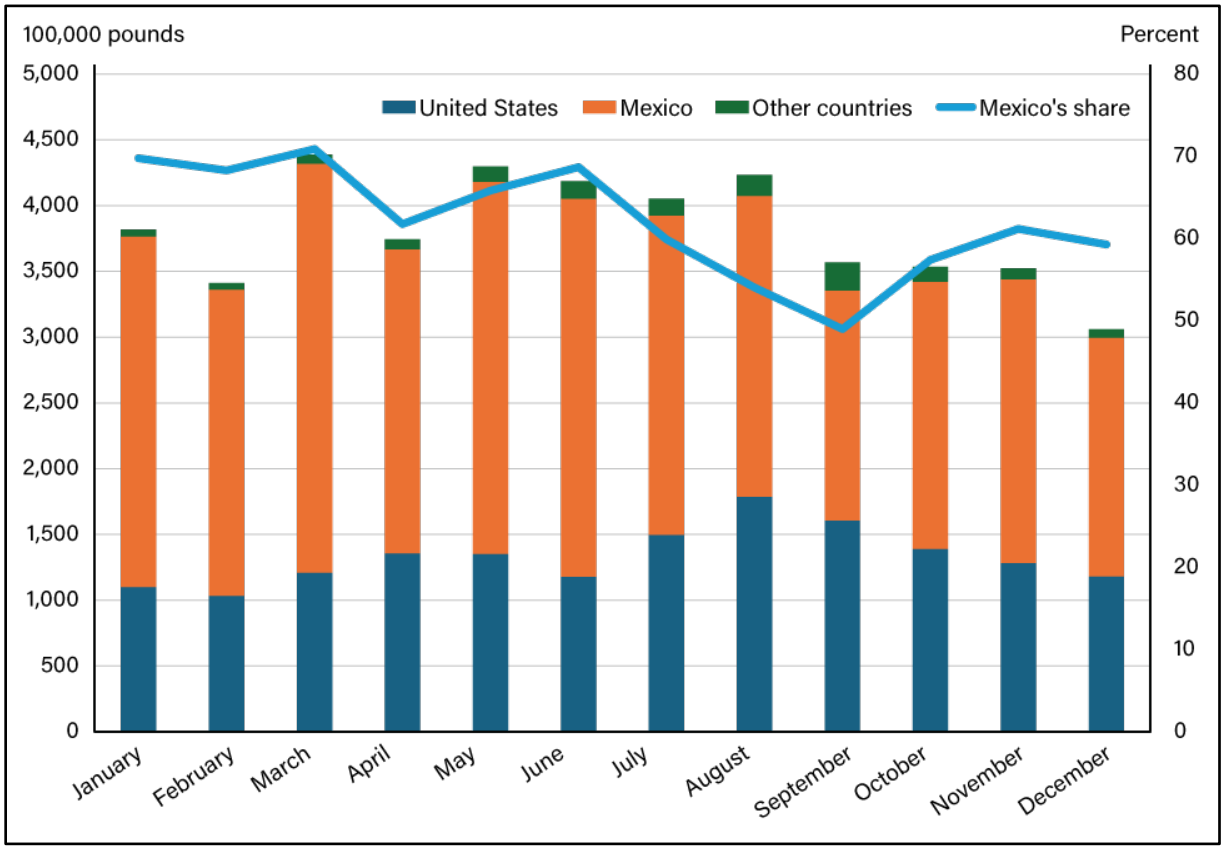
Note: Nominal (not inflation adjusted) dollars are converted to real (inflation-adjusted) dollars using Gross Domestic Product (GDP) price indices.
Source: USDA, Economic Research Service using Mexican Government trade statistics compiled by Trade Data Monitor (2024) and GDP price indices from the U.S. Department of Commerce, Bureau of Economic Analysis (2024).

Many factors explain the long-term orientation of the Mexican horticultural sector toward the U.S. market. Mexico's proximity, its favorable climate, trade liberalization, regulatory coordination, efforts by Mexican exporters to meet U.S. food safety standards, the greater affordability of farm labor in Mexico, the participation of U.S. agribusiness in Mexico's horticultural sector, and cross-country differences in population and per capita income are among the more prominent explanatory factors. First, the immediate proximity of the two countries reduces the costs of transportation between Mexico's horticultural growers and specific destinations within the United States. Mexico and the United States share a land border of about 3,145 kilometers (1,954 miles), and the highway systems of the two countries are used to transport horticultural products from Mexican farms and packing facilities to destination markets in the United States.

A second factor is Mexico's favorable climate for the cultivation of many types of fruit and vegetables. To some extent, Mexico's growing seasons are counter seasonal to U.S. growing seasons, which allows Mexican produce to be exported to the United States at times of the year when U.S.-grown produce is less available. However, for some products, Mexico's growing seasons overlap with U.S. growing seasons, which can result in direct competition between U.S. and Mexican producers. For example, blueberry imports from Mexico are low during the summer months of June, July, and August, when shipments from many U.S.-producing States are on the market, but monthly blueberry imports from Mexico are at their highest during the spring months of March, April, and May, when shipments from Florida and Georgia are on the market (USDA, Agricultural Marketing Service (AMS), 2025a; Kramer, 2020). Even in the tomato sector, where greenhouse production and favorable climatological conditions make year-round Mexican exports to the United States possible, Mexico's share of tomato shipments to the U.S. market varies by month and tends to be higher during the winter and spring (figure 2). Across the months of 2023, for example, Mexico's share of tomato shipments to the U.S. market decreased from 70 percent in January to 49 percent in August and then increased to 59 percent by December.

Figure 2

Monthly fresh tomato shipments to the U.S. market from producers in the United States, Mexico, and other countries, 2023



Note: This figure summarizes fresh tomato shipments by supplying country for all types of fresh tomatoes reported in the source data, including greenhouse, organic, organic-greenhouse, cherry, cherry-greenhouse, grape, grape-greenhouse, plum, plum-greenhouse, and other (simply listed as "tomatoes").

Source: USDA, Economic Research Service using data from USDA, Agricultural Marketing Service (2024).

Trade liberalization is a third factor. As previously mentioned, USMCA continues the tariff- and quota-free access secured by NAFTA for virtually all products traded among its member countries. Prior to NAFTA's implementation, many types of Mexican horticultural products imported by the United States faced seasonal tariffs whose rates were higher during the times of the year when U.S. products were entering the domestic market. For instance, prior to 1995, the most-favored-nation (MFN) tariff rate for fresh tomatoes (other than cherry tomatoes) equaled 3.3 cents per kilogram from November 15 to the last day of February and from July 15 to August 31, and 4.6 cents per kilogram during the rest of the year (Zahniser & Link, 2002). With the completion of NAFTA's transition to intraregional free trade on January 1, 2008, there were no longer tariff or quota barriers to bilateral agricultural trade between the United States and Mexico—not counting countervailing duties applied as trade remedies or trade barriers instituted as part of suspension agreements.

Regulatory coordination between the U.S. and Mexican Governments, particularly in the areas of phytosanitary (i.e., pertaining to plant health) measures and customs procedures, is a fourth factor explaining the long-term orientation of Mexico's horticultural sector on the U.S. market. NAFTA helped to set the tone for these efforts. The agreement recognized each member country's right "to adopt,

maintain, or apply any sanitary or phytosanitary measure necessary for the protection of human, animal, or plant life or health in its territory," while requiring that sanitary and phytosanitary (SPS) measures be scientifically based, nondiscriminatory, and transparent, and that such measures restrict trade in a minimal fashion. With these commitments in mind, the NAFTA Governments worked together—often on a bilateral basis—to fine tune their SPS measures in ways that facilitated trade and to cooperate on regulatory issues involving trade (Zahniser et al., 2020).

The USMCA, in turn, included chapters on sanitary and phytosanitary measures (chapter 9) and good regulatory practices (chapter 28). Like NAFTA, USMCA created a Committee on Sanitary and Phytosanitary Measures, whose responsibilities include the early identification and discussion of proposed SPS measures or the revision of existing SPS measures that "may have a significant effect on trade" (Office of the U.S. Trade Representative, 2025). In addition, USMCA acknowledges the possible formation of ad hoc or ongoing technical working groups on specific topics related to SPS measures.

U.S.-Mexico regulatory coordination is evident in avocados, the leading horticultural product imported by the United States from Mexico. From 1993 to 2007, a phytosanitary workplan allowed Hass avocados from certain municipalities in the Mexican state of Michoacán to enter progressively larger portions of the United States, until finally, imports to the entire United States were allowed. In 2016, the United States implemented a new phytosanitary workplan that potentially allows fresh avocados to be imported from any Mexican state, subject to a systems approach. As of the end of calendar year 2023, two Mexican states were eligible to export avocados to the United States: Michoacán and Jalisco (USDA, FAS, 2025). In 2023, these two states accounted for 75.8 percent and 10.9 percent, respectively, of Mexico's total avocado production (SADER, SIAP, 2025). Many other types of fresh fruit imported from Mexico are also subject to detailed phytosanitary requirements beyond an import permit, inspection at the Port of Entry, and the general requirements for all fruit and vegetable imports stated in U.S. Code 7 CFR 319.56-3. Examples include cherries, figs, grapefruit, guavas, limes, mangoes, nectarines, oranges, papayas, soursops, tangelos, and tangerines.[4]

A fifth factor is the sustained effort made by Mexican horticultural exporters to meet U.S. food safety standards. Passage of the Food Safety Modernization Act (FSMA) in 2011 gave the U.S. Food and Drug Administration (FDA) new authority to ensure the safety of the U.S. food supply, including both imported and domestically produced food. FSMA's main regulatory footprint was the issuance of seven new major rules related to food safety. The first compliance dates in this new set of rules were in 2016, with some compliance dates extending to 2025 as part of a deliberate effort to give small and very small businesses additional time to comply. For example, in FSMA's Produce Safety Rule, the compliance dates for covered activities (other than those involving sprouts and agricultural water requirements) were:

- January 26, 2018, for farms whose average value of produce sold during the previous 3-year period exceeded $500,000;

[4] The Agricultural Commodity Import Requirements (ACIR) database developed by USDA, Animal and Plant Health Inspection Service (APHIS) (2025) provides a comprehensive summary of the phytosanitary regulations governing imports of plant and agriculturally related products.

- January 28, 2019, for farms with an average value of produce sold greater than $250,000 and less than $500,000 (small businesses); and
- January 27, 2020, for farms with an average value of produce sold greater than $25,000 and less than or equal to $250,000 (very small businesses) (U.S. Department of Health and Human Services, Food and Drug Administration, 2024).

Zahniser et al. (2023a) conducted a case study of 26 Mexican horticultural companies to explore how the sector responded to FSMA's new requirements for food safety. The researchers discovered that 19 of the 26 companies already had initiated food safety programs prior to FSMA's enactment in 2011, and 7 of the companies reported that they had made no major change to these programs in response to FSMA. Thirteen of the companies noted that training the head of the company's food safety program was the main challenge faced as they responded to FSMA. All 26 companies in the study indicated that they relied on one or more third-party food safety certifications to demonstrate that they met food safety standards.

A sixth factor is that farmworkers' wages are much lower in Mexico than in the United States. In general, a day of farm labor in Mexico costs about the same as an hour of farm labor in the United States. A study of about 3,000 farmworkers in Mexico's export produce sector determined that their average daily wage in 2019 was roughly $10–15 when measured in U.S. currency, not counting certain in-kind benefits (e.g., social security, pensions, housing subsidies, childcare) sometimes paid to workers (Escobar Latapí et al., 2019). By contrast, the average hourly wage paid to hired farmworkers in the United States in 2019 was $14.91 (USDA, NASS, 2024).

To address U.S. concerns about the protection of worker rights and the enforcement of labor standards in Mexico, USMCA included several labor provisions that were not part of NAFTA. An annex to USMCA's labor chapter required multiple changes to Mexican law, including the elimination of all forms of compulsory or forced labor and the establishment of independent labor courts. Many of these changes were incorporated within a major labor reform enacted by the Mexican Government in 2019 (U.S. Congressional Research Service, 2023). In addition, USMCA created a Rapid Response Labor Mechanism that "allows the United States to take enforcement actions against individual factories if they fail to comply with domestic freedom of association and collective bargaining laws" (U.S. Department of Labor, Bureau of International Labor Affairs, 2025a). As of March 2025, this mechanism had been utilized more than 30 times, including 1 case involving an alleged denial of labor rights at a manufacturer of guacamole and salsa (U.S. Department of Labor, Bureau of International Labor Affairs, 2025b).

A seventh factor is the participation of U.S. agribusinesses in Mexico's horticultural sector. Although both NAFTA and USMCA contained provisions designed to facilitate foreign direct investment (FDI) (Zahniser, 2025), FDI in Mexico's horticultural production is relatively small. In all of Mexico's crop production sector (i.e., not just horticulture), annual inflows of FDI from all countries during 2007–23 averaged $67 million (calculated using data from table 3A in Secretaría de Economía, Comisión Nacional de Inversiones Extranjeras, 2024). U.S. agribusiness's involvement in the Mexican horticultural sector takes a variety of forms. For example, Driscoll's not only grows berries in Mexico and contracts with independent berry growers there, but it also operates nurseries in several Mexican states, allowing the firm to foster the development of berry varieties that can be produced for either export or Mexico's domestic market (Koger, 2022; Alarcón, 2024; Driscoll's, 2025). Another example is

Mission Produce, a vertically integrated company that sources avocados and mangoes in Mexico and other countries, ripens and distributes them in the United States and other destination markets, and operates packing houses in the United States, Mexico, and Peru (Mission Produce, 2025).

Finally, the United States is an upper-income country with a large population—making it an attractive market for Mexican horticultural producers. In 2023, GDP per capita, when expressed in 2023 U.S. dollars and using purchasing power parity (PPP), was about $81,695 in the United States and $25,602 in Mexico (World Bank, 2024). At midyear of 2024, the estimated population of the United States was 342.0 million, compared with 130.7 million for Mexico (U.S. Department of Commerce, Bureau of the Census, 2024). Thus, U.S. per capita income is about 3.2 times that of Mexico, and the U.S. population is about 2.6 times the size of Mexico's.

As a result of these factors, the horticultural sectors of Mexico and the United States are closely integrated, although perhaps not completely so. In a study of U.S. and Mexican horticultural markets during January 1998 to September 2008, Acosta Martínez et al. (2015) found that binational economic integration in these markets was partial and varied across commodities. In that research, integration was defined as the extent to which U.S. and Mexican prices follow the Law of One Price, a theory positing that identical products in different markets have the same price (Investopedia, 2024). Of the six commodities studied (avocados, cucumbers, onions, peppers, strawberries, and tomatoes), the U.S.-Mexico tomato market was shown to be the most integrated, followed by the markets for onions and peppers.

Changes in the Composition of U.S. Horticultural Imports From Mexico

The United States imports a wide variety of horticultural products from Mexico (table 1). During 2021–23, these imports averaged $18.8 billion per year in nominal terms and $19.7 billion per year in real terms. The five leading horticultural products imported from Mexico during that period were avocados, tomatoes, raspberries, peppers other than chile peppers (primarily bell peppers), and strawberries. The 20 products listed in table 1, from avocados to watermelons, accounted for 84.8 percent of all U.S. horticultural imports from Mexico (expressed in real terms) during 2021–23.

Table 1

U.S. horticultural imports from Mexico: 2007–09 versus 2021–23

Product	U.S. horticultural imports from Mexico, annual average, nominal terms			U.S. horticultural imports from Mexico, annual average, real terms			Share of total U.S. horticultural imports from Mexico, real terms		
	2007–09	2021–23	Change	2007–09	2021–23	Change	2007–09	2021–23	Change
	Millions of dollars		Percent	Millions of dollars, 2023 prices		Percent	Percent		Percentage points
Total, HS 06, 07, and 08	5,267	18,796	256.9	7,348	19,670	167.7	100.0	100.0	0.0
Avocados*	505	2,791	452.5	704	2,927	315.6	9.6	14.9	5.3
Tomatoes, fresh	1,076	2,526	134.7	1,501	2,643	76.1	20.4	13.4	-7.0
Raspberries, fresh*	62	1,187	1,808.3	87	1,241	1,330.7	1.2	6.3	5.1
Peppers other than chile peppers, fresh	306	1,114	263.6	428	1,170	173.4	5.8	5.9	0.1
Strawberries, fresh*	133	1,085	715.6	186	1,136	512.2	2.5	5.8	3.3
Cucumbers, fresh	288	717	148.8	403	749	85.8	5.5	3.8	-1.7
Grapes, fresh	258	687	166.7	359	716	99.1	4.9	3.6	-1.3
Limes (*Citrus latifolia*), fresh or dried*	137	648	371.9	192	677	253.2	2.6	3.4	0.8
Blackberries, fresh*	91	620	580.0	127	646	408.7	1.7	3.3	1.6
Blueberries, fresh*	1	553	71,693.0	1	579	60,001.1	0.0	2.9	2.9
Pecans, fresh or dried	172	535	211.5	240	562	134.6	3.3	2.9	-0.4
Lettuce, fresh*	70	492	603.4	97	514	427.7	1.3	2.6	1.3
Onions, fresh	186	399	114.0	260	417	60.6	3.5	2.1	-1.4
Cauliflower and broccoli, fresh*	62	398	538.3	87	416	378.7	1.2	2.1	0.9
Squash, fresh	194	388	99.6	271	405	49.5	3.7	2.1	-1.6
Chile peppers, fresh	242	384	58.8	338	401	18.8	4.6	2.0	-2.6

Product	U.S. horticultural imports from Mexico, annual average, nominal terms			U.S. horticultural imports from Mexico, annual average, real terms			Share of total U.S. horticultural imports from Mexico, real terms		
	2007–09	2021–23	Change	2007–09	2021–23	Change	2007–09	2021–23	Change
	Millions of dollars		Percent	Millions of dollars, 2023 prices		Percent	Percent		Percentage points
Cauliflower and broccoli, frozen	187	381	103.5	261	398	52.4	3.6	2.0	-1.5
Asparagus, fresh	135	376	179.2	188	396	110.5	2.6	2.0	-0.5
Mangoes, fresh (1)	123	339	177.1	171	355	107.8	2.3	1.8	-0.5
Watermelons	174	321	85.1	242	336	39.1	3.3	1.7	-1.6
Other products*	864	2,855	230.3	1,206	2,986	147.5	16.4	15.2	-1.2

Note: The products are listed from highest to lowest in order of their average annual nominal value of U.S. imports from Mexico during 2021–23. Products marked by an asterisk experienced an increase in their share of total U.S. horticultural imports from Mexico between 2007–09 and 2021–23. Gross Domestic Product (GDP) deflators were used to convert nominal values to real values expressed in 2023 prices. (1) Does not include mangosteens or guavas. HS = Harmonized Commodity Description and Coding System. The numbers 06, 07, and 08 refer to HS chapters.

Source: USDA, Economic Research Service using import data from U.S. Department of Commerce, Bureau of the Census, as compiled by USDA, FAS (2024b), and GDP deflators from U.S. Department of Commerce, Bureau of Economic Analysis (2024).

Between 2007–09 and 2021–23, the average annual value of U.S. horticultural imports from Mexico increased by 256.9 percent (from about $5.3 billion to $18.8 billion) in nominal terms and by 167.7 percent (from about $7.3 billion to $19.7 billion) in real terms (2023 prices) (table 1). Several noteworthy changes occurred in the composition of U.S. horticultural imports from Mexico during this period. First, while the real annual level of these imports increased by 167.7 percent, some products had larger increases and others had smaller increases, but all 20 products saw a real increase in imports. U.S. imports of raspberries and blueberries from Mexico each increased by more than 1,000 percent from small initial levels between 2007–09 and 2021–23. These products have relatively short histories of being grown in and exported by Mexico. Indeed, at the beginning of the period studied, when the last remaining tariff and quota barriers to U.S.-Mexico agricultural trade had just been removed as part of NAFTA, Mexico's raspberry and blueberry sectors were infant industries. According to Mexico's *Statistical Annual of Agricultural Production* (SADER, SIAP, 2024), the country first registered at least 1,000 hectares of raspberries harvested in agricultural year 2011 and at least 1,000 hectares of blueberries harvested in agricultural year 2013. In contrast, Mexico harvested about 10,300 hectares of raspberries and about 5,800 hectares of blueberries in agricultural year 2023. In addition, there were increases of between 200 percent and 1,000 percent in U.S. imports from Mexico of strawberries, lettuce, blackberries, cauliflower and broccoli, avocados, and limes. Other traditional horticultural imports from Mexico increased but at a slower pace—for example, tomatoes, peppers other than chile peppers, cucumbers, and grapes.[5]

[5] The rise of Mexico's export berry industry can also be seen in other metrics. Rocha-Ibarra et al. (2024), for example, used the export comparative advantage index, the revealed comparative advantage index, trade openness, and other measures to draw attention to Mexico's growing specialization in berry exports between 2001 and 2019.

Second, because imports of some horticultural products from Mexico grew faster than total horticultural imports from Mexico between 2007–09 and 2021–23, the shares of those products in the total increased, while products whose imports grew slower than the total had a decrease in share. In table 1, the products marked by an asterisk experienced an increase in their share of total U.S. horticultural imports from Mexico between 2007–09 and 2021–23, while the other products are ones whose share decreased.

Avocados, raspberries, strawberries, blueberries, and blackberries all saw their respective shares increase by a full percentage point or more. Indeed, avocados saw their share of total U.S. horticultural imports from Mexico increase by 5.3 percentage points while raspberries' share increased by 5.1 percentage points. Avocados were already an established part of U.S. horticultural imports from Mexico during 2007–09, accounting for 9.5 percent of the total while berries in general were just starting to become prominent parts of the trade.

The products listed in table 1 whose share of the total decreased the most were tomatoes (down 7.0 percentage points), chile peppers (down 2.6 percentage points), cucumbers (down 1.7 percentage points), squash (down 1.6 percentage points), and frozen broccoli and cauliflower (down 1.5 percentage points). During 2021–23, the five leading U.S. horticultural imports from Mexico were avocados, tomatoes, raspberries, peppers other than chile peppers, and strawberries. During 2007–09, the five leaders were tomatoes, avocados, peppers other than chile peppers, cucumbers, and grapes.

These product-specific statistics may mask important changes in trade for specific classes or varieties of individual products. For instance, greenhouses supply a rising share of U.S. tomato imports. In the early part of the 21st century, greenhouse tomatoes accounted for about 14 percent of the volume of U.S. tomato imports from all countries. By the early 2020s, this share had risen to 60 percent (Davis et al. 2024). The addition of new tariff codes in 2023 that distinguish among types of greenhouse and "not greenhouse" products (for instance, cherry, grape, round, and Roma tomatoes) may provide the means for deeper analysis of this aspect of U.S. horticultural imports from Mexico.

Increases in output by Mexico's horticultural sector made possible higher levels of U.S. horticultural imports from Mexico, as is indicated by the production statistics in table 2. This table compares the growth in Mexico's annual production of the leading horticultural products with the growth in U.S. imports of these products for the years 2007–09 and 2022–23. The period 2022–23 was used instead of 2021–23 because the Mexican Government did not collect production statistics for the full complement of agricultural products during agricultural years 2020 and 2021. While most of the matches of products between the Mexican production statistics and the U.S. import statistics were straightforward to make, a few were more challenging. For instance, the word "chile" in Spanish corresponds to the word "pepper" in English, but the term "chili pepper" in English is used to identify certain peppers that tend to have a spicier taste. The Mexican Government provides production statistics for many different chile varieties, while for many years, the U.S. Government's import statistics distinguished only between chili peppers and other peppers. Starting in 2023, however, U.S. import statistics began to distinguish between six types of chile peppers (jalapeño, sweet mini, anaheim, poblano, serrano, and other) and six types of peppers other than chile peppers (green, red, yellow, orange, sweet, and other). Frozen broccoli and cauliflower, included in table 1, are not listed in table 2 for want of Mexican production statistics for that product.

Table 2

Mexican production and U.S. imports of selected horticultural products: 2007–09 versus 2022–23

Product	Mexican production, annual average			U.S. horticultural imports from Mexico, annual average			Share of Mexican horticultural production exported to United States		
	2007–09	2022–23	Change	2007–09	2022–23	Change	2007–09	2022–23	Change
	Metric tons (thousands)		Percent	Metric tons (thousands)		Percent	Percent		Percentage points
Avocados*	1,178.8	2,757.0	133.9	251.5	1,035.2	311.6	21.3	37.5	16.2
Tomatoes	2,244.1	3,549.3	58.2	994.7	1,814.1	82.4	44.3	51.1	6.8
Raspberries*	13.3	184.5	1,292.3	10.2	121.0	1,089.7	76.7	65.6	-11.2
Peppers other than chile peppers	241.5	611.0	153.0	244.7	621.5	154.0	101.3	101.7	0.4
Strawberries*	205.9	609.8	196.1	73.3	255.8	249.2	35.6	41.9	6.4
Cucumbers	475.3	1,032.6	117.2	413.4	863.4	108.8	87.0	83.6	-3.4
Grapes	180.3	385.9	114.0	128.8	212.4	64.9	71.4	55.0	-16.4
Limes (*Citrus latifolia*)*	754.6	1,613.3	113.8	312.2	586.8	87.9	41.4	36.4	-5.0
Blackberries*	92.8	230.4	148.1	26.2	138.1	427.9	28.2	60.0	31.8
Blueberries*	0.6	73.5	11,699.3	0.2	69.7	39,940.2	27.9	94.8	66.9
Pecans	90.0	169.9	88.7	45.2	61.4	35.8	50.2	36.1	-14.1
Lettuce*	298.1	565.6	89.7	89.3	410.2	359.3	30.0	72.5	42.6
Onions	1,276.4	1,664.8	30.4	196.4	450.5	129.4	15.4	27.1	11.7
Cauliflower and broccoli*	372.8	753.2	102.1	91.9	338.1	268.1	24.6	44.9	20.3
Squash	519.8	687.7	32.3	238.0	445.0	87.0	45.8	64.7	18.9
Chile peppers	1,539.4	678.8	-55.9	277.4	923.5	232.9	18.0	136.1	118.0
Asparagus	57.1	352.6	517.1	59.2	158.4	167.5	103.6	44.9	-58.7
Mangoes	1,075.3	2,238.0	108.1	183.4	367.1	100.1	17.1	16.4	-0.7
Watermelon	1,084.8	1,303.0	20.1	391.6	653.8	67.0	36.1	50.2	14.1

Note: Products marked by an asterisk experienced an increase in their share of total U.S. horticultural imports from Mexico between 2007–09 and 2021–23 (see table 1). Import data for peppers other than chile peppers are matched to production data for chile verde morrón (bell pepper). Import data for limes are matched to production data for limón persa. Import data for pecans are matched to production data for nuez encarcelada (pecanera).

Source: USDA, Economic Research Service using production data from Secretaría de Agricultura y Desarrollo Rural, Servicio de Información Agroalimentaria y Pesquera (SADER, SIAP) (2024) and import data from U.S. Department of Commerce, Bureau of the Census, as compiled by USDA, Foreign Agricultural Service (2024b).

All 19 horticultural products listed in table 2—except chile peppers (in Spanish, chiles other than chile verde morrón)—saw increases in their annual average output between 2007–09 and 2022–23. Several products had very large percentage increases in output from very low initial levels in 2007–09—reflecting the fact that the beginning of the period studied roughly coincided with the start of that part of Mexico's horticultural sector. For instance, Mexico's annual average raspberry production increased by 1,292.3 percent between 2007–09 and 2022–23, while Mexico's blueberry production increased even more sharply at 11,699.3 percent. But longer established portions of Mexico's horticultural sector—avocados, peppers other than chile peppers, and strawberries, for instance—also saw substantial increases in production.

One outcome of the rise in U.S. horticultural imports from Mexico is that Mexico's horticultural sector became more oriented toward the U.S. market, as measured by the share of Mexican production imported by the United States. Between 2007–09 and 2022–23, this share increased for 12 of the 19 horticultural products listed in table 2. For 11 of the 19 products listed, the share during 2022–23 exceeded 50 percent, compared with 6 of the 19 during 2007–09. However, caution must be taken with the statistics in table 2 as there were a few products for which the calculation of the import share exceeded 100 percent (peppers other than chile peppers and asparagus during 2007–09 and peppers other than chile peppers and chile peppers during 2022–23).

Increases in U.S. horticultural imports from Mexico helped to boost per capita U.S. food availability for many types of fruit and vegetables (table 3). Thus, U.S. customers can consume more of certain fruits and vegetables because imports of those products have increased. As was the case for tables 1 and 2, the products marked with an asterisk in table 3 saw an increase in their share of U.S. horticultural imports from Mexico between 2007–09 and 2021–23. Table 3 compares the periods 2007–09 and 2019–21 rather than 2007–09 and 2021–23 because the latest complete set of food availability data are for the year 2021. For all products listed in table 3 except fresh tomatoes, fresh lettuce, and fresh watermelons, U.S. per capita retail food availability increased over the period examined. The reasons for the decrease in the availability of these three products are not known. Changes in availability can be driven by changes in U.S. and foreign consumer demand, including shifts in consumer preferences away from some products and toward others, and in U.S. and foreign production, which can be affected by weather and changes in input and transaction costs.

Table 3

U.S. per capita retail food availability and production of selected horticultural products: 2007–09 versus 2019–21

Product	U.S. per capita retail food availability, annual average			U.S. production, annual average		
	2007–09	2019–21	Change	2007–09	2019–21	Change
	Kilograms		*Percent*	*Metric tons (thousands)*		*Percent*
Avocados, fresh*	1.7	3.7	122.1	183.7	147.3	-19.8
Tomatoes, fresh (4)	7.4	7.1	-3.4	1,682.2	970.0	-42.3
Raspberries, fresh*	0.1	0.4	357.1	42.2	56.7	34.6
Bell peppers, fresh	4.0	4.6	14.4	740.6	482.3	-34.9
Strawberries, fresh*	1.8	2.8	57.1	644.0	932.7	44.8
Cucumbers, fresh (2)	2.7	3.2	19.1	421.9	177.6	-57.9
Grapes, fresh	3.3	3.5	4.1	835.9	867.5	3.8
Limes, fresh*	1.0	1.9	78.5	n.a.	n.a.	n.a.
Blackberries, fresh*	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Blueberries, fresh*	0.3	1.0	207.0	86.2	162.9	89.0
Pecans	0.2	0.3	18.9	62.1	65.0	4.8
Lettuce, fresh (3)*	11.7	10.4	-11.0	4,067.4	3,645.7	-10.4
Onions, fresh	8.7	8.7	0.2	3,038.4	2,791.2	-8.1
Cauliflower and broccoli, fresh*	3.2	3.4	8.3	1,167.4	1,070.3	-8.3
Squash, fresh	1.7	2.3	35.2	305.0	313.1	2.7
Chile peppers, fresh	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Cauliflower and broccoli, frozen	1.0	1.1	9.8	39.3	31.3	-20.3
Asparagus, fresh	0.5	0.8	52.0	35.5	22.7	-35.9
Mangoes, fresh (1)	0.9	1.5	69.3	n.a.	n.a.	n.a.
Watermelons, fresh	6.1	6.0	-2.2	1,757.2	1,570.7	-10.6

Note: Products marked by an asterisk experienced an increase in their share of total U.S. horticultural imports from Mexico between 2007–09 and 2021–23 (see table 1). Per capita availability data are measured in pounds in fresh-weight equivalent and then converted to kilograms. (1) Excludes mangosteens and guavas. (2) Production data for cucumbers do not include protected agriculture. (3) Sum of head lettuce and romaine. (4) Production data include estimates for greenhouse production. n.a. = not available.
Source: USDA, Economic Research Service, Food availability (per capita) data system (2024a).

Decreases in U.S. production of some horticultural crops have accompanied the increases in imports from Mexico. Of the 16 crops shown in table 4, 10 experienced a decline in U.S. production between 2007–09 and 2019–21. However, one must interpret U.S. statistics for horticultural imports and horticultural production with care, as the changes in U.S. food availability and U.S. production are not solely attributable to Mexico. Regarding imports, Mexico is one of many countries that sell horticultural products to the United States. During 2021–23, Mexico supplied 56.7 percent of total U.S. horticultural imports, while Canada (another USMCA country) and Peru (a U.S. free-trade partner via a bilateral accord) had shares of 10.4 percent and 6.7 percent, respectively (based on nominal values

(not inflation-adjusted) from USDA, FAS (2024b)). Mexico's and Peru's shares of total U.S. horticultural imports saw substantial increases during the period studied, while Canada's share declined by about 1 percentage point. During 2007–09, Mexico's share was 36.6 percent, Canada's share was 11.4 percent, and Peru's share was 2.3 percent (USDA, FAS, 2024b). The increase in Peru's share was mainly due to the country's emergence as a major exporter of fresh berries (Zahniser et al., 2023b).

Regarding production, U.S. statistics for horticultural production do not fully capture the output of protected agriculture, which relies on "protective structures such as greenhouses and shade houses to protect crops from climatic and biological damages and improve growth conditions," as defined by Wu et. al., (2022). For example, the statistics for cucumbers do not include protected agriculture, and the statistics for tomatoes rely on internal estimates rather than survey data for tomatoes grown in greenhouses. Moreover, increases in horticultural production occurred during the period studied for a variety of crops not shown in table 3—such as sweet potatoes, spinach, apples, and potatoes (Zahniser, 2023).

The Product Life Cycle Model and Horticultural Trade

The product life cycle model, as outlined by Levitt (1965), provides a framework for considering the process of growth and decline that products undergo during their life in the market. In this model, the life cycle of a product is defined in terms of the trajectory of its sales and is divided into four phases of the product's market: development (sometimes referred to as introduction), growth, maturation, and decline. In the words of Levitt, development occurs when a new product is launched, "Sales are low and creep along slowly." In the growth phase, "Demand begins to accelerate, and the total size of the market expands rapidly." In the maturity phase, "demand levels off and grows, for the most part, at the rate needed at the replacement and new-family formation rate." In the last phase, the product begins to lose its attractiveness to the consumer and sales decline.

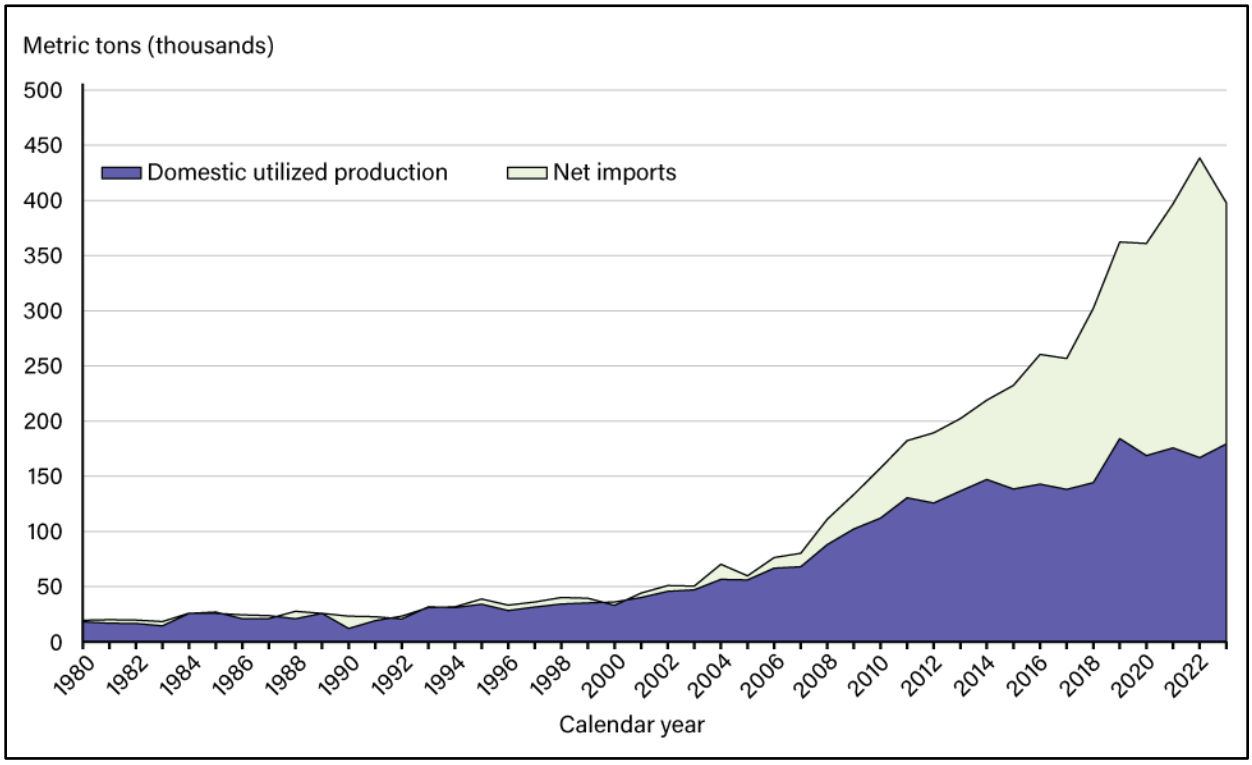
For many horticultural products such as tomatoes, Mexican growers entered the U.S. market during the maturity phase, since those products had been part of the U.S. diet for a long time and demand for those products was growing slowly. However, some horticultural products from Mexico entered the U.S. market early in the growth phase—almost at the same time when U.S. producers were trying to increase their production or had reached the limits of their domestic production. Another economist—Vernon (1966)—added the dimension of international competition to his analysis of the life cycle of products, suggesting that new countries enter the sector as producers as the product matures and become standardized. Although Vernon did not use the same set of phases as Levitt, Vernon seemed to conceive that imports of the product in question would begin to increase during the maturity phase. For some horticultural products such as avocados and blueberries, however, the experience of U.S. imports from Mexico has differed from what Vernon conceptualized, with imports beginning early in the growth phase.

For blueberries, U.S. imports began to increase around 2003—roughly the same time when U.S. production also began to grow more rapidly (figure 3). Together, these two developments enabled U.S. blueberry consumption (depicted in the figure as the sum of net imports and utilized domestic production) to increase substantially. Mexican growers played a central role in this consumption

growth, as the share of total U.S. blueberry imports supplied by Mexico climbed from 0.3 percent during 2007–09 to 22.4 percent during 2019–21 (USDA, FAS, 2024b).

Figure 3

U.S. fresh blueberry market: Utilized domestic production and net imports, 1980–2023

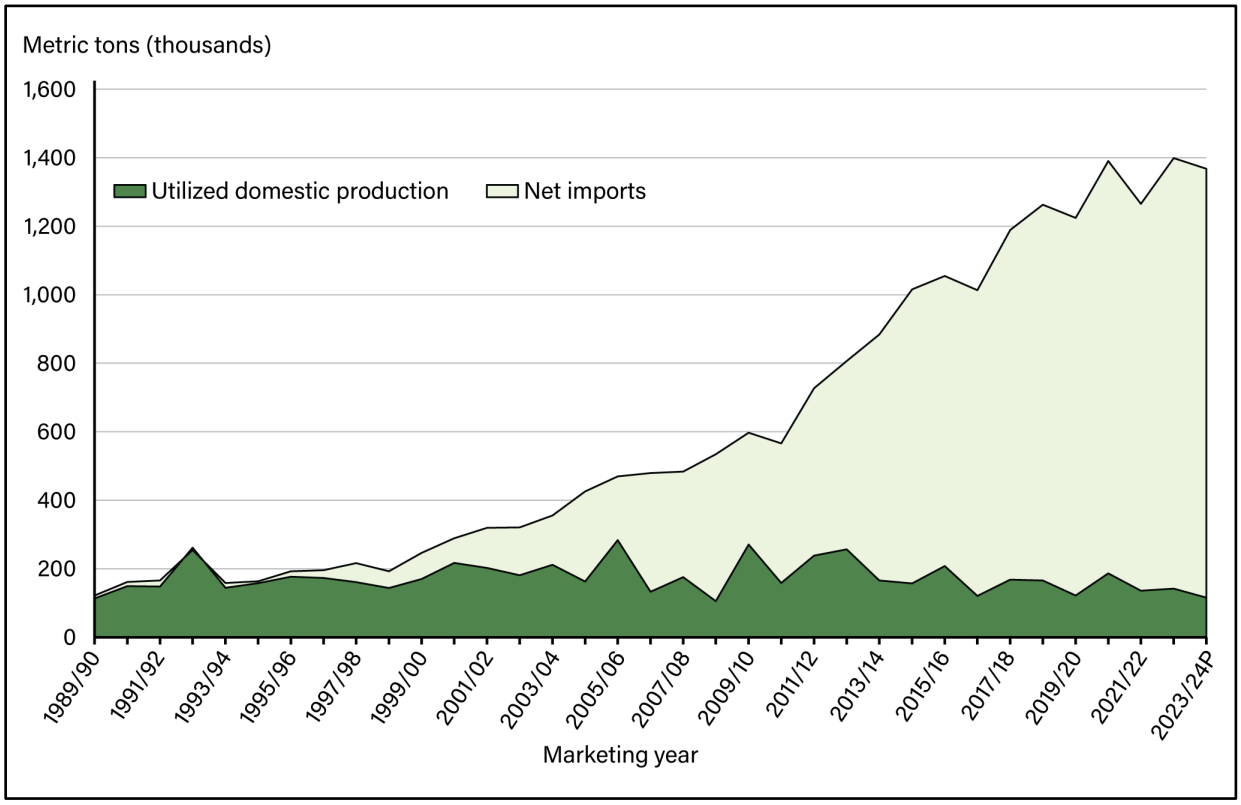


Note: The figure is a stacked area graph that "stacks" the values of net imports on top of the values of utilized domestic production to illustrate the total domestic supply. The figure depicts the supply of fresh blueberries only and not processed blueberry products. Data for 1993–2023 include wild blueberries for the fresh market, as well as tame blueberries.
Source: USDA, Economic Research Service, Fruit and Tree Nut Yearbook Tables (2024b).

For avocados, U.S. imports from Mexico began to increase around the time of the 1994/95 season, when the United States and Mexico implemented a phytosanitary workplan. As was the case for blueberries, an increase in imports helped make possible a substantial increase in U.S. domestic consumption, but these increases were not accompanied by an upward trend in U.S. avocado production (figure 4). Instead, U.S. avocado production fluctuated over the past three decades, without showing a clear upward or downward trend. Growth in the U.S. avocado industry is limited by the fact that a single State—California—accounts for about 90 percent of domestic production, in contrast to the blueberry industry, where production is spread more evenly across about 10 States (USDA, NASS, 2024).

Figure 4

U.S. fresh avocado market: Utilized domestic production and net imports, marketing seasons 1990/91–2023/24



Note: Data for 2023/24 are preliminary. The figure is a stacked area graph that "stacks" the values of net imports on top of the values of utilized domestic production to illustrate the total domestic supply. The figure depicts the supply of fresh avocados only and not processed avocado products. Beginning in 2002/03, the marketing season for California runs from November of the first year shown to October of the following year, and Florida's marketing season runs from June of the first year mentioned through the following March. In prior years, the marketing season for California lasted more than a 12-month period, running from November of the first year shown to November of the following year, and Florida's marketing season ran from June of the second year mentioned through the following March. Net imports are on a calendar-year basis. In the absence of U.S. production data for 2012/13 from USDA, National Agricultural Statistics Service (NASS), production data derived from estimates from the California Avocado Commission and the Florida Avocado Administrative Committee were used. Production estimates for the years 2018/19 through 2021/22 are derived from USDA, NASS and the California Avocado Commission.
Source: USDA, Economic Research Service, Fruit and Tree Nut Yearbook Tables (2024b).

Conclusion

Mexico's horticultural exports to the world experienced substantial growth between 2007–09 and 2021–23. According to the Mexican Government's trade statistics, the average annual value of this trade in real terms (i.e., adjusted for inflation, expressed in 2023 U.S. dollars) climbed from $8.2 billion to $19.6 billion over this period, an increase of 140.1 percent.

Throughout this period, the United States remained the destination for about 90 percent of Mexico's total horticultural exports. The Mexican Government's trade statistics indicate that such exports to the United States increased in real terms from an annual average of $7.5 billion during 2007–09 to $18.1 billion during 2021–23. The U.S. Government's trade statistics suggest that this trade was even larger, with the real average annual value of U.S. horticultural imports from Mexico growing from $7.3 billion to $19.7 billion between 2007–09 and 2021–23, an increase of 167.7 percent. Many factors made this increase possible, including Mexico's proximity to the United States, Mexico's favorable climate for growing produce, the Mexican horticultural sector's attention to food safety, the relative affordability of farm labor in Mexico, agricultural trade liberalization under first NAFTA and now USMCA, and growth in the U.S. population and its per capita income.

For almost all the products studied, U.S. horticultural imports from Mexico increased between 2007–09 and 2021–23. Imports of some products grew faster than imports of others, leading to changes in each product's share of the total. In terms of real average annual value, the five products whose share of U.S. horticultural imports from Mexico increased the most were avocados, raspberries, strawberries, blueberries, and blackberries, and the five products whose share decreased the most were tomatoes, chile peppers, cucumbers, squash, and watermelons. As a result of imports growing at different rates for different products, the ranking of horticultural products imported by the United States from Mexico also changed. The five leading imports during 2021–23 were avocados, tomatoes, raspberries, peppers other than chile peppers, and strawberries, while the five leading imports during 2007–09 were tomatoes, avocados, peppers other than chile peppers, cucumbers, and grapes.

Higher levels of horticultural production in Mexico made possible higher levels of U.S. horticultural imports from Mexico, which in turn facilitated higher levels of food availability in the United States, particularly for fresh produce. For some horticultural products—cucumbers, tomatoes, bell peppers, avocados, watermelon, and strawberries—U.S. production appears to have decreased during the period studied, although U.S. production statistics for certain crops may have some data limitations. Finally, the initiation of imports of some products such as avocados and blueberries from Mexico and other countries marked the start of a growth phase for these products when viewed through the lens of the product life cycle model.

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