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Vegetable and Pulses Outlook: April 2021

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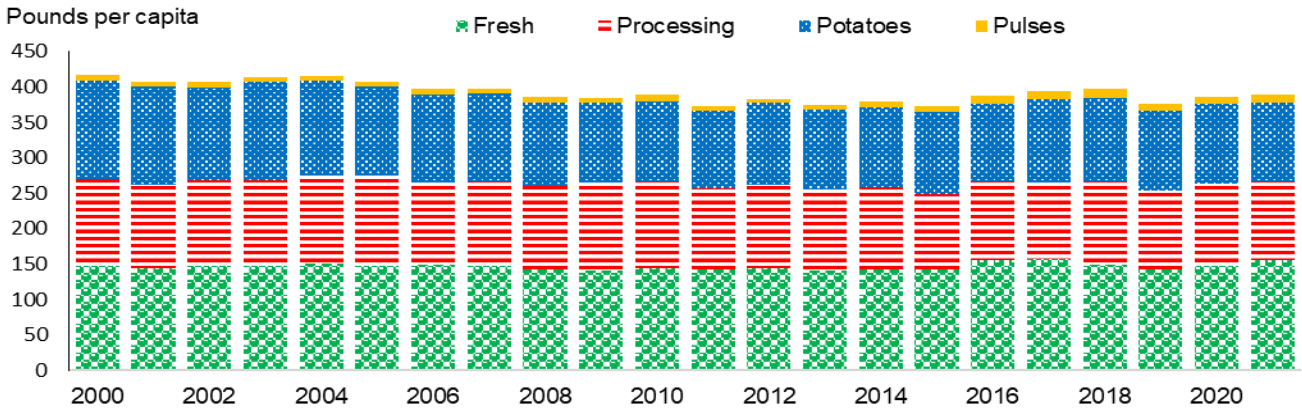
In this report:

Per Capita Availability Up in 2020

Despite a continuing global pandemic and a number of weather-related events, the U.S. vegetable industry was able to overcome the myriad of obstacles and challenges and continue to supply consumers with an almost uninterrupted flow of vegetables and pulse crops. According to preliminary data, this effort resulted in per capita domestic availability of all vegetables, potatoes, sweet potatoes, pulse crops, and mushrooms rising 3 percent to 390 pounds from 2019. Availability increased for fresh and processing vegetables, was about steady for potatoes, and declined for pulse crops and mushrooms. Much of the gain in availability was served by increased imports as aggregate domestic production was steady. As vaccinations become widespread, employment rises, and consumers can enjoy more pre-pandemic activities and behaviors, per capita vegetable availability is expected to increase again in 2021.

Per capita availability of all vegetables and pulses[1]



[1]Calendar year annual domestic availability per person.
Source: Computed by U.S. Dept. of Agriculture, Economic Research Service.

Industry Overview

Domestic Output Steady in 2020

Despite the pandemic's negative impact on the foodservice industry (more than 110,000 restaurant units closed) and widespread crop losses last spring due to the abrupt economic shutdown in March, domestic utilized production of vegetable and pulse crops was largely unchanged in 2020. The sizeable reduction in foodservice (industry sales were down about $200 billion from 2019) were perfectly offset by a combination of increased grocery store and online sales, community/farmer's markets, and deliveries through several food donation programs such as USDA's Farmers to Families Food Box Program and the Emergency Food Assistance Program. Diet surveys indicate that in recent years U.S. consumers sourced about one-third of their volume-based consumption through away-from-home dining.

As expected, utilized production of field-grown fresh-market vegetables declined 2 percent as greater output of crops such as leaf lettuce (up 25 percent), romaine lettuce (up 11 percent), and onions (up 3 percent) was outweighed by reduced production of most other crops such as cucumbers (down 32 percent), cauliflower (down 13 percent), tomatoes (down 11 percent), bell peppers (down 11 percent), sweet corn (down 10 percent), and iceberg lettuce (down 3 percent). Of interest was the surge in leaf-type lettuce output since foodservice is generally an important destination for salad greens. At retail, these leafy crops are largely sold pre-packaged in a wide variety of salad mixes that were in high demand by pandemic-weary consumers.

More than offsetting the reduction in field-grown fresh-market vegetable output was rising volume of fresh-market imports and falling export quantity. This combination resulted in more fresh products in the marketplace. A 2 percent increase in fresh vegetable import volume was led by crops from Mexico (up 3 percent), Costa Rica (up 9 percent), and Honduras (up 2 percent). A 3 percent reduction in fresh market export volume left more products in the country for domestic consumers. Destinations receiving reduced fresh vegetable volume from the United States in 2020 included Canada (down 3 percent), Taiwan (down 12 percent), and Japan (down 35 percent).

California tomato processors intend to contract for 12.1 million tons of tomatoes for processing into canned, frozen, and dried products—up 7 percent from the 11.3 million tons produced a year earlier. A year ago, the early California intentions report indicated a total of 12 million tons were planned by processors, but weather, periods of extreme heat, and smoke from wildfires

during the season reduced the final tally. This year may prove similar since the industry faces daunting challenges from irrigation water cutbacks/shortages due to low mountain snowpack this past winter, uneven/uncertain demand as the country and world struggle to emerge from the pandemic, relatively low tomato paste carryover, and higher input costs.

Assuming the impact of the pandemic begins to wane in the second half of 2021, potatoes and potato products may see a burst of demand as consumers resume some of their pre-pandemic activities such as travel and away-from-home dining. The restaurant industry expects sales to rebound by 11 percent from last year's low level but remain 15 percent below the pre-pandemic level of 2019 due to the thousands of restaurant units that closed permanently. Increases in potato product consumption will be served by rising domestic production, drawdown of processed stocks, or further gains in imports. Potato prices in 2020 (down about five percent from a year earlier) do not appear to be strong enough to take significant area away from higher-priced field crops, implying that any gain in national acreage this spring will likely be modest, with most emanating from increasing processor contracts. The first official indication of 2021 potato area will be released by USDA's National Agricultural Statistics Service in the June 30 Acreage report.

According to preliminary data, 2020 per capita domestic availability of all vegetables, potatoes, sweet potatoes, pulse crops, and mushrooms rose 3 percent to 390 pounds. Availability rose for fresh and processing vegetables, was about steady for potatoes, and declined for pulse crops and mushrooms. Much of the gain in availability was served by increased imports as aggregate domestic production was steady. Per capita vegetable availability is expected to increase in 2021 as vaccinations become widespread, employment rises, and consumers can enjoy more pre-pandemic activities and behaviors. In the year ahead, increased consumer spending on away-from-home meals will help buoy demand for vegetables, especially those with closer ties to foodservice meals such as french fries, tomato catsup, and coleslaw.

Prospective pulse crop (dry bean, pea, and lentil) acreage for 2021 is down 5 percent to 3.36 million acres. Prospective dry edible bean area is down 11 percent due to carryover from last year's large crop and stronger returns for competing crops such as corn, soybeans, and wheat, even though prices are averaging above a year earlier for most dry bean classes. With prices for competing crops above a year earlier, growers intend to plant 11 percent less area to dry edible peas. However, with good global demand, lower and stronger domestic Kabuli chickpea stocks, and rising prices, prospective area is up for lentils (up 16 percent) and chickpeas (up 7 percent).

Table 1. U.S. vegetable and pulse industry at a glance, 2017-20[1]

Item	Unit	2017	2018	2019	2020	Percent change 2019-20
Area harvested						
Vegetables, fresh and processed	1,000 acres	2,572	2,485	2,357	2,326	-1.3
Potatoes	1,000 acres	1,045	1,015	937	914	-2.5
Dry beans, peas, and lentils	1,000 acres	4,096	3,554	3,099	3,433	10.8
Mushrooms[2]	1,000 acres	33	30	27	31	13.3
Total	**1,000 acres**	**7,746**	**7,084**	**6,420**	**6,705**	**4.4**
Production, utilized						
Vegetables fresh	Million cwt	382	365	362	354	-2.4
Vegetables processing[4]	Million cwt	373	394	352	361	2.5
Potatoes	Million cwt	451	450	424	414	-2.4
Dry beans, peas, and lentils	Million cwt	58	63	55	65	20.1
Mushrooms[2]	Million cwt	9	9	8	8	-1.8
Total	**Million cwt**	**1,273**	**1,280**	**1,202**	**1,203**	**0.1**
Crop value						
Vegetables fresh	$ millions	12,441	10,695	11,618	11,058	-4.8
Vegetables processing[4]	$ millions	2,227	2,175	1,938	2,008	3.6
Potatoes	$ millions	4,135	4,006	4,217	3,911	-7.3
Dry beans, peas, and lentils	$ millions	1,343	1,263	1,087	1,415	30.1
Mushrooms[2]	$ millions	1,226	1,135	1,115	1,153	3.5
Total	**$ millions**	**21,372**	**19,274**	**19,975**	**19,545**	**-2.2**
Unit value [3]						
Vegetables fresh	$/cwt	32.60	29.34	32.06	31.25	-2.5
Vegetables processing	$/cwt	5.97	5.52	5.51	5.56	1.1
Potatoes	$/cwt	9.17	8.90	9.94	9.44	-5.0
Dry beans, peas, and lentils	$/cwt	23.16	20.17	19.93	21.61	8.4
Mushrooms[2]	$/cwt	131.37	130.57	134.02	141.27	5.4
Total	**$/cwt**	**16.79**	**15.06**	**16.62**	**16.25**	**-2.2**
Imports						
Vegetables fresh	$ millions	7,508	7,950	8,514	9,527	11.9
Vegetables processing[4]	$ millions	3,007	3,216	3,164	3,559	12.5
Potatoes	$ millions	1,367	1,511	1,530	1,734	13.4
Dry beans, peas, and lentils	$ millions	275	275	237	315	33.0
Mushrooms[2]	$ millions	355	403	435	480	10.2
Total	**$ millions**	**12,511**	**13,355**	**13,881**	**15,615**	**12.5**
Exports						
Vegetables fresh	$ millions	2,272	2,312	2,393	2,300	-3.9
Vegetables processing[4]	$ millions	2,325	2,236	2,195	2,035	-7.3
Potatoes	$ millions	1,814	1,787	1,925	1,674	-13.0
Dry beans, peas, and lentils	$ millions	841	535	622	783	16.1
Mushrooms[2]	$ millions	41	47	44	42	-4.3
Total	**$ millions**	**7,293**	**6,917**	**7,178**	**6,833**	**-4.8**
Per-capita availability						
Vegetables fresh	Pounds	157.2	149.6	142.0	147.0	3.5
Vegetables processing[4]	Pounds	107.5	117.5	111.1	116.9	5.3
Potatoes	Pounds	117.8	117.6	112.6	112.8	0.2
Dry beans, peas, and lentils	Pounds	11.5	13.2	10.4	9.6	-7.1
Mushrooms[2]	Pounds	4.0	3.9	3.8	3.7	3.7
Total	**Pounds**	**397.9**	**401.9**	**379.8**	**390.1**	**2.7**

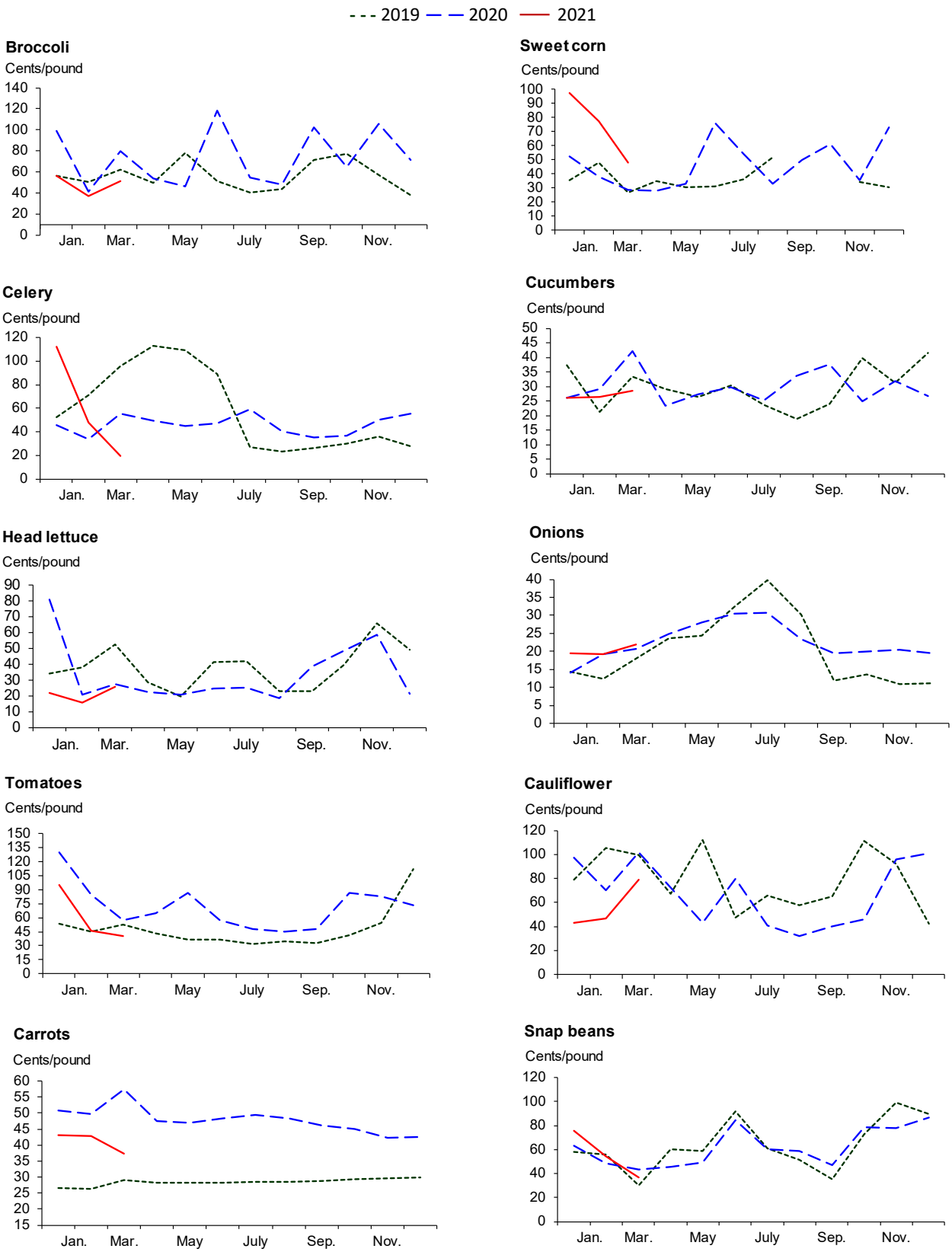
[1] Total values rounded. [2] Mushroom area equals total fillings (multiple crops). [3] Ratio of total value to total production.

[4] Includes canned, frozen, and dried. Excludes potatoes, pulses, and mushrooms. All international trade data are expressed on a calendar-year basis. Hundredweight (cwt) = 100 pounds.

Sources: USDA, Economic Research Service calculations using USDA, National Agricultural Statistics Service data and U.S. trade data from U.S. Department of Commerce, U.S. Census Bureau.

Figure 1

Free-on-board (f.o.b.) prices for selected fresh-market vegetables



Sources: USDA, Economic Research Service calculations using USDA, National Agricultural Statistics Service and USDA, Agricultural Marketing Service, *Market News* data.

Commodity Highlights

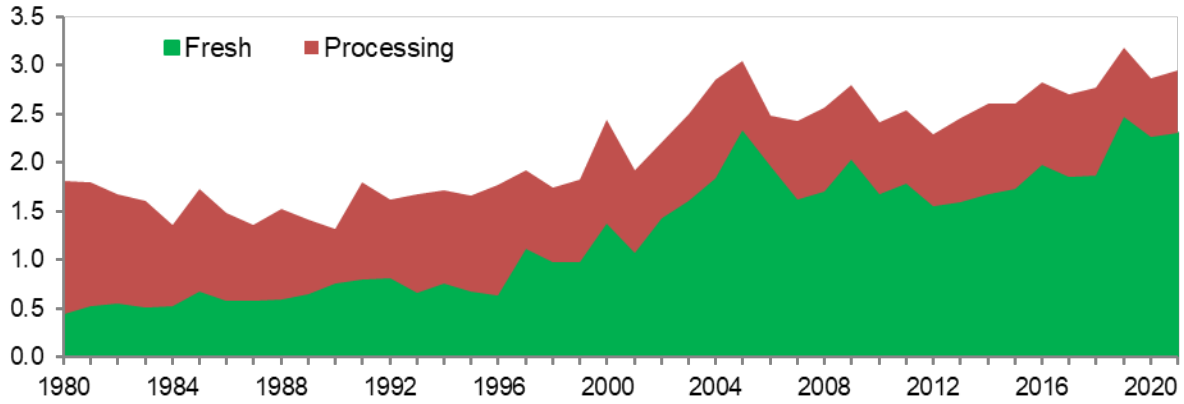
Spinach: Fresh and Processing Per Capita Availability

Driven by fresh-market use, consumer interest in spinach rose in the United States during the past few decades due to new products (e.g., baby bagged spinach), rising disposable incomes, and shifts in U.S. consumers' tastes and preferences. In addition to use as a salad green and plate vegetable, spinach has long enjoyed a reputation as a functional food packed with vitamins and minerals beneficial to human health, including vitamins C and A, the carotenoid lutein (may promote eye health), iron, folic acid, and magnesium. Total per capita availability of this leafy green (in the same family as table beets and Swiss chard) has trended upward since bottoming out in the late 1980s. Per capita availability of all spinach (on a fresh-weight basis) totaled 3.2 pounds in 2019, the highest since 1960.

As it was before World War II, the fresh market is currently the primary driving force in the spinach market (figure 2). Fresh per capita availability peaked in 1939 at 2.9 pounds after which the convenience of canned spinach was joined by the surging popularity of frozen spinach (frozen vegetables were viewed as upscale) to whittle away at fresh availability. Along with green peas, spinach was the first frozen vegetable to be test marketed in retail stores in 1930, jump-starting a new retail food sector.

Trending higher, the fresh market accounted for 70 percent of domestic spinach availability during 2015-19, up from 49 percent 20 years prior. Since falling to historic lows in the early 1970s, fresh-market spinach availability has trended upward, peaking at a record

Figure 2
U.S. spinach per capita availability, 1980-2021
Pounds



Source: Computed by USDA Economic Research Service.

729 million pounds in 2015-19—about 12 times greater than in 1970-74 (table 2). A temporary trough in this upward trend occurred following the 2006 e-coli food safety outbreak traced back to spinach, requiring several years for consumer trust to be restored.

Table 2: Fresh spinach: U.S. supply and availability

Period	Area harvested	Yield per acre	Production	Imports	Total supply	Availability			Nominal price
						Exports	Domestic	Per capita	
	1,000 acres	*Cwt/acres*	*Million pounds*					*Pounds*	*Dollars/cwt*
1970-74	10,710	58	61	0	61	0	61	0.29	13.86
1974-79	11,264	73	83	0	83	7	76	0.34	19.26
1980-84	15,725	83	139	0	139	20	119	0.51	27.14
1985-89	--	--	174	7	181	26	155	0.62	27.68
1990-94	17,750	123	219	2	222	27	195	0.76	28.46
1995-99	20,970	125	265	4	270	32	238	0.87	32.16
2000-04	31,530	146	463	16	479	56	423	1.47	31.50
2005-09	36,034	169	609	18	627	46	581	1.93	31.70
2010-14	33,818	170	571	15	586	66	521	1.66	42.48
2015-19	50,778	138	702	26	729	85	644	1.98	59.28

Note: Cwt = hundredweight (100 pounds), -- = not available. 1/ Production estimated by ERS for 1983-91.

Source: Compiled and computed by USDA, Economic Research Service.

At the same time, availability of processed spinach, although unaffected by the food safety incident, did not changed greatly over the past few decades (table 3). While consumers show a preference for fresh-market produce, frozen foods (including prepared frozen foods that contain spinach) remain popular. Although per capita availability of canned spinach trended sharply lower, availability of frozen spinach steadied since peaking in 2004 and now accounts for about 85 percent of processing spinach.

Table 3: Processing spinach: U.S. supply and availability

Period	Area harvested	Yield per acre	Production	Imports	Total supply	Availability			Nominal price
						Exports	Domestic	Per capita	
	Acres	*Tons/acre*	*Million pounds*					*Pounds*	*Dollars/cwt*
1970-74	25,804	6.35	328	0	458	2	311	1.48	47.50
1974-79	21,422	7.14	306	0	466	5	310	1.41	72.84
1980-84	20,755	6.13	254	0	384	6	263	1.14	96.62
1985-89	--	--	220	0	286	6	215	0.89	97.60
1990-94	15,500	7.78	241	0	324	10	223	0.87	105.56
1995-99	14,854	8.61	256	9	354	11	249	0.91	112.96
2000-04	13,316	9.32	248	18	349	13	265	0.92	114.80
2005-09	10,140	9.17	186	54	303	14	223	0.74	118.20
2010-14	8,600	9.76	168	96	332	15	252	0.80	133.00
2015-19	8,028	8.52	137	141	340	7	272	0.84	197.60

Notes: Tons = short (2000 pounds), -- = not available. 1/ Production estimated by ERS for 1983-91.

Source: Compiled and computed by USDA, Economic Research Service.

According to the United Nations' Food and Agriculture Organization, the United States is the world's second-largest producer of spinach, with 4 percent of world output, following China, which accounts for 76 percent. California (68 percent of 2018-20 U.S. output), Arizona (23 percent), and Texas (4 percent) are the top producing States, with 7 other States reporting production of at least 100 acres. The farm value of the U.S. spinach crop (fresh and for processing) averaged $490 million per year during 2018-20, with the fresh-market accounting for 97 percent.

Spinach has taken hold in the expanding organic vegetable market (organic vegetable sales were valued at $2.1 billion in 2019). About one-third of domestic spinach acreage was produced under organic culture in 2019. According to the 2019 Organic Vegetable Survey, organic spinach acreage totaled 23,018 acres—second only to potatoes among commodities grown organically. Organically produced spinach accounted for about one-fifth of all spinach produced in 2019. As in conventionally produced spinach, California farms account for the vast majority (78 percent) of organic spinach production.

The import share of availability of fresh spinach trended higher but still averaged just 4 percent during 2015-19—about double 2 decades earlier. For many vegetables, the increase in fresh import share over the past decade was much more pronounced than for the processing side of the market. The opposite is true for spinach, with frozen imports trending sharply higher over the past two decades.

During 2015-19, the import share of processing spinach averaged 52 percent—up from less than 4 percent during 1995-99, with import volumes trending higher over the past 20 years. The leading suppliers of frozen spinach are China (55 percent of 2015-19 volume), Mexico (33 percent), and Belgium (3 percent). Dried and dehydrated spinach imports account for about 5 percent of processed spinach imports and are also trending higher. On average, dehydrated spinach imports during 2015-19 were more than 5 times greater than 1995-99.

As a share of the supply, U.S. exports of fresh and processing spinach did not change greatly over the past few decades. During 2015-19, nearly 12 percent of fresh spinach supplies were exported—about the same as 2 decades earlier. For processing spinach, 2 percent of supplies were exported on average during 2015-19—down slightly from 2 decades earlier.

Fresh Market Vegetables

Production Declines Widespread in 2020

Widespread fresh-market production declines permeated 2020 but total production was only down 2 percent. Table 4 shows several fresh-market vegetables with double-digit percent change declines in utilized production; cucumbers (down 32 percent), spinach (down 25 percent), chile peppers (down 18 percent), artichokes (down 15 percent), cauliflower (down 13 percent), snap beans (down 12 percent), bell peppers and tomatoes (down 11 percent each), and asparagus, garlic, and pumpkins (each down 10 percent). Less than a handful of commodities garnered positive gains, but the production gains of lettuce and onions buoyed overall production with leaf lettuce (up 25 percent), romaine lettuce (up 11 percent), onions (up 3 percent), and celery (up 2 percent).

Table 4. Annual U.S. utilized production of selected fresh-market vegetables

Commodity	2017	2018	2019	2020p	Change 2019-20[2]
	Million pounds				*Percent*
Artichokes[1]	93.6	100.1	95.7	81.2	-15
Asparagus	65.3	61.8	58.1	52.1	-10
Broccoli	1,990.8	1,677.8	1,583.6	1,525.9	-4
Cabbage	1,976.5	1,729.7	1,946.3	1,914.3	-2
Carrots	2,085.7	3,661.6	2,432.1	2,229.3	-8
Cauliflower	869.0	930.9	1,005.8	879.7	-13
Celery[1]	1,608.9	1,751.6	1,573.6	1,612.8	2
Cucumbers	502.9	559.6	459.2	314.1	-32
Garlic	175.4	183.1	134.0	121.0	-10
Lettuce	9,937.9	8,031.8	8,168.6	8,659.7	6
Head	4,939.6	4,056.1	4,200.8	4,066.4	-3
Leaf	1,367.5	1,072.8	1,246.7	1,563.6	25
Romaine	3,630.8	2,902.9	2,721.2	3,029.7	11
Onions	6,038.6	4,843.3	4,784.3	4,945.7	3
Peppers, bell	1,200.4	1,153.5	920.7	821.9	-11
Peppers, chile[1]	333.6	266.5	291.9	238.0	-18
Pumpkins	968.4	987.8	907.1	819.4	-10
Snap beans	377.1	386.3	304.0	268.7	-12
Spinach	663.4	674.3	856.1	644.8	-25
Squash	574.5	511.6	510.6	498.9	-2
Sweet corn	2,361.3	2,254.8	1,677.3	1,514.9	-10
Tomatoes	2,097.0	1,977.4	1,421.5	1,261.9	-11
Selected fresh subtotal	**33,920.0**	**31,743.5**	**29,130.4**	**28,404.4**	**-2**
Mushrooms	838.4	839.1	767.4	760.8	-1
Potatoes	11,433.6	10,791.5	10,173.5	10,086.8	-1
Sweet potatoes[1]	3,564.6	2,737.8	3,197.3	3,066.8	-4
Total	**83,676.7**	**77,855.3**	**72,398.9**	**70,723.1**	**-2**

p = preliminary. -- = not available.

[1] All uses. [2] Percentage changes based on data for comparable States for 2019 and 2020.

Source: USDA, Economic Research Service calculations using USDA, National Agricultural Statistics Service data.

Cucumber Production Continues Declining Trend in 2020

The fresh-market cucumber production decline of 32 percent to 314.1 million pounds in 2020 is the largest year-to-year decline in cucumber history reaching an all-time low since fresh-market production values were first provided by the National Agricultural Statistics Service (NASS) in 1998. NASS provided fresh-market cucumber production values for Michigan, Florida, North Carolina, California, and Texas. All other cucumber-producing States are grouped under “Other States.” The State with the largest cucumber production decline from 2019 to 2020 was Michigan—down 59 percent. NASS reported downy mildew which affected yield in July amid humid weather in Michigan while harvesting cucumbers mid-June through early August.

The Risk Management Agency (RMA) data on causes of loss reported 48 cucumber production-based crop insurance policies with 4,420 insured acres planted across Michigan, Texas, Maryland, Florida, and Delaware. RMA data reveals 94 percent of the insured planted acres in Michigan were lost due to either heat, excess moisture/precipitation/rain, or drought in June-October 2020. NASS also reported heat in California reducing the quality of the cucumber crop in the summer months. The only State with positive gains in cucumber production for 2020 was North Carolina with an increase of 10 percent.

Although annual NASS production statistics only provide information for five States grouping the remainder in “Other States,” the 2017 agricultural census provides a broader picture. The census indicates fresh-market cucumber production was reported in 43 States. The decline in fresh-market cucumber production is not unique to 2020 as the long-term downward trend is influenced by rising cucumber import competition. The effects of import competition on select fresh-market vegetables is addressed in greater detail in the special article that accompanies this report. In addition to production, cucumber area harvested and yield for all utilizations also declined by 8.3 and 6.1 percent respectively in 2020. This contributed to the 16.7 percent rise in the cucumber season average price in 2020.

Pandemic Effects of Fresh Market Vegetable Production

Impacts from the pandemic affected fresh-market vegetable production by either decreased demand as restaurants closed or decreased availability of labor. Bell pepper and chile pepper production were down by 11 and 18 percent respectively from 2019. NASS reported some producers diverted fresh market bell peppers to the processing market due to pandemic related stoppages in the supply chain in addition to hot weather and wildfires in California. Broccoli

production was down 4 percent as restaurants did not require as much broccoli volume and some broccoli producers in Arizona and California intentionally left the crop in the fields due to the lack of demand.

Farmers to Families Food Box Program

USDA's Farmers to Families Food Box Program began in April 2020 as part of the Coronavirus Food Assistance Program. The program purchases agricultural products (e.g., fresh produce, dairy, meats), packages the family-size boxes weighing at least 20 pounds each, and distributes them across the country to families in need through local food banks, churches, and other non-profit organizations. The program not only benefits food box recipients, but aids producers and distributors affected by the closure of restaurants, hotels, and other food service businesses. The Agricultural Marketing Service (AMS) partners with farms, farmer associations, and distributors and is now on its fifth round. By the end of April 2021, delivered food boxes will total 155.1 million.

Fresh Vegetable Industry Weathering Storms

The U.S. met several challenges with a record number of weather-related events affecting the fresh-vegetable market while the country was also struggling with pandemic-related impacts. The National Oceanic and Atmospheric Administration (NOAA) reported 22 separate billion-dollar weather events costing the U.S. 95 billion dollars and broke the previous annual record of 16 weather events in 2017 and 2011. NOAA reported the most costly events in 2020 were the historic wildfires which primarily affected California but also affected Oregon, Washington, and Colorado; the August derecho which affected the Midwest, predominantly Iowa and Illinois; and Hurricane Laura which affected the Gulf Coast States but mostly Louisiana. The sweet potato crop is just one example of a fresh vegetable affected by one of these weather events.

Sweet potato planted acres were up by 7 percent from 2019; however, production was down by 4 percent. NASS reported sweet potato yield in North Carolina, the largest producer of sweet potatoes, was affected by excessive rain at the end of the growing season in 2020. Reports and data from both NOAA and RMA support the precipitation challenges affecting sweet potato production in the Southeast as well. NOAA reported a record-breaking number of hurricanes in 2020 which affected sweet potato production in Louisiana. In August-October 2020, RMA recorded over 660 acres of sweet potato lost with crop insurance indemnities paid out of over

$300,000 in Avoyelles, Morehouse, and West Carroll Counties, Louisiana due, to hurricane/tropical depression and excess moisture/precipitation/rain.

California's Low Snowpack in 2021

Wildfires in California can be prevalent due to a low snowpack from the California mountains. A low snowpack means less runoff of melted snow from the Sierra Nevada as the snowpack acts as a natural reservoir. At sufficient levels, the snowpack supplies a third of California's annual water supply needed in the drier summer months. March and April are key months as strong storms could replenish low reservoirs avoiding a dry summer prone to wildfires. California's Department of Water Resources (DWR) is monitoring snowpack levels closely as 2021 could potentially be another dry year if strong storms do not materialize. California's snowpack is typically the deepest and has the highest snow water equivalent (SWE) on April 1st. On April 1, 2021, DWR's manual recorded surveys indicated 83, 70, and 58 percent of the average in Southern Sierra, Northern and Central Sierra, and in the Feather River respectively which means 2021 will be a critically dry year for California. However, DWR is prepared for the drought with several programs emphasizing water use efficiency and conservation.

Texas February 2021 Freeze

The Texas freeze extended 9 days, February 11-20. This freeze affected a wide variety of fresh vegetables, though more than a month later, the impacts are still being assessed and some are still coming as spring harvest for some crops will occur in April through June. The last notable freezes in Texas were in 1989 and 1983, but near freezing temperatures are not unknown in South Texas, such as during the 2004 Christmas Eve snowstorm. A Florida freeze of this magnitude and duration would have had severe consequences for U.S. vegetable prices into the spring. Texas produces a wide variety of vegetable crops and accounts for about 2 percent of U.S. vegetable area (3 percent fresh and 1 percent processing).

Although NASS surveys report about half of Texas vegetable area on an annual basis, the 2017 Census indicated that Texas harvested a little over 100,000 acres of vegetables and melons—about 85 percent for fresh market. Any unprotected warm-season vegetable (e.g., tomatoes, peppers, cucumbers, snap beans, squash) subject to several hours of temperatures below freezing would likely be destroyed. Some cool season vegetables, like cabbage, can withstand freezing temperatures for several hours but can be damaged over an extended period of below freezing temperatures.

The top vegetable crops in Texas are potatoes (23,000 acres), bulb onions (12,000 acres), and

cabbage (5,400 acres). A portion of the potato crop was likely planted in February. However, most onions were already planted and account for a sizeable volume of the spring sweet onion market. Most consist of the Texas 1015 sweet variety (analogous to the Vidalia onion) which command higher prices than the more pungent storage onion harvested in the fall and sold through April. The freeze may have damaged the more mature of these onions (as the tops would have been exposed) while the foliage on other onions may have been damaged to the point of stopping growth. Depending on how much smaller the surviving onions are this year, some price impact in the onion market may start in April when the spring season begins.

The High Plains area of Texas hosts half of the State's potato crop. As this area is not as reliably warm in winter as the Rio Grande Valley, it is unlikely that growers would have begun planting potatoes. However, potatoes were likely planted in both the Rio Grande Valley and the Winter Garden area near San Antonio. Some of the potato area is usually contracted for processing into potato chips in the spring (around April).

Although head cabbage (5,400 acres) is hardy, any damage may be significant to the market in March or April 2021. Although Texas harvests just under 8 percent of annual cabbage acreage, the State accounts for about a fifth of all shipments in March for the St. Patrick's Day peak in fresh market cabbage movement.

Consumers Demand More Organic Vegetables in 2021

First quarter analysis of various price indicators from 2020 to 2021 reveal non-organic fresh vegetable prices are down. Advertised retail prices provided by the Agricultural Marketing Service (AMS) show first quarter non-organic prices for fresh cucumbers are down by 44 percent from 2020 to 2021 while organic cucumber retail prices rose sharply by 138 percent during the same period. This suggests consumer demand for organic cucumbers in the first quarter of 2021 was greater than the demand for non-organic cucumbers. Similarly, increased consumer demand for other organic fresh vegetables over their non-organic counterparts are indicated by sharp percentage differences in retail prices within the same period for commodities such as organic beets, broccoli, carrots, cauliflower, lettuce, portabella mushrooms, and vine ripe tomatoes (see table 5).

Table 5. U.S. vegetable advertised retail prices per pound, 2020-21

Select Commodities	2020 - 1st Quarter		2021 - 1st Quarter		2020-21 Change - 1st Quarter[1]	
	Non-Organic	Organic	Non-Organic	Organic	Non-Organic	Organic
	---------- *Dollars per pound* ----------				*Percent*	*Percent*
Asparagus, green	2.49	3.50	2.67	4.21	7.4	20.1
Beans, round green (snap)	1.61	2.47	1.70	2.67	6.0	8.0
Beets	0.71	1.75	0.65	2.59	-7.6	47.9
Broccoli, unspecified	1.50	1.94	1.42	2.16	-5.3	11.6
Broccoli, crown cut	1.70	2.51	1.49	2.61	-12.4	4.0
Brussels sprouts	2.19	3.99	2.57	4.08	17.6	2.4
Cabbage, all	0.56	1.11	0.57	1.26	1.3	13.7
Carrots, unspecified	0.74	1.32	0.73	1.35	-1.2	2.6
Carrots, baby peeled	1.36	1.68	1.32	1.76	-3.4	4.4
Cauliflower	1.30	1.55	1.27	1.93	-2.4	24.6
Celery, unspecified	1.38	1.49	1.15	1.34	-16.5	-10.2
Celery, hearts	2.51	2.56	2.49	2.74	-0.9	7.0
Cucumbers, all	1.58	0.99	0.88	2.37	-44.0	138.9
Eggplant	1.26	1.99	1.31	1.64	3.8	-17.6
Garlic	3.10	4.47	3.35	3.99	7.9	-10.6
Greens, kale/collards	1.93	2.49	1.93	2.04	0.0	-18.3
Lettuce other, all	1.58	2.38	1.54	2.99	-2.4	25.6
Lettuce, romaine	1.42	1.33	1.54	2.24	8.8	68.7
Lettuce, romaine, hearts	0.83	1.01	0.87	1.10	4.5	8.9
Mushrooms, portobella	1.10	1.08	1.06	1.26	-3.7	16.8
Mushrooms, white	1.29	1.17	1.28	0.80	-0.6	-31.3
Onions dry, all	1.02	1.59	1.04	1.82	1.7	14.0
Peppers, bell, green	1.46	1.73	1.48	2.01	1.6	16.4
Peppers, bell, non-green	2.69	3.72	2.64	3.78	-1.9	1.5
Peppers, mixed mini sweet	2.84	3.43	3.17	4.16	11.7	21.4
Potatoes, round red	1.33	1.49	1.06	1.55	-20.3	4.3
Potatoes, round white	1.00	0.50	1.02	1.25	1.9	151.8
Potatoes, russet	0.78	1.46	0.80	1.40	2.6	-3.8
Potatoes, yellow	1.08	1.51	1.37	1.69	26.7	12.0
Spinach, flat, baby	3.24	7.72	3.38	7.35	4.3	-4.7
Squash, acorn/butternut/spaghetti	1.09	1.32	0.94	1.20	-13.6	-9.3
Squash, yellow crook/straight neck	1.49	1.69	1.29	1.78	-13.4	5.9
Squash, zucchini	1.40	2.05	1.25	1.84	-11.0	-10.2
Sweet potatoes	0.92	1.96	0.93	1.63	0.6	-17.0
Swiss chard	1.87	2.79	1.14	1.67	-39.2	-40.1
Tomatoes, unspecified	1.62	2.96	1.75	2.72	8.0	-8.3
Tomatoes, cherry	3.45	3.67	2.70	2.41	-21.7	-34.2
Tomatoes, grape	3.24	4.19	3.58	4.09	10.5	-2.5
Tomatoes, plum, roma	1.16	2.25	1.02	1.89	-12.5	-15.9
Tomatoes, vine ripe, heirloom	3.63	3.95	3.50	3.68	-3.6	-7.0
Tomatoes, vine ripes	1.85	2.45	1.60	3.56	-13.3	45.4

Note: Q = calendar quarter. Data exclude greenhouse. 1/ Change in first quarter 2021 from previous quarter/year.
Source: USDA, Economic Research Service calculations using USDA, Agricultural Marketing Service, *Market News* data.

Steady Rise in Fresh Vegetable Imports, Exports Down

The U.S. remains a net importer of fresh market vegetables with the import volume increasing by 3 percent in 2020 and the volume of fresh vegetable exports down by 4 percent in 2020 (see table 6).

Table 6. Selected fresh-market vegetable trade volume, 2017-20[1]

Item	January - December				Change
	2017	2018	2019	2020	2019-20
	Million pounds				*Percent*
Imports, fresh:					
Tomatoes, all	3,944	4,092	4,023	4,053	1
Cucumbers	1,944	2,081	2,145	2,193	2
Peppers, bell	1,457	1,535	1,613	1,667	3
Squash[2]	1,077	1,130	1,206	1,210	0
Peppers, chile	990	994	957	970	1
Lettuce, all	597	617	789	821	4
Asparagus	503	568	572	586	2
Carrots	459	494	504	467	-7
Broccoli	486	423	493	542	10
Other	3,874	4,121	4,370	4,542	4
Subtotal	**15,330**	**16,056**	**16,671**	**17,050**	**2**
Mushrooms	133	151	168	179	6
Potatoes, excl. seed	944	911	763	927	21
Sweet potatoes	23	29	25	20	-19
Total	**16,430**	**17,146**	**17,628**	**18,175**	**3**
Exports, fresh:					
Onions, dry bulb	670	708	810	740	-9
Lettuce, excl. head	424	416	439	418	-5
Lettuce, head	260	258	243	235	-3
Cauliflower	249	284	243	238	-2
Carrots	153	165	153	150	-2
Tomatoes, all	185	183	173	145	-16
Sweet corn	151	147	126	134	6
Peppers	107	104	104	98	-5
Spinach	82	84	96	103	7
Other	1,278	1,255	1,196	1,176	-2
Subtotal	**3,558**	**3,604**	**3,582**	**3,438**	**-4**
Mushrooms	12	18	17	18	3
Potatoes, excl. seed	1,093	1,019	1,140	1,044	-8
Sweet potatoes	636	657	571	576	1
Total	**5,299**	**5,297**	**5,311**	**5,076**	**-4**

Note: excl. = excludes. [1]Excludes melons and dry pulses. [2]Includes chayote.

Source: USDA, Economic Research Service calculations using U.S. Department of Commerce, Bureau of the Census data.

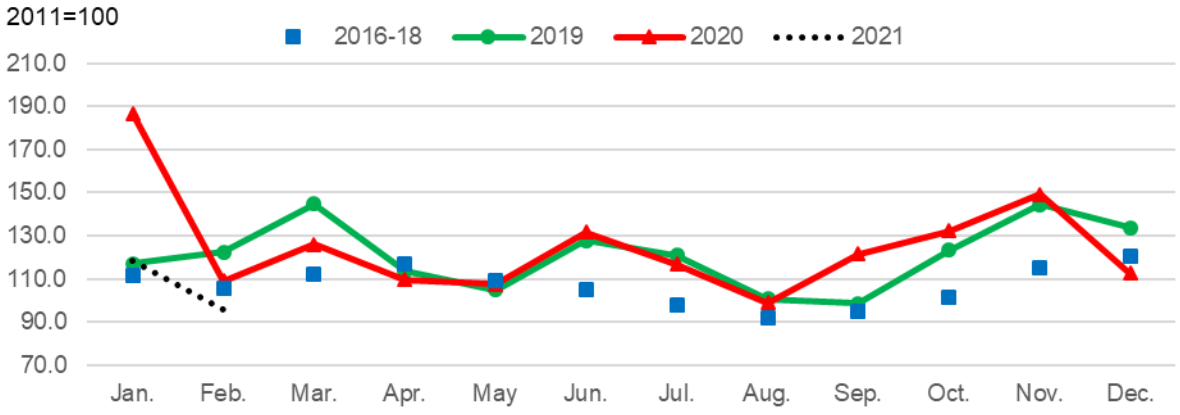
This combination resulted in more fresh products in the marketplace. The 3 percent increase in fresh vegetable import volume was led by crops from Mexico (up 3 percent), Costa Rica (up 9 percent), and Honduras (up 2 percent). A 4 percent reduction in fresh market export volume left more products in the country for domestic consumers. Destinations receiving reduced fresh vegetable volume from the United States in 2020 included Canada (down 3 percent), Taiwan (down 12 percent), and Japan (down 35 percent).

The rise of fresh vegetable imports steadily rose for over a decade and the volume of fresh vegetable imports have exceeded exports for over three decades. The increase in fresh vegetable imports in 2020 was largely driven by potato and broccoli imports which rose by 21 and 10 percent respectively. However, sweet potato and carrot import volume declined by 19 and 7 percent respectively in 2020.

Non-Organic Vegetable Price Index Down in 2021

The domestic vegetable price index computed by USDA's National Agricultural Statistics Service (NASS) can be used to determine the industry average price change for major non-organic vegetables from 2020 to 2021. Overall, non-organic vegetable prices for the major vegetables (snap beans, broccoli, carrots, cauliflower, celery, lettuce, onions, potatoes, sweet corn, and tomatoes) declined by 22 percent. NASS changed the data source for calculating the vegetable price index in February 2020 from prices at the point-of-first sale (which included grower level, f.o.b. shipping point, and other first buyers) to using only the f.o.b. shipping-point price. The prices of major vegetables peaked in January, June, and November 2020 above the same months in 2019 and the average of the previous three years (2016-18), before the prices declined in February and August (see figure 3). Prices in January 2021 began at January 2019 price levels before declining below both the February 2019 and the February 2016-18 price levels. The index for February 2021 decreased 19 percent from the previous month and 13 percent from February 2020. Price decreases during February 2021 for celery, lettuce, tomatoes, and broccoli more than offset the price increase for cauliflower.

Figure 3
Monthly vegetable price index, average 2016-21



Source: USDA, Economic Research Service calculations using USDA, National Agricultural Statistics Service data.

Non-Organic and Organic F.O.B. Prices Per Pound

USDA's Agricultural Marketing Service provides both non-organic and organic f.o.b. shipping-point price data with a wide array of package/carton sizes. The price data in table 7 includes select commodities where unit prices and known industry carton-to-pound assumptions were used to convert the prices to a dollars-per-pound basis with varietal and sub-varietal offerings

Table 7. U.S. quarterly fresh-market organic and non-organic vegetable f.o.b. prices per pound, 2020-21

Selected Commodities	2020 - 1st Quarter		2021 - 1st Quarter		2020-2021 Change - 1st Quarter[1]	
	Non-organic	Organic	Non-organic	Organic	Non-organic	Organic
	Dollars per pound				*Percent*	
Beans, snap, machine picked	0.50	--	0.60	--	18.8	--
Broccoli, all	0.72	1.13	0.49	0.81	-31.2	-28.3
Broccoli, unspecified	0.57	1.11	0.40	0.70	-29.3	-37.2
Broccoli, crown cut	0.78	1.45	0.52	0.92	-34.1	-36.6
Broccoli, crown cut, short trim	0.81	0.82	0.57	--	-29.8	--
Carrots, all	0.47	0.70	0.47	0.71	1.5	1.6
Carrots, unspecified	0.32	0.46	0.33	0.46	5.5	1.1
Carrots, baby peeled	0.62	0.94	0.61	0.96	-0.5	1.8
Cauliflower, white	0.81	1.12	0.60	0.79	-26.1	-29.5
Celery, all	0.34	0.47	0.54	0.73	57.3	56.6
Celery, unspecified	0.17	0.30	0.28	0.46	62.4	53.9
Celery, hearts	0.51	0.63	0.79	1.00	55.5	57.8
Lettuce, all	0.41	0.66	0.36	0.75	-12.2	14.1
Lettuce, Boston	0.46	--	0.43	0.97	-7.2	--
Lettuce, green leaf	0.57	1.01	0.41	1.01	-28.9	-0.3
Lettuce, iceberg	0.29	0.31	0.21	0.37	-29.8	21.2
Lettuce, red leaf	0.57	1.00	0.55	1.03	-2.8	2.3
Lettuce, romaine	0.24	0.49	0.22	0.59	-7.9	20.2
Lettuce, romaine, hearts	0.31	0.48	0.33	0.54	7.6	12.6
Onions, dry, all	0.25	--	0.24	--	-3.8	--
Onions, dry, red, globe	0.28	--	0.25	--	-9.1	--
Onions, dry, white	0.24	--	0.24	--	2.6	--
Onions, dry, yellow, globe	0.18	--	0.24	--	31.5	--
Onions, dry, yellow, grano	0.26	--	0.20	--	-22.8	--
Onions, dry, yellow, grano marked sweet	0.47	--	0.46	--	-2.2	--
Onions, dry, yellow, hybrid	0.14	--	0.13	--	-9.8	--
Onions, dry, yellow, spanish hybrid	0.16	--	0.14	--	-12.7	--
Potatoes, all	0.34	--	0.26	--	-23.8	--
Potatoes, round red	0.35	--	0.26	--	-27.1	--
Potatoes, round white	0.48	--	0.37	--	-21.9	--
Potatoes, russet, burbank	0.27	--	0.15	--	-45.7	--
Potatoes, russet, norkotah/other	0.28	--	0.22	--	-22.2	--
Potatoes, yellow	0.31	--	0.30	--	-5.1	--
Sweet corn, all	0.41	--	0.76	--	86.0	--
Sweet corn, bi-color	0.41	--	0.76	--	86.7	--
Sweet corn, white	0.41	--	0.76	--	84.7	--
Sweet corn, yellow	0.41	--	0.77	--	86.8	--
Tomatoes, all	1.26	2.29	0.92	2.47	-26.9	8.1
Tomatoes, cherry	1.95	--	0.94	--	-51.7	--
Tomatoes, grape	1.29	2.29	1.65	2.47	28.0	8.1
Tomatoes, mature greens	0.92	--	0.61	--	-34.4	--
Tomatoes, plum, roma	0.88	--	0.49	--	-44.5	--
Vegetables[2]	**140.57**	**--**	**109.68**	**--**	**-22.0**	**--**

1/ Change in 2021 projected first quarter over 2020 first quarter. 2/ Price index with base period of 2011 (the period when the index equaled 100).

Source: USDA, Economic Research Service calculations using USDA, National Agricultural Statistics Service and USDA, Agricultural Marketing Service, *Fruit and Vegetable Market News* data.

not historically explored in previous vegetable outlook reports. Converting to a common unit provides the vegetable industry with a more comprehensive outlook and easier comparison within various vegetable varieties and sub-varietal offerings.

First Quarter 2021 Organic F.O.B. Prices Up

Non-organic f.o.b. shipping point prices are available for all the major vegetables with varietal breakdowns. In general, first quarter 2020 non-organic f.o.b. prices price percentage changes ranged from a decline of 52 percent (cherry tomatoes) to an increase of 87 percent (bi-color sweet corn). Some of the major vegetable commodities (broccoli, carrots, cauliflower, celery, lettuce, and grape tomatoes) also have organic varietal vegetable f.o.b. price data. In general, organic price premiums in the first quarter of 2020 averaged about 57 percent above non-organic commodities with the organic premiums ranging from 2 percent (organic crown cut, short trim broccoli) to 109 percent (organic romaine lettuce) above the non-organic variety. Organic price premiums in the first quarter of 2021 increased an average of 75 percent above non-organic commodities with the organic price premiums ranging from 27 percent (organic white cauliflower) to 173 percent (organic Boston lettuce) above the non-organic variety (see table 7).

First Quarter 2021 PPI Prices Down, CPI Prices Steady

The Producer Price Index (PPI) for all fresh vegetables (excluding potatoes) reported by the Bureau of Labor Statistics (using shipping-point prices) through the first quarter of 2021 with a year earlier reveals fresh vegetable producer prices decreased by 8 percent (see table 8). The top producing commodities contributing the most to the decline in first quarter PPI are lettuce (down 23 percent), sweet potatoes (down 8 percent), tomatoes (down 46 percent), and broccoli (down 8 percent) which outweigh the first quarter percent change gains in celery (up 124 percent), sweet corn (up 91 percent), and cabbage (up 90 percent).

With such volatility in fresh market vegetable PPIs, it is important to understand fundamentally how the Bureau of Labor Statistics collects PPI. PPI data is collected on one day of the month, the 13th day. BLS also advises PPI users that indexes are subject to revision four months after their original publication as sometimes selected establishments fail to report on time or reports are incomplete. BLS economists request needed information which may prompt an update later. Considering a one-day snapshot of the market out of the month, one should expect volatility

with fresh market vegetable PPIs. Considerable inventory and marketing changes are customary when the seasons change, like toward the end of winter into spring —March to April.

Comparing the Consumer Price Index (CPI) over the same period reveals an increase in fresh vegetable prices of 1 percent with potatoes (up 1 percent) and tomatoes (down 3 percent).

Table 8. Fresh vegetables: U.S. Consumer and Producer Price Indices, 2019-21

	2019		2020		2021		Change 2020/21[1]	
Input	1st Q	2nd Q	1st Q	2nd Q	1st Q	2nd Qf	1st Q	2nd Q
	Index						*Percent*	
Consumer Price Indices (CPI, 1982-84 = 100)								
Food at home	242.0	241.8	244.1	253.5	252.7	255.3	3.5	0.7
Food away from home	281.2	283.5	289.7	291.9	300.6	302.8	3.8	3.8
Fresh vegetables	343.3	335.4	343.2	344.7	347.7	346.7	1.3	0.6
Potatoes	355.2	357.5	371.1	392.9	374.4	384.7	0.9	-2.1
Tomatoes, all	347.1	321.8	360.9	347.7	350.5	331.4	-2.9	-4.7
Lettuce, all	324.7	314.3	328.4	323.5	345.5	351.7	5.2	8.7
Prepared salads[2]	126.5	125.2	133.3	128.5	133.1	130.1	-0.1	1.3
Other vegetables	347.9	342.9	338.1	340.0	344.5	346.7	1.9	2.0
Producer Price Indices (PPI, 12/1991 = 100)								
Fresh vegetables (excluding potatoes) [3]	274.6	259.0	253.8	226.2	233.37	234.71	-8.0	3.8
Beets	103.8	103.4	128.0	116.5	128.40	123.10	0.3	5.7
Broccoli	208.8	197.6	180.4	201.2	161.73	168.79	-10.4	-16.1
Cabbage[3]	449.3	318.3	183.4	273.2	348.00	347.41	89.7	27.1
Carrots[3]	178.1	180.1	191.5	182.7	189.27	178.84	-1.2	-2.1
Cauliflower	127.4	103.0	109.7	83.3	89.63	80.53	-18.3	-3.3
Celery[3]	791.8	1356.7	174.5	190.8	390.37	428.70	123.7	124.7
Cucumbers	--	184.3	--	210.7	226.90	216.13	--	2.6
Eggplant	412.0	280.6	216.6	421.6	336.73	361.50	55.5	-14.3
Greens	300.1	184.5	193.3	181.5	205.30	175.91	6.2	-3.1
Lettuce [3]	290.2	231.2	274.4	200.5	212.67	214.55	-22.5	7.0
Onions, dry bulb [3]	196.0	214.9	136.4	158.4	146.10	153.10	7.1	-3.3
Peppers, green/bell	447.3	392.0	470.4	461.0	317.03	332.03	-32.6	-28.0
Spinach	594.2	439.7	472.2	529.2	443.73	396.68	-6.0	-25.0
Squash	235.8	137.9	391.1	172.7	168.27	125.06	-57.0	-27.6
Sweet potato	90.0	96.4	105.9	106.9	97.24	96.07	-8.2	-10.1
Sweet corn[3]	162.8	132.8	192.5	187.1	367.07	338.67	90.7	81.0
Tomatoes [3]	332.5	321.9	468.5	382.6	251.95	255.63	-46.2	-33.2

Note: Q = calendar quarter. f = ERS forecast. -- = not available. 1/ Percent change in actual first quarter and forecasted second quarter 2021 from the previous year. 2/ Index base is Dec 2007 = 100. 3/ Index base is 1982=100.

Source: USDA, Economic Research Service calculations using U.S. Department of Labor, Bureau of Labor Statistics data.

Fresh-Market Per Capita Availability Rises in 2020

Overall, per capita availability of fresh vegetables increased by 2 percent in 2020 (see table 9). Commodities with the largest gains were romaine/leaf lettuce (up 17 percent), pumpkins (up 16 percent), celery (up 9 percent), and onions (up 8 percent).

Table 9. Fresh market vegetables: Per capita availability[1], 2016-20

Commodity	2016	2017	2018	2019r	2020p	Change 2019-20
	---------- Pounds per capita ----------					*Percent*
Artichokes, all	1.39	1.43	1.35	1.37	1.20	-12
Asparagus	1.56	1.62	1.76	1.76	1.83	4
Bell pepper	11.08	11.31	11.16	10.87	11.00	1
Broccoli	7.46	7.12	5.93	5.91	5.86	-1
Cabbage	5.91	6.20	5.68	6.35	6.25	-2
Carrots	7.82	7.36	12.20	8.47	7.71	-9
Cauliflower	1.66	2.37	2.50	2.97	2.69	-9
Celery	5.04	4.74	4.89	5.18	5.66	9
Cucumbers	8.12	7.43	7.99	7.83	7.51	-4
Eggplant	0.86	0.88	0.91	0.98	1.03	5
Garlic, all	2.90	2.98	2.40	1.83	1.71	-7
Leafy greens[2]	2.10	3.21	2.89	2.98	2.93	-2
Head lettuce	16.87	15.31	12.33	12.90	12.38	-4
Romaine/ leaf lettuce	14.54	15.08	12.12	12.35	14.42	17
Onions, bulb	22.75	25.07	20.50	19.41	21.03	8
Pumpkins, all	7.02	6.45	6.26	5.53	6.44	16
Snap beans	1.70	1.55	1.63	1.38	1.30	-6
Spinach	1.97	1.86	1.87	2.48	2.26	-9
Squash, all	5.73	5.69	5.64	5.77	5.72	-1
Sweet corn	7.10	7.22	6.80	5.11	4.67	-9
Tomatoes[3]	20.32	20.14	20.28	18.34	19.32	5
Others[4]	1.96	2.08	2.14	2.20	2.54	15
Subtotal	**155.86**	**157.10**	**149.23**	**141.97**	**145.46**	2
Mushrooms	2.96	2.93	2.94	2.77	2.79	1
Potatoes	33.74	34.86	33.02	30.10	30.60	2
Sweet potatoes, all	7.23	8.01	5.56	7.14	6.69	-6
Total	**199.79**	**202.90**	**190.75**	**181.98**	**185.54**	**2**

r= revised. p = preliminary, final estimates provided in ERS *Vegetable and Pulses Yearbook* (July 2021) .

[1]Availability is a proxy for calendar-year consumption. [2]Collards, kale, mustard greens, and turnip greens.

[3]Includes both domestic and imported hothouse tomatoes. [4]Includes brussels sprouts, escarole, endive, okra, radishes, and lima beans.

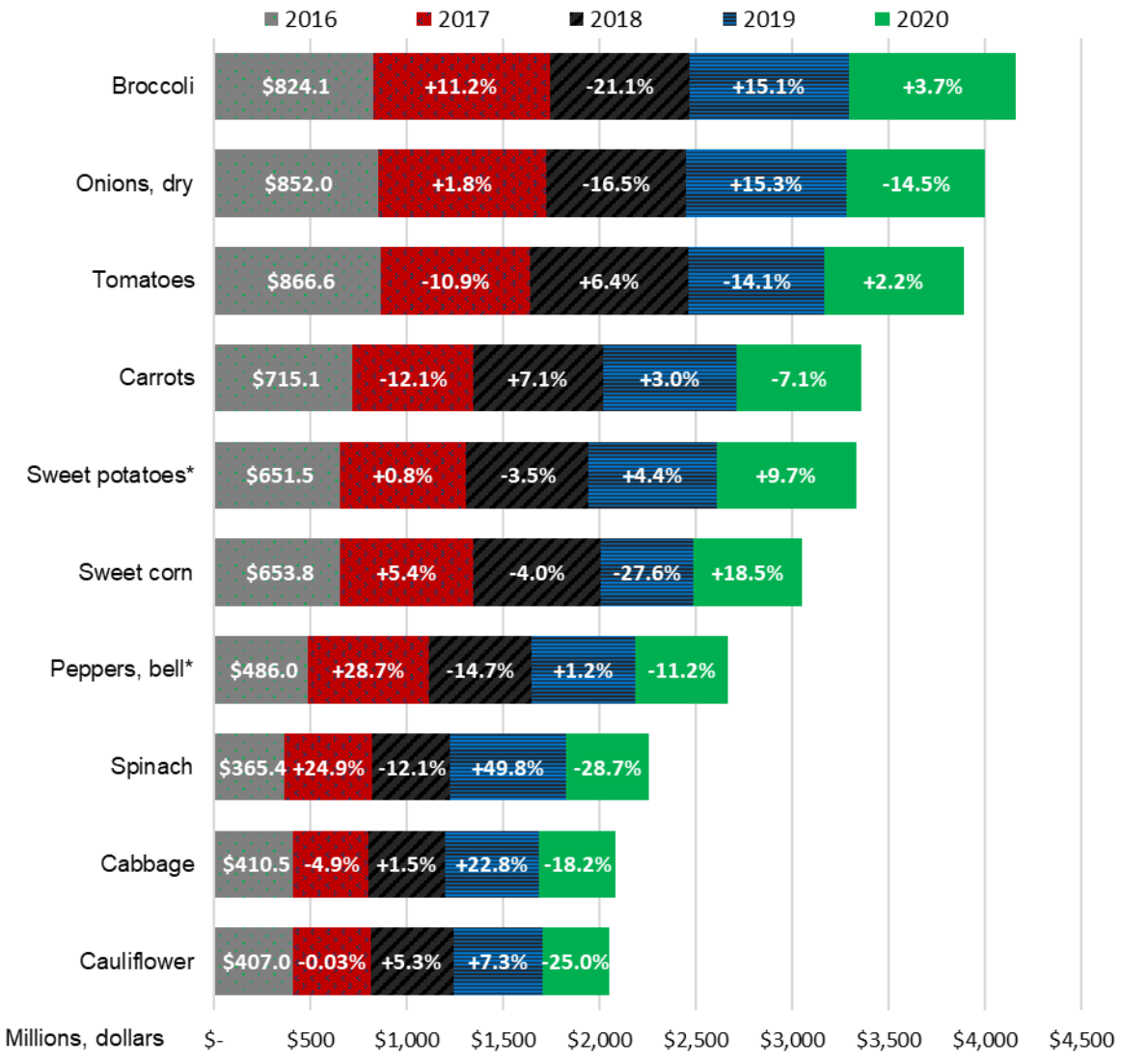
Source: USDA, Economic Research Service, *Vegetable and Pulses Yearbook* (March 2020).

The commodities with the greatest per capita declines in 2020 were artichokes (down 12 percent) and carrots, cauliflower, spinach, and sweet corn (each down 9 percent).

Fresh Vegetable Production Value Down in 2020

Overall, fresh-vegetable production value is down 11 percent from 2019 and the production value of selected vegetables are in figure 4. The percent changes in value for all fresh-market vegetables ranged from chile peppers (down 66 percent) to sweet corn (up 19 percent).

Figure 4
U.S. fresh select vegetable production value and percentage change[1], 2016-20



Note: * = all utilizations. 1/ All percentage changes compared to previous year.
Source: USDA, Economic Research Service calculations using USDA, National Agricultural Statistics Service data.

NASS reported fresh market chile pepper production in California, New Mexico, and “Other States” but a State breakdown is not available. However, reports of reduced labor availability in New Mexico due to the pandemic and an early hot summer plagued by wildfires and smoke in California likely contributed to the decline.

Processing Vegetables

Per Capita Availability Rises in 2020

Preliminary data indicates that per capita availability of all processing vegetables (excluding potatoes and mushrooms) totaled 116.6 pounds in 2020, up 5 percent from a year earlier (table 10). Per capita availability declined 6 percent during the 2010s, the same reduction experienced during the 2000s. ERS is no longer able to reliably compile processing vegetable supply and availability into canning and freezing components because of the loss of production breakouts.

Despite the pandemic, Federal programs helped boost real per capita disposable personal income 5 percent in 2020. Growth in personal income supports increased food demand, especially in the away-from-home market. Although the pandemic led to an estimated 19 percent drop in restaurant and bar sales in 2020, increased vaccination rates and warmer weather, which support outside dining should combine with income growth to spur resurgence in consumer restaurant visits this summer and fall.

The National Restaurant Association expects industry sales to recover a portion of last year's losses with a projected 11 percent gain in 2021. Although an estimated 110,000 restaurant establishments closed permanently or "long-term" in 2020, the gain in industry sales is expected to slightly favor full-service establishments, which appear to have the majority of the pandemic closings. Thus, in the year ahead, availability of processing vegetables is expected to return to pre-pandemic levels as consumers exercise pent-up demand for sit-down restaurant meals and reduce at-home dining which bolstered canned and frozen vegetable consumption.

A few of the major changes in preliminary per capita availability estimates follow:

Tomatoes: Per capita availability of processing tomatoes was estimated at 67.5 pounds in 2020, up 6 percent from the previous year. The increase in domestic use was significant for industry movement since export volume trended lower annually since peaking in 2014. Given the mass shutdown of restaurants or chain locations (an estimated 1,500 locations were permanently closed) due to the pandemic, much of the increased movement in domestic tomato products moved through grocery and other retail channels. Pizza delivery was one area that thrived during the pandemic, helping to support tomato-based sauce demand. A decline in per capita availability is projected for 2021 as an expected sharp gain in away-from-home dining siphons demand from retail channels.

Sweet corn: The third most popular processed vegetable in the United States saw a 17 percent increase in per capita availability in 2020. On a fresh-equivalent basis, per capita use of processed sweet corn totaled 12.4 pounds. However, pandemic-inspired demand may have only offered a temporary respite from long-term trends. Since the most recent peak in the 1990s, processing sweet corn consumption has been on a downward trend (especially for canned corn). Processing sweet corn availability has declined each of the past 2 decades from 20.0 pounds per person during the 1990s to 13.6 pounds during the 2010s. If this trend continues, availability will average about 10 pounds per person over the coming decade.

Snap/green beans: Per capita availability of processed snap beans (on a fresh basis) declined 3 percent to 4.0 pounds in 2020. The processed snap bean industry is a fairly steady, mature market, which depends largely on domestic demand, with just 2 percent of processed snap beans exported annually. The basic trends in demand are similar to those of most other processed vegetables, except the long-run downward trend was very slight for several decades.

Table 10. Vegetables for processing: Per capita availability, 2016-20

Commodity	2016	2017	2018	2019r	2020p	Change 2019-20
	Pounds per capita					*Percent*
Asparagus	0.2	0.2	0.1	0.2	0.1	-7
Beans, lima	0.3	0.2	0.3	0.2	0.2	-7
Beans, snap/green	5.2	5.0	4.7	4.1	4.0	-3
Beets	0.6	0.6	0.5	0.5	0.5	-1
Broccoli	2.6	2.6	2.4	2.5	2.6	5
Cabbage	1.1	1.4	0.6	0.9	1.4	57
Carrots	3.0	3.5	3.4	3.0	3.0	-1
Cauliflower	0.4	0.5	0.6	0.7	0.7	5
Corn, sweet	12.5	13.1	13.1	10.6	12.4	17
Cucumbers[2]	3.0	3.7	3.3	3.0	3.0	0
Onions, dehydrating	1.5	0.3	1.8	1.4	1.6	15
Peas, green	1.8	2.0	1.9	1.5	1.8	19
Peppers, chile 1/	7.6	7.5	7.2	7.1	7.2	1
Spinach	0.9	0.8	0.8	0.8	0.6	-23
Tomatoes	61.1	57.9	65.6	63.8	67.5	6
Other processing	8.3	8.2	11.1	10.6	10.2	-4
Processing subtotal	109.9	107.5	117.5	111.1	116.9	5
Other processing						
Mushrooms	1.0	1.0	1.0	1.0	1.0	-3
Potatoes	76.5	82.9	84.5	82.5	82.1	-1
Other subtotal	77.5	83.9	85.5	83.5	83.0	-1
Grand total	**187.4**	**191.4**	**203.0**	**194.6**	**200.0**	3

p = preliminary.

[1]Availability is an imperfect proxy for calendar-year consumption. [2]For pickling. [3]Includes french fries and other frozen potato products, chips, and others.

Source: Calculated by USDA, Economic Research Service.

In the 2010s, per capita availability of processed snap beans fell 13 percent from the 2000s as domestic production declined. Although domestic output is slipping, import volume rose since the late 1990s, with average import volume up 34 percent from a decade earlier. With volume trending higher, imports of canned and frozen snap beans accounted for a record-high 16 percent of domestic availability in 2020. Despite a smaller crop in 2020, frozen stocks on January 1 were the third highest over the past decade with imports helping to fill the gap. Given the mature nature of snap bean demand, little change is expected in per capita availability in 2021.

Chile peppers (all uses): Preliminary estimates of per capita availability of chile peppers for all uses (more than half of availability consists of processed products) totaled 7.2 pounds in 2020—up 1 percent from a year earlier. Availability of chile peppers trended higher since at least the 1980s due to a combination of shifting demographics and changing consumer preferences. Average per capita chile pepper availability rose 21 percent from the 2000s to the 2010s after gaining 27 percent from the 1990s to the 2000s. All the gain in the use of pungent peppers was from rising imports (up 53 percent on average during the 2010s). Domestic production continues to trend lower across the industry (average output during the 2010s was 30 percent below the 2000s) as lower cost imports fulfill market demand. With no end in sight for chile pepper consumption and its multiple uses, availability is expected to continue trending upward in 2021 and beyond.

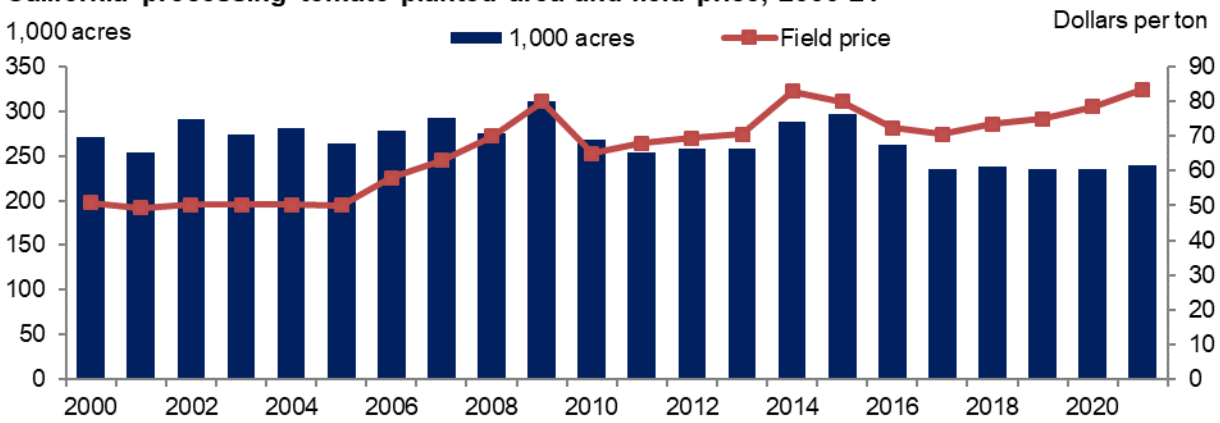
Processing Tomato Output to Rise

California tomato processors intend to contract for 12.1 million tons of tomatoes for processing into canned, frozen, and dried tomato products—up 7 percent from the 11.3 million tons produced a year earlier. Although no longer estimated annually by USDA/NASS, production in other States (led by Indiana, Ohio, Michigan, Pennsylvania, and New Jersey) averages about 0.5 million tons each year. An update to the early January intentions report will be released by the NASS California office on May 28.

A year ago, the early California intentions report indicated a total of 12 million tons were planned by processors, but weather, periods of extreme heat, and smoke from wildfires during the season reduced the final tally. Due largely to nature’s impact on trend yields, falling below contract intentions is not unusual as over the previous 20 years, production has equaled or exceeded intentions only 4 times. This year may prove no different since the industry faces daunting challenges from irrigation water cutbacks/shortages due to low mountain snowpack

this past winter, uneven/uncertain demand as the country and world struggle to emerge from the pandemic, relatively low paste carryover, and higher input costs.

Figure 5
California processing tomato planted area and field price, 2000-21



Note: Ton is a 2,000 pound short ton. Data for 2021 are projected.
Source: USDA Economic Research Service calculations using USDA, National Agricultural Statistics Service and California Tomato Growers data.

California is the world's leading producer of tomatoes for processing. The State accounts for about 93 percent of national processing tomato acreage and more than 95 percent of volume. In 2020, the leading counties within the State remained Fresno (32 percent of output), Yolo (13 percent), Kings (13 percent), and Merced (10 percent). Fresno and Kings are also typically within the top three counties in terms of per-acre productivity annually.

Early Agreement on Tomato Price

In a departure from the extended negotiations of a year earlier, the California Tomato Growers Association (CTGA) and all processors agreed in March on a base contract price for raw tomatoes at the point of first delivery. The agreed upon conventionally grown price of $84.50 per ton is up 8 percent from the hard-fought $78.50 per ton a year earlier. For the first time, the CTGA also represented producers of organically grown processing tomatoes (which represented less than 5 percent of the 2020 crop) in price negotiations with processors. As of early April, agreement was reached with all but one processor with the per-ton price ranging from $136 to $150. This season, a combination of higher prices for energy-based inputs, labor, and water, higher prices for field crops competing with tomatoes for acreage (and water), and tightening inventories of paste and other finished products likely contributed to early price agreement within the industry.

As processed tomato product inventories continue to tighten seasonally, wholesale tomato paste prices rose since the advent of the 2020/21 season. The average spot price for bulk 31-

percent natural tomato soluble solids (NTSS) tomato paste, the key raw ingredient used in the manufacture of tomato products like sauces, soups, ketchup, and juice, was up about 11 percent from a year earlier during the first calendar quarter of 2021. This was the highest paste price since 2014/15 but remains on the low to moderate level when viewed from both a nominal and inflation-adjusted historical perspective. Over the past 40 years, nominal dollar tomato paste prices ranged from 28 to 68 cents per pound. Rising paste prices reflect a general tightening of the California processed tomato stock situation. According to the California League of Food Processors, the March 1 inventory of processed tomato products (converted to a fresh-equivalent basis) was about 15 percent below a year ago, with monthly disappearance running nearly 6 percent above a year earlier.

Processed Exports Decline in 2020

In 2020, the value of processed vegetable (including potatoes and mushrooms) exports declined 10 percent to $3.5 billion (see table 11). As is the case in 17 of the past 21 years, the processed vegetable industry remained a net importer in 2020, with import value exceeding the value of exports by $1.8 billion, up from a margin of $0.8 billion in 2019. The only processed vegetable category that is “in the black” over time is vegetable juices, which experienced negative trade value in just 4 of the past 21 years, including each of the past 3 years. In general, the pandemic continues to cause a variety of issues in international trade ranging from port congestion, internal shipping delays, container availability, and reduced international food service demand (due to lack of tourism and restaurant closures).

Some selected changes in calendar year 2020 processed vegetable trade volume expressed on a fresh-weight basis follow:

Tomatoes: The fresh-weight volume of processed tomato exports fell 2 percent to 5.7 billion pounds while import volume surged 29 percent to 2.2 billion pounds. Since peaking in 2014 at 8.5 billion pounds, tomato export volume declined annually due to in part to unfavorable exchange rates and intense global competition. Exports accounted for 13 percent of 2020 tomato supply while imports satisfied 8 percent of domestic availability. Export volume was down for several key products including sauces (down 3 percent), paste (down 1 percent), and ketchup (down 11 percent). In terms of value, Canada (down less than 1 percent from 2019), Mexico (up 14 percent), and Japan (down 1 percent) were the leading foreign buyers of U.S. tomato products in 2020.

Table 11. Selected processed vegetable trade value, 2016-20[1]

Item	2016	2017	2018	2019	2020	Change 2019-20
			---------- Million dollars ----------			*Percent*
Imports						
Canned vegetables and juices	1,485	1,618	1,651	1,594	1,833	15
Tomatoes	183	195	215	233	311	34
Artichokes	142	152	139	139	124	-11
Peppers	125	125	127	113	114	1
Mushrooms and truffles	112	117	111	115	118	2
Frozen vegetables	1,899	2,035	2,286	2,345	2,583	10
Potatoes	783	863	960	969	1,064	10
Broccoli	320	296	341	360	381	6
Cauliflower	40	57	64	80	92	15
Dried, dehydrated, chipped	679	718	786	748	809	8
Starches	155	163	199	212	197	-7
Potato flakes/granules/dried	121	140	150	153	184	20
Potato chips	70	75	90	102	115	13
Garlic, dried/dehydrated	99	91	53	22	21	-4
Total processed imports	**4,062**	**4,371**	**4,723**	**4,687**	**5,224**	**11**
Exports						
Canned vegetables and juices	1,897	1,854	1,802	1,785	1,642	-8
Tomatoes	1,346	1,283	1,239	1,250	1,176	-6
Sweet corn	108	110	108	96	86	-10
Cucumbers	61	65	63	71	46	-36
Frozen vegetables	1,502	1,533	1,506	1,583	1,318	-17
Potatoes	1,145	1,175	1,159	1,251	1,022	-18
Sweet corn	112	110	107	105	95	-10
Dried, dehydrated, chipped	517	527	488	504	512	2
Potato chips	195	197	190	185	186	1
Potatoes, dried/dehydrated	120	125	119	141	135	-4
Onions, dehydrated	80	81	80	79	82	4
Total processed exports	**3,916**	**3,914**	**3,796**	**3,873**	**3,472**	**-10**

[1] Potato chips were grouped with dried and dehydrated for the purposes of this table. This table includes vegetables, potatoes, and mushrooms.

Source: USDA, Economic Research Service calculations using U.S. Dept. of Commerce, Bureau of the Census data.

Sweet corn: The fresh-weight volume of processed (canned and frozen) sweet corn exports fell 13 percent to 915 million pounds (the lowest since 1989), while import volume jumped 24 percent to 353 million pounds. Exports accounted for 12 percent of 2020 processed sweet corn supply while imports satisfied a record-high 9 percent of domestic availability. Export volume was down 13 percent for both canned and frozen sweet corn products. In terms of ordinal value, Japan (down 16 percent), China (down 13 percent), and Canada (down 12 percent) were the leading export destinations for U.S. sweet corn products in 2020.

Broccoli: The fresh-weight volume of frozen broccoli imports rose 1 percent to a record 813 million pounds. Frozen broccoli exports are not broken out of the aggregate data by Census. Imports now satisfy 94 percent of domestic availability as domestic production remains low due primarily to the long-held cost advantage of foreign suppliers. In terms of ordinal value, Mexico (up 5 percent), Ecuador (up 14 percent), and Guatemala (up 5 percent) were the leading import sources for U.S. frozen broccoli products in 2020.

Dehydrated onion: The fresh-weight volume of dehydrated (dried, powdered, flour) onion exports rose 4 percent to 531 million pounds, while import volume fell 19 percent to 100 million pounds. Exports accounted for 50 percent of 2020 supply while imports satisfied 19 percent of domestic availability. In terms of ordinal value, Canada (up 13 percent), Japan (up 18 percent), and Indonesia (down 19 percent) were the leading export destinations for U.S. dehydrated onion products in 2020.

Input Prices

Energy-Based Input Prices Up in 2021

As global economic activity continues to recover from the COVID-19 pandemic and energy prices return to (and exceed) pre-pandemic levels, growers can expect to pay more for most of the inputs required to produce, pack, and ship vegetables in 2021 (table 12). Energy and energy-based manufactured inputs account for about one-fourth of the production expenses of specialized vegetable farms. With energy costs up substantially since the close of 2020, weighted average prices for energy-based inputs used in vegetable production are projected to rise 11-15 percent in 2021.

Table 12. Selected U.S. indices of prices paid by farmers, 2016-21

Input	2016	2017	2018	2019	2020	2021f	Change
	Index, 2011 = 100						*Percent*
Seeds and plants	121.4	119.9	118.5	116.0	113.4	112.9	-0.4
Fertilizer, nitrogen	71.6	66.5	66.5	71.4	73.7	84.2	14.3
Fertilizer, potash/phosphate	70.5	64.4	62.9	63.0	70.0	91.5	30.6
Chemicals, insecticides	107.7	103.1	100.9	99.2	93.6	99.0	5.8
Chemicals, herbicides	109.7	106.4	101.7	101.8	100.9	105.0	4.1
Chemicals, fungicides/other	98.7	95.1	95.7	99.5	101.0	104.0	3.0
Fuels, diesel	51.8	57.6	67.4	71.5	62.3	70.4	12.9
Fuels, gasoline	59.0	64.5	70.9	75.1	67.0	80.2	19.7
Farm machinery	115.4	117.7	120.0	124.1	123.9	127.6	3.0
Farm supplies	106.3	107.6	111.6	115.5	117.4	120.0	2.2
Custom services	111.6	114.3	113.3	118.4	119.6	119.6	0.0
Buliding materials	107.6	110.4	116.1	118.1	120.8	128.0	6.0
Cash rent	130.4	130.4	126.1	123.3	124.7	123.3	-1.1
Interest	103.9	108.3	114.7	115.1	100.9	101.4	0.5
Taxes	110.7	115.5	117.1	117.9	118.7	120.4	1.4
Wage rates	115.9	119.1	126.3	133.2	135.2	140.6	4.0
Crop sector 2/	106.6	108.0	110.2	111.7	111.4	115.9	4.1

f = forecast. 1/ Change from 2020 to 2021. 2/ Input items common to crop production.

Source: USDA, National Agricultural Statistics Service except 2021 projections by USDA, Economic Research Service.

According to the U.S. Energy Information Administration forecast in mid-March, strengthening consumer activity coupled with inconsistent global petroleum supplies will pressure global oil markets higher into early summer before slipping in 2022 as production settles into rhythm and inventories rise. With more balanced petroleum markets, crude oil prices are projected to ease during the latter stages of 2021 and remain subdued through 2022. Following last year's pandemic-influenced 17 percent price drop in diesel fuel, growers and truckers can expect to see 2021 diesel prices average at least 13 percent above 2020 levels.

Fertilizer prices are expected to average above year-earlier levels during the first half of 2021 due to reduced inventories and stronger demand spurred by surging crop prices (particularly for

corn). Prices for nitrogen fertilizers such as urea (up 37 percent from a year earlier in mid-March) reflect reduced inventories, elevated crop prices, and somewhat higher natural gas prices (used to produce ammonia). Nitrogen prices are expected to ease later in 2021 as new global capacity comes online and stocks are rebuilt.

For phosphates, low domestic inventories due to strong global demand and higher field crop prices are expected to keep prices well above a year earlier into early summer. According to the USDA Market News fertilizer price report, mid-March mono-ammonium phosphate (MAP) and di-ammonium phosphate (DAP) prices were up 58 and 47 percent, respectively, from the low levels of a year ago.

Finally, stronger demand spurred by the surge in crop prices pushed mid-March potash (potassium) prices up 16 percent from a year ago. Thus, with higher prices for each of the three fertilizer components, conventional vegetable growers who had not already locked in their fertilizer requirements (or decide to add acreage above planned levels), may realize elevated costs for this critical input in 2021.

The combination of energy-based inputs and labor account for more than half of production expenses on specialized vegetable farms. For many fresh-market vegetable producers, the combined share is closer to two-thirds of production expenses. Labor availability and expense remains a critical issue for most commercial vegetable growers, particularly those producing for the fresh market. Wage rates rose steadily over the past several years and are projected to rise again in 2021 as skilled farm labor remains scarce, with much of the population still to be vaccinated and border restrictions still in force. According to the USDA-NASS Farm Labor report issued in February, the weighted national annual average gross (pre-tax) wage rate for field workers rose 4.6 percent to $14.76 per hour in 2020. The first USDA estimates for 2021 farm wage rates will reflect an April survey and is expected to be released on May 26.

Building supplies is another area in which input prices are strongly rising this year. In most years, this is a minor expense item for most vegetable producers, but for those building or renovating packing or equipment sheds, price increases may be noteworthy. Partly because of strong demand from residential construction and pandemic-related slowdowns within the supply chain, the February Producer Price Index (PPI) for softwood lumber (used in framing structures) was up 80 percent from a year earlier. The PPI for steel mill products (typically used for sheds and outbuildings) was up 20 percent over the same period. So far, producer prices for concrete products such as block and brick remain in check, rising less than 2 percent from last February.

Potatoes

Per Capita Availability Steady

Preliminary data indicate that calendar year potato availability did not change greatly from a year earlier despite severe disruptions to the foodservice market segment which powers a large share of the demand within key processed product categories and large/carton sizes of table stock potatoes (see table 13 and figure 6). As expected, indicated fresh availability rose in part because of the initial surge in pandemic panic purchases, USDA food programs, and increased in-home meal preparation. The gain last year may prove to be fleeting as the long-run trend in table stock use has pointed downward for decades.

Table 13: U.S. per capita domestic availability of potatoes[1]

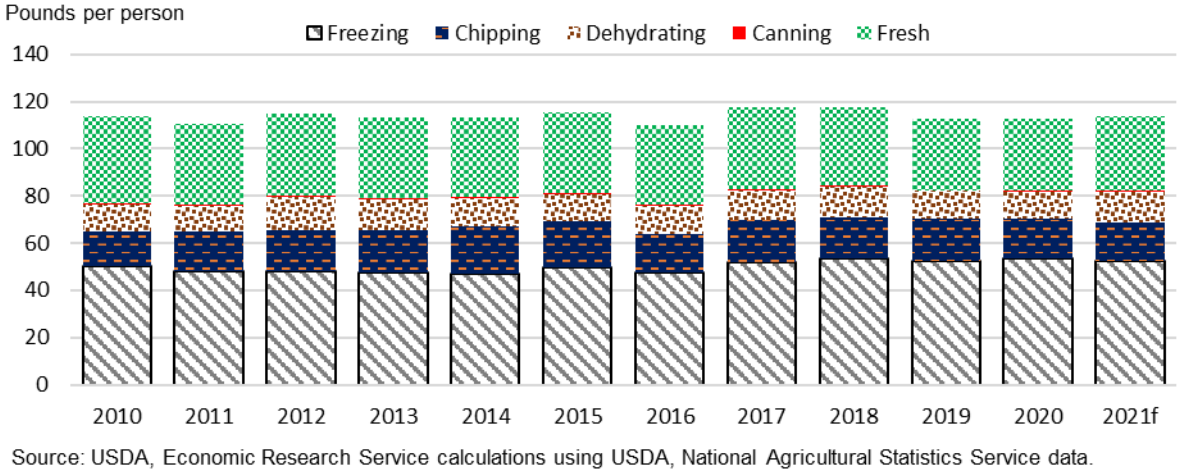
Product	Average 2011-15	2016	2017	2018 r	2019 r	2020 f	2021 f
	Pounds/person, fresh-weight						
Fresh	34.2	33.7	34.9	33.1	30.1	31.5	30.4
Processing	79.2	76.5	82.9	84.5	82.5	81.3	82.1
Freezing	48.1	47.4	51.8	53.4	52.4	50.9	51.3
Chipping	18.3	16.6	17.8	17.8	17.9	17.9	17.4
Dehydrating	12.2	12.0	12.9	12.9	11.9	12.1	12.9
Canning	0.6	0.4	0.5	0.5	0.4	0.4	0.5
Total	113.4	110.2	117.8	117.6	112.6	112.8	112.5

r = Revised. f = ERS forecast. [1]Availabilty is a proxy for calendar year consumption.

Source: Computed by USDA, Economic Research Service.

Figure 6

U.S. potatoes: Annual per capita availability, 2010-21



Source: USDA, Economic Research Service calculations using USDA, National Agricultural Statistics Service data.

Average annual per capita fresh potato availability over the past three years (2018-20) was down 15 percent from a decade earlier and 33 percent from 2 decades ago. Over the next 10 years, baseline projections indicate fresh-market potato availability could decline by one-fifth from current levels due to continued consumer interest in alternatives such as rice, sweet potatoes, and quinoa. Final per capita potato availability estimates for 2020 will be published in the November *Vegetable and Pulses Outlook* report.

For 2021, processed potato availability is expected to show some recovery while fresh use slips back into its downward trend. Availability for use as french fries and other frozen products is expected to show some recovery in demand this year as the restaurant industry begins what may be a lengthy recovery process. The length of this recovery may depend not only on consumer behavior but also on when (and how many) of the estimated 110,000 foodservice establishments that closed during the pandemic reopen.

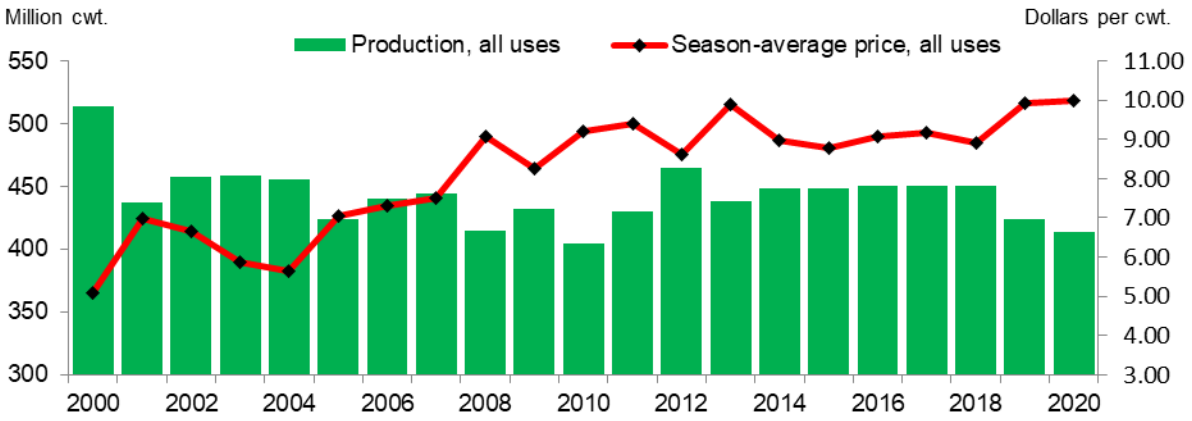
Outlook for 2021 Remains Clouded

Once again, the potato industry must decide what and how much to plant this spring. If relative crop prices and potential revenue were the only signal of importance the decision would likely favor fewer potatoes and more field crops in 2021. However, in addition to non-price factors such as production/marketing contracts, other long-term business arrangements, input supplies/prices, and land/water availability, the industry must analyze a complex demand situation presented by the eventual end of pandemic restrictions. Although it is very likely that away-from-home meals will increase in 2021, the timing will not likely present a smooth flow back into pre-pandemic economic activity as some consumers are likely to remain cautious for a while even after being vaccinated. The National Restaurant Association projects a multi-year process with the industry gaining back a portion of lost sales in 2021.

Despite considerable uncertainty as to timing, anticipated additional demand is probable later this year as pandemic restrictions are eased. Given additional demand, the market would be able to absorb a slightly larger potato crop (figure 7). Given the downward trend in fresh demand and consumers once again moving away from in-home meal preparation, any additional potatoes would likely be destined for processing. A larger crop is not assured even with a small increase in area. Drought and dry soils will make dryland potato production difficult in several potato-producing States and without timely rains, will impact yield and crop potential (as it did in Maine last year). The 30-year national trend yield would be 457 hundredweight (cwt) per acre for 2021 which would best the record high of 453 cwt reached in 2019 and tied in 2020.

With a smaller crop and pandemic-affected demand to begin the marketing year, the preliminary estimate of season-average potato prices (all uses) was $9.44 per cwt for 2020/21—down 5 percent from 2019/20.

Figure 7
U.S. potato production and price, 2000-20



Note: Cwt. = hundredweight, a unit of measure equal to 100 pounds.
Source: USDA, Economic Research Service calculations using USDA, National Agricultural Statistics Service data.

As of the first week of April 2021, fresh potato prices continue to average below the relatively strong levels of a season ago but until January were above the prices received two years earlier (see table 14). The January and February all potato price each fell below both those of a year earlier and prices received two years ago.

Table 14. Potatoes: U.S. consumer and producer price indices and advertised retail prices, 2019-21[1]

Item	2019				2020				2021	1st Q Change[3]	
	1st Q	2nd Q	3rd Q	4th Q	1st Q	2nd Q	3rd Q	4th Q p[2]	1st Q p[2]	Quarter	Year
	Index									*Percent*	
Producer price indexes											
Fresh tablestock (2011=100)	105.4	113.2	126.9	127.4	139.8	122.1	128.1	106.6	100.7	-5.5	-28.0
Fresh, russet (1991=100)	172.8	182.0	219.4	208.7	229.8	192.1	221.6	169.7	154.5	-9.0	-32.8
Fresh, red (1991=100)	168.2	171.9	235.0	286.5	265.8	261.5	213.9	196.5	181.7	-7.5	-31.6
Fresh, round white (1991=100)	195.1	154.4	121.4	224.3	229.4	248.6	161.4	250.6	239.8	-4.3	4.5
Frozen products	208.0	208.0	208.1	208.7	209.5	209.5	210.6	212.7	212.7	0.0	1.5
Chips (includes corn) (1985=100)	219.0	219.3	219.5	219.8	222.2	222.2	222.3	222.7	223.7	0.4	0.7
Consumer price indexes											
Fresh tablestock (1982-84=100)	355.2	357.5	375.6	359.2	371.1	392.9	390.7	360.7	374.4	3.8	0.9
	Dollars/pound										
Retail prices[4]											
Fresh potatoes, white	0.75	0.75	0.79	0.78	0.79	0.85	0.84	0.77	0.78	1.0	-2.2
Potato chips	4.51	4.46	4.44	4.54	4.57	4.98	5.07	5.07	5.01	-1.2	9.6
Retail prices (advertised)[5]											
Fresh, russet	0.79	0.82	0.80	0.77	0.78	0.86	0.82	0.77	0.80	3.5	2.2
Fresh, red	1.09	1.11	1.26	1.15	1.33	1.25	1.20	1.04	1.06	2.0	-20.1
Fresh, yellow	0.94	1.01	1.16	1.03	1.08	1.18	1.37	1.38	1.38	-0.5	27.1
Fresh, round white	0.89	0.91	1.11	1.01	1.00	1.14	1.09	0.97	1.02	4.9	1.7

Note: p = preliminary. Q = calendar quarter. f = ERS forecast. 1/ Not seasonally adjusted. 2/ All BLS indexes are subject to revision four months after original publication. 3/ Change in projected fourth quarter 2020 from the previous quarter/year. 4/ As reported by BLS.
5/ Average of weekly advertised retail prices as reported by *Market News* all units converted to *a* per pound basis, excludes organic.

Source: USDA, Economic Research Service calculations using U.S. Dept of Labor, Bureau of Labor Statistics (BLS) and USDA, Agricultural Marketing Service, *Market News data.*

Although domestic and import movement was above a year earlier, demand may have slowed due to periods of inclement weather in major metropolitan areas. Through the first six months of the marketing year, fresh-market potato prices were running about one-fifth below a year earlier but were up about a tenth from two seasons ago. It should be noted that the September-February (unweighted) average price during 2019/20 was the highest since 2008/09.

Exports Down Through February

The volume of U.S. potato exports was down 5 percent during the first 6 months of the 2020/21 marketing year compared with the previous year. Dried exports are down 12 percent and frozen are down 8 percent, while fresh are up 2 percent and chips up 3 percent, running ahead of a year earlier. Through February, potato exports totaled $880 million, down 7 percent from a year earlier.

Potato chip export volume is running 3 percent above a year earlier during September-February, with the value of chip exports up 5 percent to $99 million (figure 8).

Figure 8
U.S. potato chips: Export and import volume, 2019-21
Million pounds

Source: USDA, Economic Research Service using U.S. Department of Commerce, Bureau of the Census data.

In all of 2019/20, chip exports fell 8 percent to 99.3 million pounds. Canada, Mexico, and the Philippines were the top 3 destinations for several years. The unit value of potato chips is the highest among export products and is up 2 percent so far this marketing year to $1.85 per pound. The lowest unit value was for fresh potatoes at 22 cents per pound and was up 1 percent from a year earlier.

U.S. imports of potato products totaled $918 million during the September-February period, up 10 percent from the same period a year earlier. Import volume was also higher, rising 8 percent from a year earlier during September-February (see table 15). During all of 2019/20, potato imports totaled $1.7 billion—11 percent above 2018/19. Potato chip import volume was running 17 percent above a year earlier during September-February, with the value of chip imports up 23 percent to $61 million. In all of 2019/20, chip imports rose 8 percent to 57 million pounds. Canada, Mexico, and Honduras are the top 3 foreign sources for several years.

Table 15. U.S. potato trade volume [1]

	September-August			September-February		Change
Commodity	2016/17	2017/18	2018/19	2018/19	2019/20	18/19-19/20
	---------- *1,000 cwt* ----------					*Percent*
Exports						
Fresh	10,946	9,880	11,706	4,688	4,494	-4
Frozen, all	22,699	22,395	22,955	10,941	11,840	8
French fries	20,210	19,854	20,281	9,604	10,500	9
Other frozen	2,489	2,541	2,674	1,337	1,340	0
Chips	1,137	1,082	1,076	543	519	-4
Dried & dehydrated	2,192	2,023	2,131	992	1,139	15
Other prep/preserved	809	896	950	409	431	5
Seed	1,107	385	619	158	186	18
Total	**61,589**	**59,057**	**62,392**	**28,670**	**30,449**	**6**
Imports						
Fresh	9,387	9,261	7,393	4,365	4,751	9
Frozen, all	20,446	22,084	21,446	10,588	11,420	8
French fries	18,497	19,821	18,759	9,349	9,521	2
Other frozen	1,950	2,262	2,687	1,239	1,899	53
Chips	393	453	526	246	265	7
Dried & dehydrated	4,169	4,620	4,647	2,290	2,319	1
Seed	1,657	1,533	1,543	477	484	1
Total	**56,500**	**60,034**	**57,001**	**28,555**	**30,658**	**7**

[1] Cwt= hundredweight, a unit of measure equal to 100 pounds.

Source: USDA, Economic Research Service calculations using U.S. Dept. of Commerce, Census Bureau data.

Dry Edible Beans

Prospective Area Down in 2021

According to USDA's March *Prospective Plantings* report, area for dry edible beans (excluding chickpeas) is expected to decline 11 percent to 1.54 million acres (table 16). All surveyed States are expected to register declining area except for Washington (up 10 percent). Washington accounts for just 3 percent of national dry bean area but produces most every class of bean. North Dakota, the largest dry bean producing State with 50 percent of prospective 2021 area, is expected to sow 6 percent fewer acres. North Dakota's expected area reduction was the smallest among States showing reduced area reflecting the broad array of bean classes produced in the State and the State's position as an important producer of the top 3 bean classes—pinto, navy, and black.

Table 16. U.S. dry beans: Area, yield, production, price, and crop value, 2010-21[1]

Year	Acreage		Yield per acre	Production	Season average price	Crop value
	Planted	Harvested				
	-------- 1,000 acres --------		*Cwt/acre*	*Million cwt*	*Dollars per cwt*	*Dollars, million*
2010	1,765	1,699	17.6	2,986	28.00	899
2011	1,082	1,033	17.1	1,769	42.10	851
2012	1,535	1,484	19.3	2,859	38.00	1,235
2013	1,141	1,096	19.2	2,103	39.10	982
2014	1,488	1,437	18.2	2,610	32.30	981
2015	1,559	1,506	18.3	2,754	27.30	866
2016	1,339	1,238	18.8	2,328	29.20	863
2017	1,472	1,412	20.5	2,890	26.70	1,006
2018	1,231	1,182	21.1	2,496	25.40	951
2019	1,291	1,174	17.7	2,076	31.80	677
2020	1,740	1,677	19.7	3,296	29.90	1,006
2021f	1,540					

Note: cwt = hundredweight, a unit of measure equal to 100 pounds. f = forecast.
1/ This table excludes chickpeas with the exception of crop value prior to 2019.
Source: USDA, Economic Research Service calculations using USDA, National Agricultural Statistics Service data.

This year, despite surging input costs (especially for fertilizer), most key economic factors signal reduced dry bean area. These include rebuilt stocks for several classes, elevated prices for competing crops such as corn and soybeans and building strength in the consumer economy (which generally favors higher-priced protein sources). Although most planting decisions are already made, a variety of factors can influence the final crop mix well into the spring. Spring weather is one of the most important factors and already poses a potential threat this year with dry conditions across several key dry bean growing regions. As usual, the supply response to price changes (relative returns) will vary among bean classes. Early analysis suggests a

decrease in area is likely for pinto, black, Great Northern, and light-red kidney beans, with small increases possible for dark-red kidney, pink, and lima beans. Based on relative price changes, navy bean area will likely be down although reported stocks suggest space for a crop similar to 2020.

In 2020, national dry bean yield was a record 19.66 cwt per acre—up 11 percent from a year earlier and 6 percent above the 30-year trend. Even with average weather this summer and fall (with an easing of the widespread drought), yield is likely to decline from the strong performance of a year ago when the timing of moisture was nearly ideal. The 30-year (1990-2020) national trend yield for 2021 would be 18.67 cwt, a 5 percent reduction from the 2020 record high. Similarly, for comparison, the 3-year (2018-20) national average yield per harvested acre was 18.65 cwt.

Trend yield for the 2021 pinto bean crop would be about 9 cwt above the strong 2020 yield of 18.22 cwt which indicates expected production area reduction could potentially be partially muted. Black bean yield exceeded both trend and the 3-year average in 2020. Black bean yield exceeded 20 cwt for the first time in 2018 when it reached a record high 21.47 cwt. The black bean trend yield for 2021 would be 18.86 cwt—down 7 percent from the strong 2020 level. If weather cooperates, navy bean yield could reach the 30-year trend and exceed the 2020 actual yield of 20.2 cwt by 2 percent.

Pinto and Navy Stocks Up

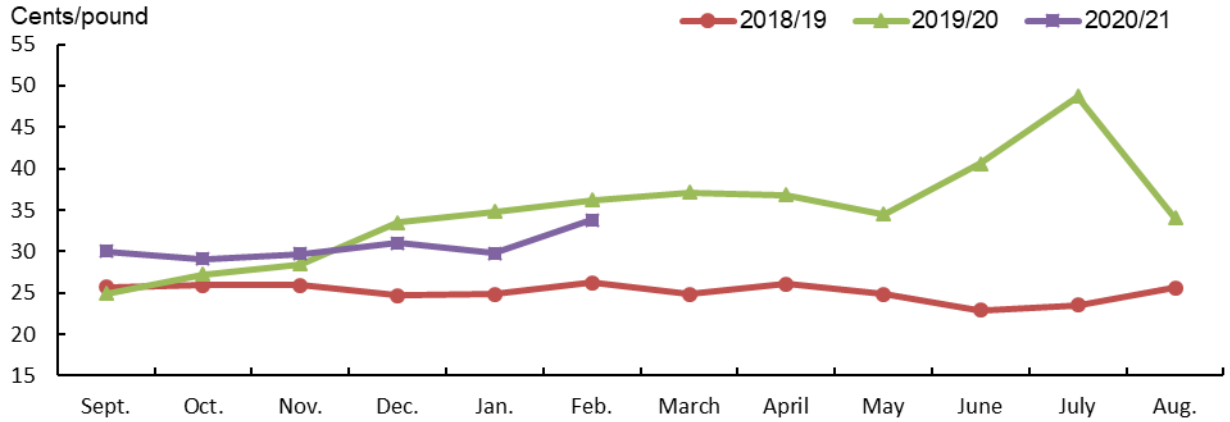
As a result of strong output last fall, stocks on December 31,2020, were up for two of the three major dry bean classes. According to the Upper Great Plains Transportation Institute at North Dakota State University, stocks of pinto and navy beans increased from the low levels of the previous year. Pinto bean stocks rose 51 percent while navy beans were up 24 percent. Black bean stocks were 5 percent lower reflecting smaller gains in production and good export demand.

Although higher, navy bean stocks were not burdensome and were 7 percent below the average of the previous 5 years. On the other hand, pinto bean stocks on December 1 were 28 percent above the average levels of the previous 5 years. Similarly, black bean stocks were 21 percent higher than the 5-year average.

Despite Higher Stocks, Dry Bean Prices Follow Corn Upward

The U.S. aggregate grower price for all dry beans averaged 1 percent below the unusual pandemic-influenced highs of a year earlier during the initial 6 months of the marketing year (September 2020 through February 2021) (figure 9).

Figure 9
U.S. dry edible beans: Average monthly grower price



Source: USDA, Economic Research Service calculations using National Agricultural Statistics Service, *Agricultural Prices* data.

Compared with the average of the past 5 years during those months, dry bean prices were up 9 percent so far in 2020/21, largely reflecting competition with elevated field crop prices. During this same period, simple-average soybean prices were $10.55 per bushel—22 percent above the previous year. Meanwhile, the all wheat price was up 15 percent, field corn 5 percent higher, and the all barley price rose 3 percent. Although potential revenue per acre initially favored dry beans late in 2020, the rapid advances in most field crop markets in 2021 turned the tables in favor of the major field crops. However, as was experienced in the late 2000s, rapid advances in field crop demand and prices also buoy pulse crop prices as dealers and processors work to ensure their supply pipelines by offering more competitive dry bean pricing.

Crop Value Up in 2020

The preliminary value of the 2020 dry bean crop (excluding chickpeas) was estimated to have increased 49 percent from a year earlier to $1.006 billion as output surged and the season average price declined modestly. In nominal (unadjusted for inflation) dollars, this was second only to the 2012 record high of $1.12 billion. North Dakota accounted for 34 percent of national dry bean crop value followed by Minnesota (19 percent), Michigan (18 percent), and Nebraska (11 percent). Estimates now cover the 9 leading states with estimates for Montana and Texas

discontinued after 2018. The preliminary season-average price for 2020/21 was estimated to be $29.90 per cwt, 6 percent below a year earlier but 18 percent above 2 years ago. In the year ahead, higher average prices will likely be outweighed by a smaller crop, resulting in reduced dry bean crop value.

Despite Pandemic, Export Volume Rises

ERS analyzes dry bean trade on both a calendar year and a crop year basis. ERS considers calendar year trade because the supply and availability tables used to calculate per capita dry bean use/availability historically were on a January-December basis to match estimates produced for most of the other crops grouped with vegetables. ERS also considers crop year trade in order to match import and export levels to domestic production trends. This report focuses on calendar year trade (table 17).

Table 17. U.S. dry bean calendar-year import volume[1]

	Jan. - Dec.			Jan. - Feb.		Change
Commodity	2018	2019	2020	2020	2021	2020-21
	1,000 cwt (bags)					*Percent*
Mung bean	466.6	474.3	777.9	81.7	99.3	21
Black	310.0	245.5	388.1	46.0	48.0	5
Light-red kidney	160.2	176.0	234.9	37.9	21.5	-43
Pinto	162.1	154.0	302.3	32.5	29.0	-11
Blackeye	64.9	150.2	137.9	32.5	17.7	-46
Small red	131.2	136.9	198.6	28.1	26.8	-5
Navy	56.2	62.8	33.1	2.2	2.3	5
Dark-red kidney	57.3	36.6	41.9	7.3	7.9	9
Other	1,195.2	902.0	1,267.3	180.8	127.7	-29
Total	**2,603.6**	**2,338.3**	**3,381.8**	**449.1**	**380.2**	**-15**
All by source						
Canada	669.0	607.4	740.5	127.4	106.0	-17
Mexico	484.8	253.9	540.5	45.4	31.9	-30
India	279.3	327.7	481.6	46.1	51.0	11
Nicaragua	232.3	249.9	387.9	58.8	40.1	-32
Other	938.3	899.6	1,231.3	176.0	153.8	-13
Total	**2,603.6**	**2,338.3**	**3,381.8**	**453.8**	**382.8**	**-16**

[1]Excludes chickpeas but includes pigeon peas. Cwt = hundredweight, a unit of measure equal to 100 pounds.
Source: USDA, Economic Research Service using data from U.S. Dept. of Commerce, Bureau of the Census.

During calendar year 2020, dry bean (excluding chickpeas) export volume increased 3 percent from a year earlier and was up 12 percent from 2 years earlier (table 18). Although dry bean export volume was up from 2019, it was 7 percent below the annual average of the past decade (2010-19) and the second lowest since 2008. Among other factors, this reflects the strength of the dollar and the struggle for competitiveness faced by many U.S. industries in the global marketplace. The gain in 2020 exports was paced by a 24 percent rise in dark red kidney bean volume and a 56 percent surge in black bean movement. In 2020, a reduction in volume was

realized for navy beans (down 26 percent) and pintos (down 13 percent)—normally among the top 3 in exports annually. During the first 2 months of 2021, dry bean export volume was up 33 percent, paced by pinto, navy, and black beans.

Table 18. U.S. dry bean calendar-year export volume[1]

	Jan. - Dec.			Jan. - Feb.		Change
Commodity	2018	2019	2020	2020	2021	2020-21
	1,000 cwt (bags)					*Percent*
By class						
Dark-red kidney	1,114.3	1,450.9	1,803.9	299.7	225.8	-25
Black	1,138.5	1,107.1	1,725.5	286.1	297.7	4
Navy	1,242.0	1,626.9	1,203.7	226.1	252.4	12
Pinto	1,105.9	1,328.6	1,157.8	148.8	400.2	169
Small red	249.4	240.1	486.7	40.0	37.0	-8
Light-red kidney	354.9	258.4	309.7	48.4	62.9	30
Lima, all	183.1	248.3	168.7	44.5	30.5	-31
Great Northern	201.6	519.6	145.9	32.6	46.5	42
Other	1,898.4	1,360.7	1,363.6	145.4	344.0	137
Total	**7,488.1**	**8,140.6**	**8,365.6**	**1,271.6**	**1,696.9**	**33**
All by destination						
Mexico	2,179.4	1,808.1	2,065.0	329.1	678.0	106
Canada	1,002.8	1,090.4	1,042.0	112.3	116.0	3
Italy	854.4	1,021.0	932.6	185.8	129.3	-30
Dominican Republic	506.4	586.3	833.2	47.1	151.3	221
United Kingdom	622.6	558.7	698.4	109.5	156.0	42
Haiti	173.9	311.7	435.9	57.9	51.8	-10
Costa Rica	54.6	93.0	336.2	52.7	60.3	14
Australia	106.8	123.9	134.1	18.6	21.6	16
Other	1,987.3	2,547.6	1,888.1	358.6	332.7	-7
Total	**7,488.1**	**8,140.6**	**8,365.6**	**1,271.6**	**1,696.9**	**33**

[1]Excludes chickpeas. Cwt = hundredweight, a unit of measure equal to 100 pounds.

Source: USDA, Economic Research Service using data from U.S. Dept. of Commerce, Bureau of the Census.

The leading export destinations in 2020 were Mexico (25 percent of total volume), Canada (12 percent), and Italy (11 percent). Despite the pandemic, shipments to Mexico remained strong, advancing 14 percent as increased movement of pinto and kidney beans outweighed lower shipments of pink, black, and Great Northern beans. Exports to Canada slipped 4 percent as reduced movement of miscellaneous beans more than offset increased dark red kidney and small red bean volume. Despite reduced movement of lima beans, exports to the United Kingdom (UK) rose 25 percent as the volume of navy beans and dark red kidney beans increased.

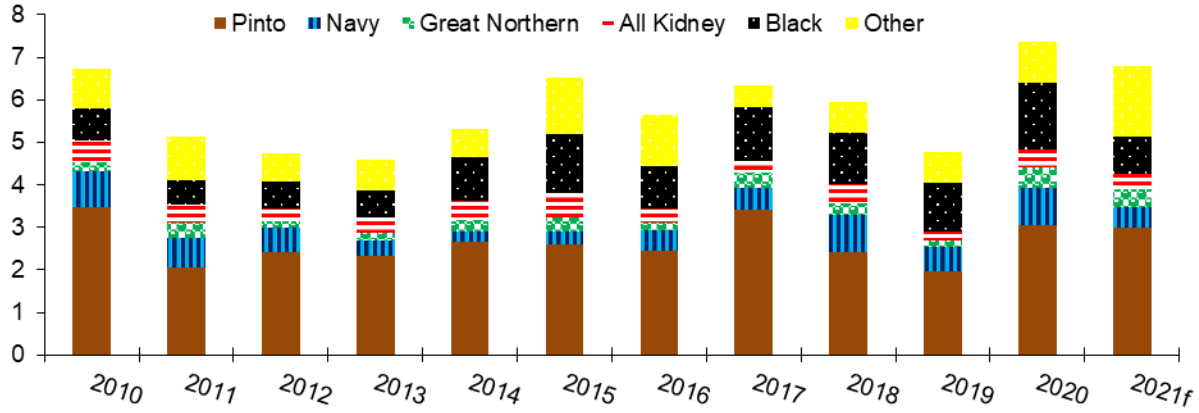
The value of exports increased 12 percent to $332 million as both volume and average unit values increased. The average unit value (export price) for all dry beans was up 9 percent from the moderate level of a year ago to 40 cents per pound. Lower export values for navy (down 24 percent) and Great Northern beans (down 66 percent) were outweighed by gains in black beans (up 80 percent) and others.

Per Capita Availability Rises in 2020

Driven by pandemic-inspired consumer stock-up of staple foods, stocks of many dry bean classes were driven to very low levels in the spring and summer of 2020. Reflecting this, preliminary estimates indicate that per capita availability of dry edible beans (excluding chickpeas) increased 54 percent to 7.4 pounds in 2020. This was the strongest dry bean demand since 1999 and was a direct reflection of pandemic consumer behavior seen across many other storable vegetable commodities such as canned and frozen vegetables, potatoes, and sweet potatoes. Despite the lowest beginning stocks since 2012, surging production and rising imports pushed aggregate dry bean domestic availability upward to 2.4 billion pounds in 2020.

Markets for all major classes of dry beans featured increased per capita availability in 2020 led by an 84 percent gain in white bean (navy, lima, Great Northern) use and a 48 percent increase for non-white classes. Gains were led by pinto (up 53 percent), black (up 40 percent), light/dark red kidney (up 81 percent), and navy/pea (up 56 percent) beans (see figure 10). In the year ahead, per capita dry bean availability is projected to decline about 10 percent as reduced total supply declines on lower production and imports while prospects in the global market improve export demand during the second half of the year.

Figure 10
Dry edible beans (excluding chickpeas): Per capita availability, 2010-21



f = forecast.
Source: USDA, Economic Research Service calculations.

Dry Bean Farms Fewer and Larger

According to the 2017 Census of Agriculture, 5,408 farms produce dry edible beans (excluding chickpeas and limas) in the United States—22 percent fewer than in 2012. Along with fewer growers, acreage and production also declined. However, the average dry bean farm continued to enlarge. As a result, nearly 94 percent of production came from operations with 100 or more acres of dry beans in 1997—up from 92 percent in 2012. The most common dry bean acreage remains 100 to 249 acres, with 28 percent of farms fitting into this classification—the same as in 2012. In both 2012 and 2017, the highest per-acre yields were achieved within the 50-99 acre farm class, although without further research, no conclusion can be made about relative efficiency among enterprise sizes. Given the threat of drought this year, the prevalence of irrigation is important. The 2017 Census of Agriculture indicated that 29 percent of national dry bean area is produced under irrigation—little changed from 2012.

Concentration among farms harvesting dry beans continued to increase in 2017. The number of farms with more than 1,000 acres of dry beans continued to rise in 2017 with the census indicating that 266 farms harvested more than 1,000 acres of dry beans in 2017, up from 249 farms in 2012. These 266 farms accounted for 5 percent of all farms with dry beans but harvested 27 percent of the acreage in 2017. In 2012, farms with more than 1,000 acres of dry beans accounted for 4 percent of operations with dry beans but harvested 23 percent of all dry bean area.

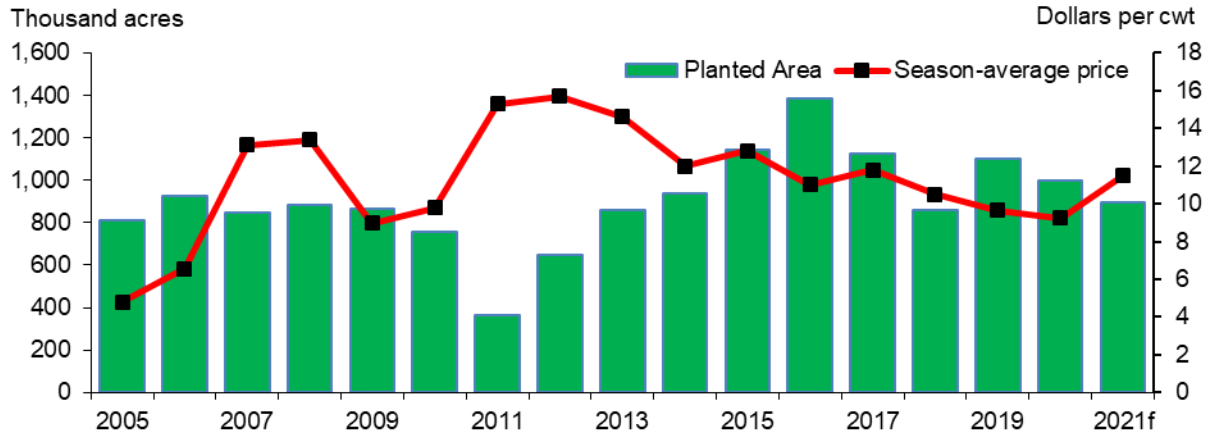
In North Dakota, the number of farms harvesting dry beans declined 16 percent. Virtually all the decline came in farms harvesting less than 500 acres of dry beans. Reflecting the national trend, concentration increased between 2012 and 2017. In North Dakota, the share of the State’s total dry bean area grown on farms harvesting at least 500 acres of dry beans rose from 64 percent in 2012 to 71 percent in 2017. The number of farms within this group remained unchanged at 483 in 2017—37 percent of all North Dakota operations with dry beans. Irrigation remained scarce on dry bean operations in the State, with just 2 percent of area covered by irrigation in 2017.

Dry Edible Peas, Lentils, and Chickpeas

Prospective Stable in 2021

According to USDA's March 31 Prospective Plantings report, growers plan to seed a similar area to 2020 to aggregate dry edible peas, lentils, and chickpeas this spring. Dry pea area is projected to be down 11 percent to 893,000 acres (figure 11), while lentil area is projected to rise 16 percent to 611,000 acres (table 19). Chickpea (large and small caliber) area is expected to rise 7 percent.

Figure 11
U.S. dry edible pea planted area and season-average price, 2005-21[1]



[1]Price for 2021 is an ERS forecast. Cwt = hundredweight, a unit of measure equal to 100 pounds.
Source: USDA, National Agricultural Statistics Service except 2021 price projection by USDA, ERS.

Among the leading States, much of the reduction in the dry pea and lentil complex is expected to be centered in North Dakota (down 21 percent) and be offset by increases in Montana (up 21 percent), and the Pacific Northwest States (up 4 percent).

Table 19. Dry peas, chickpeas, and lentils: Planted area, 2017-21

Commodity	2017	2018	2019	2020	2021f	Change 2019-21
			1,000 acres			*Percent*
Dry peas	1,128.0	856.5	1,102.0	999.0	893.0	-11
Lentils	1,104.0	780.0	486.0	528.0	611.0	16
Chickpeas, all	625.5	863.2	453.4	269.8	290.0	7
Large chickpeas	448.0	637.5	348.4	221.4	231.0	4
Small chickpeas	179.5	225.7	105.0	48.4	59.0	22
Total	2,857.5	2,499.7	2,041.4	1,796.8	1,794.0	0

f = NASS forecast.
Source: USDA, Economic Research Service calculations using National Agricultural Statistics Service, *Crop Production* and Prospective Plantings data.

The steady combined area for these pulse crops reflects prospective gains for lentils and chickpeas offset by a decline in peas. Larger acreage for lentils partly reflects stronger global demand) while the increase in chickpeas is more keyed to the domestic market where a sharp production drop in 2020 led to tighter supplies. In contrast, pea production fell only 2 percent in 2020 and stocks remained relatively high, dropping 2020 pea prices to the lowest level in a decade, while prices for competing field crops such as wheat and corn have been much stronger.

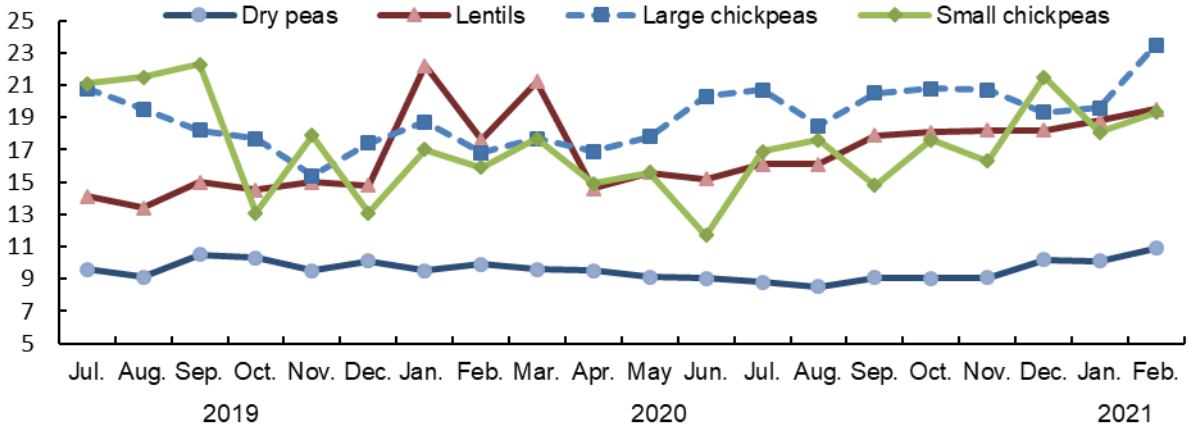
Although the Prospective Plantings report did not enumerate it, most of the decline in expected dry pea area may be centered in dry green peas. Prices for green peas have not kept pace with surging field crop prices and were also surpassed by prices for yellow peas—a rare event since green peas generally sell at a premium to yellow. According to USDA's *Bean, Pea, and Lentil Market Review*, mid-March f.o.b. grower prices for whole yellow peas were selling for $13.34 per bag (cwt) in the Minnesota-North Dakota market while whole green peas were averaging $11.13 per bag. Strong yellow pea prices reflect continued expansion in domestic demand (in both human foods and animal feed) as well as surging export volume this crop year.

According to the USDA-NASS *Grain Stocks* report, dry edible pea stocks on December 1 of 2020 were down 23 percent from the record high a year earlier. For lentils, good export and domestic demand managed to more than offset the impact of the larger 2020 crop, resulting in a 5 percent decline in the December 1 stock position. Since the pandemic's market influence began last March, lentil prices trended higher on good demand and the February all lentil average reported by NASS was 11 percent above a year earlier (figure 12).

Figure 12

Dry peas, chickpeas, and lentils: Average monthly grower prices, 2019-21

Dollars per cwt



Cwt = hundredweight, a unit of measure equal to 100 pounds.
Source: USDA, Economic Research Service calculations using USDA, National Agricultural Statistics Service data.

Chickpea stocks were down 16 percent to 5.8 million cwt as kabuli peas dropped 19 percent and desi fell 10 percent. Reflecting lower supplies on a smaller crop, lower stocks, and higher prices for competing crops, the February all chickpea price was up 35 percent from a year earlier.

Yellow Peas Lead Exports Higher

During the first 8 months of the 2020/21 marketing year (July-February), dry pea, lentil, and chickpea export volume rose 18 percent above a year earlier (table 20). Although up from the relatively strong levels of 2019/20, dry pea, lentil, and chickpea export volume was 56 percent above the average of the past 3 marketing years. The leading export destinations so far in 2020/21 were Canada, China, and Spain.

Export volume was up 70 percent through February 2020/21 for dry edible peas but down for lentils (10 percent) and chickpeas (20 percent). The increase for dry peas was paced by a huge leap in yellow pea movement. This was spurred by interest from China, which accounted for 57 percent of yellow pea volume. China is an importer of opportunity and did not import any U.S. yellow peas the previous year. In China, yellow peas are used as animal feed (especially when soybean prices rise), to make snack foods (e.g. yellow pea cake), and to produce starch used in manufacturing noodles. U.S. exports to Canada (the world's largest dry pea exporter) jumped 777 percent as global demand surged.

Per Capita Availability Dry Peas and Lentils Down

Although demand for dry peas and lentils is on an upswing both nationally and globally, preliminary estimates suggest that per capita availability of dry peas and lentils declined moderately during 2019/20. Data suggest the decline was likely due to a return of lentil use to average levels after rising the previous two years. It appears that per capita availability of lentils declined as low prices and soaring global demand doubled exports and siphoned product from the domestic market. For dry edible peas, the added boost from consumer stocking (hoarding) behavior during the early days of the pandemic may have played a role as retail demand for storable/shelf stable foods soared. As a result, preliminary data indicate per person availability (a proxy for consumption) of dry peas (excluding chickpeas) increased during the 2019/20 crop marketing year.

The availability of chickpeas for domestic consumption remained steady in calendar year 2020 as the reduction in domestic output was largely offset by increased imports and a drawdown in

stocks. As a result, availability in 2020 remained around 293 million pounds—little changed from 2019. On a per capita basis, chickpea availability was also largely unchanged at 0.9 pounds.

Estimates of food use of dry peas and lentils remain imprecise because of a lack of official data on feed use, particularly for dry peas. ERS estimates assume about 10 percent of dry edible pea production currently moves into domestic animal feeds (including pet food). Given rising use of pea proteins in various pet foods, ERS estimates likely understate the importance of peas in the nonfood market.

Table 20. U.S. dry edible peas, chickpeas, and lentils: Trade volume by class[1]

	July - June			July - February		Change
Commodity	2017/18	2018/19	2019/20	2019/20	2020/21	19/20-20/21
	1,000 cwt (bags)					*Percent*
Exports						
Green peas	2,399	2,884	3,541	1,864	1,967	6
Yellow peas	609	284	1,085	286	2,746	860
Split peas	1,400	1,755	2,531	1,501	1,598	6
Austrian winter peas	52	30	17	12	10	-21
Misc. dry peas	531	677	462	303	441	46
Lentils, all	3,568	3,248	6,560	4,362	3,923	-10
Chickpeas, all	2,753	2,897	3,459	2,203	1,770	-20
Total	**11,312**	**11,774**	**17,655**	**10,531**	**12,455**	**18**
Imports						
Green peas	224	97	50	24	27	12
Yellow peas	987	1,947	947	812	357	-56
Split peas	967	554	457	297	178	-40
Austrian winter peas	2	2	4	3	1	-51
Misc. dry peas	294	429	364	259	254	-2
Lentils, all	955	1,382	1,021	608	600	-1
Chickpeas, all	1,291	997	859	506	655	29
Total	**4,721**	**5,408**	**3,703**	**2,509**	**2,073**	**-17**

[1]This table excludes planting seed. Chickpea data are July - June in this table. Cwt = hundredweight which equals 100 pounds.
Source: USDA, Economic Research Service calculations using data from U.S. Dept. of Commerce, Bureau of the Census data.

Despite measurement limitations, dry peas and lentils are definitely rising in the national diet. For decades, per capita food availability of dry peas and lentils averaged about a half pound annually with much of the demand coming from soup manufacturers and dry packaged consumer sales with few new products in the market. However, over the past decade surging consumer interest in plant-based diets featuring vegetable-based protein substitutes is joined by rising demand for gluten-free products. As a result, food demand for dry peas and lentils is on an upswing as an explosion of new products entered the market. These include meat substitutes (burgers), various snack foods, pasta, flours, starches, and even dairy substitutes.

Crop Value Flat in 2020

The preliminary value of the 2020 dry pea and lentil crop (including chickpeas) was largely unchanged from a year earlier at $409 million as slightly lower output was offset by higher average prices. The value of both the dry edible pea and chickpea crops fell from a year ago, while lentil crop value recovered almost completely from the low prices of 2019 precipitated by weaker than anticipated export demand and burdensome stocks. The preliminary average unit value across all dry peas and lentils for 2020/21 was estimated to be $12.24 per cwt, 1 percent above a year earlier. Although crop value was unchanged from 2019, it was down 29 percent from 2018 and half the 2016 record nominal value. In the year ahead, higher average prices should outweigh somewhat smaller production and leave crop values up slightly from 2020.

Special Article

Import Competition in the U.S. Fresh Vegetable Industry

Wilma Davis and Gary Lucier

The value of all vegetable and pulse imports totaled $16.1 billion in 2020, up 79 percent this past decade. Fresh-market vegetable imports accounted for 63 percent ($10.2 billion) of this value. The U.S. fresh-market vegetable sector has an expanding net trade deficit with the value of imports exceeding exports since 1992. In 2020, the value of fresh-market vegetable imports exceeded fresh exports by $7.6 billion—more than double the deficit of a decade earlier.

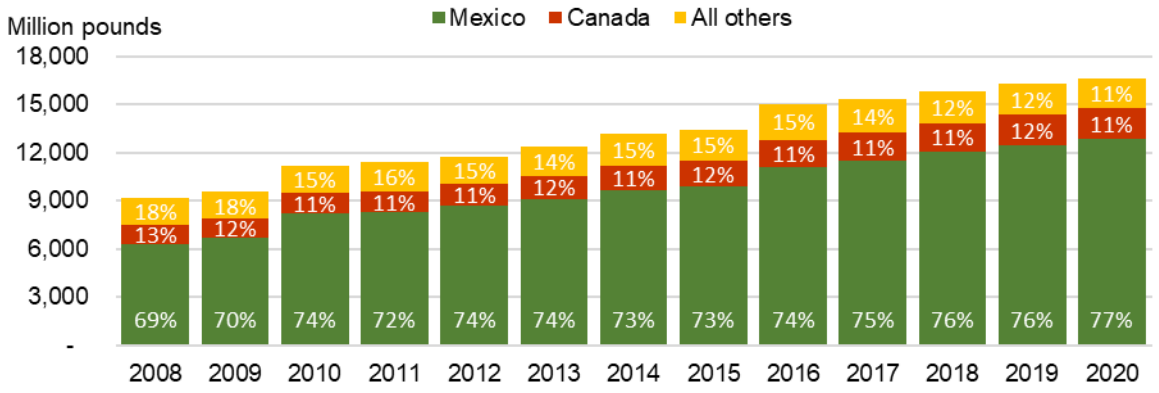
On average, the United States imported $9.2 billion of fresh vegetables annually during 2018-20—up from $4.7 billion during 2008-10. Imports have long played an important role in most U.S. vegetable markets, particularly those destined for the fresh market. Over the past 50 years, a combination of factors such as contra-seasonal demand, rising income, trade agreements, and structural change within the marketing system contributed to the ever-rising volume of fresh vegetables from outside the country. The fresh vegetable industry has long had a love-hate relationship with imports. The retail/consumer sector embraced more variety, year-round availability, and competitive pricing while the domestic production sector, primarily growers and grower/shippers, lamented below-cost pricing or unfair competition.

This article provides an update on the impact of imports on the U.S. fresh vegetable industry this decade with a focus on four markets: bell peppers, cucumbers, squash, and snap beans.

Fresh Vegetable Imports from Mexico and Canada Continue to Dominate

The aggregate import volume of fresh-market vegetables (excluding potatoes) rose 63 percent between 2008-10 and 2018-20 with imports originating from over 125 countries. On average during 2018-20, Mexico accounted for 77 percent of all fresh vegetable imports, up from 71 percent in 2008-10 (see figure 1).

Figure 1
U.S. fresh vegetable import volume by country, 2008-20



Source: USDA, Economic Research Service calculations using U.S. Dept of Commerce, Bureau of the Census data.

Mexican and Canadian producers recognized opportunity in the U.S. market and embraced technological change, including extensive use of protected culture (greenhouse), to dominate the fresh vegetable market and meet U.S. market demands. Organic and greenhouse vegetable trade are growing components of the expanding market.

Organic imports were first reported by the U.S. Department of Commerce, Bureau of the Census in 2011. Comparing the last three years of organic fresh vegetable imports with an average of the first three years of reported organic imports reveals strong trends. On average during 2018-20, Mexico accounted for 87 percent of all organic fresh vegetable imports, up from 81 percent in 2011-13. The aggregate volume of organic fresh-market vegetables (excluding potatoes) imported from Mexico skyrocketed 799 percent between 2011-13 and 2018-20 while conventional fresh-market vegetable imports from Mexico increased 42 percent in the same period (see table 1).

Table 1. U.S. fresh vegetable imports: conventional vs. organic, 2011-2020

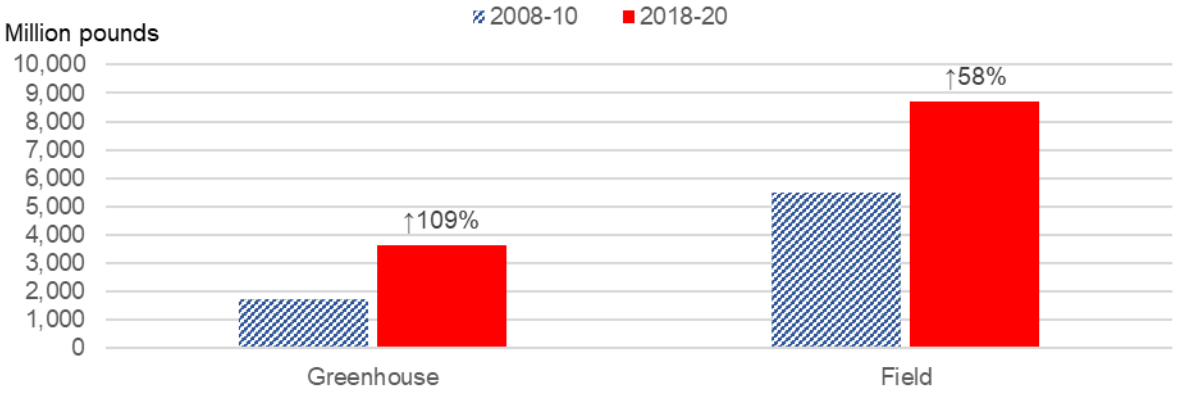
Category	Conventional	Organic
2011-13 (million pounds)	8,617.80	11.41
2018-20 (million pounds)	12,219.09	102.58
Change (percent)	+42	+799

Source: USDA, Economic Research Service calculations using U.S. Dept. of Commerce, Bureau of the Census data.

Similarly, imports of vegetables grown in protected structures/greenhouses in Mexico accounted for 81 percent of all greenhouse-grown U.S. vegetable imports in 2018-20, up from 76 percent in 2008-10. The 3-year average aggregate volume of greenhouse fresh-market vegetables (excluding potatoes) imported from Mexico increased 109 percent from 2008-10 to 2018-20

while imports of field-grown fresh-market vegetables from Mexico increased 58 percent in the same period (see figure 2).

Figure 2
Greenhouse vs. field-grown fresh vegetable import volume, 2008-10 and 2018-20



Source: USDA, Economic Research Service calculations using U.S. Dept of Commerce, Bureau of the Census data.

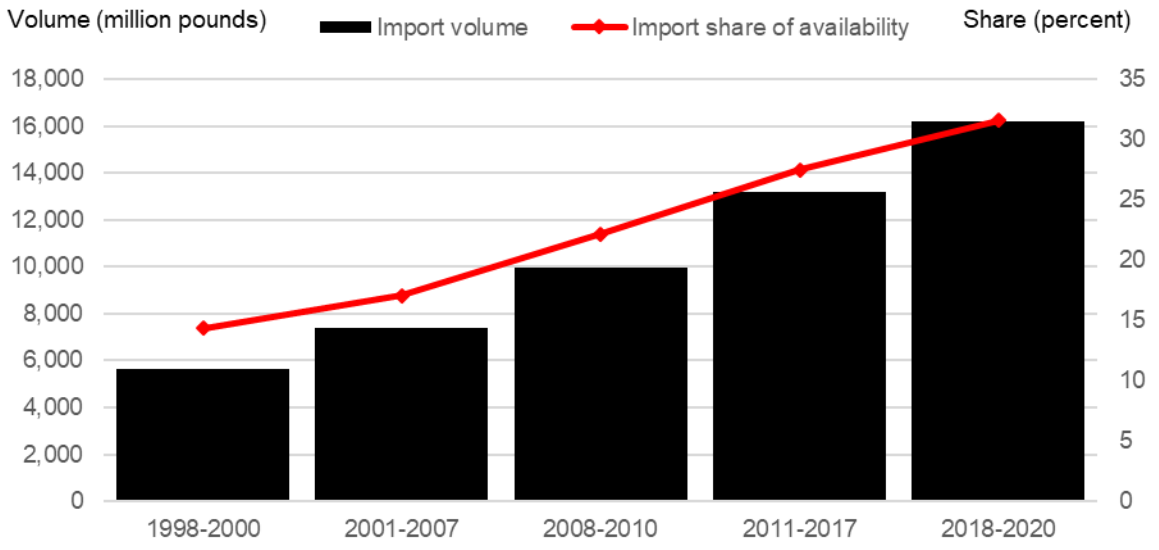
The largest volume of fresh vegetable imports, mostly from Mexico and Central American countries, typically enter the United States during the winter, autumn, and early spring months when domestic supplies are limited. Tomatoes, peppers, cucumbers, squash, and other tender warm-season vegetables require warmer temperatures for growth than those that prevail in most parts of the United States during the winter. Southern Florida is virtually the only domestic outdoor growing area that can reliably produce these warm-season vegetables in commercial volume throughout the winter. But even in Florida, cold weather remains an annual threat to winter crops. As a result, winter imports of vegetables help insulate the domestic market against impacts from localized weather events, such as freezes, heavy rain, and hurricanes.

Hardier cool-season fresh vegetable crops, such as lettuce, broccoli, spinach, and celery, can withstand fluctuating winter temperatures that prevail in the deserts of California and Arizona and the Rio Grande Valley of Texas. Consequently, for cool-season crops, a smaller share of supply is imported during the winter and spring than for warm-season crops, such as tomatoes, peppers, and cucumbers. But imports are also creeping higher for these hardier vegetables as demand rises (in the case of cauliflower and spinach) and salad shippers look to ensure a reliable alternate supply of leafy vegetables (e.g., leaf lettuce and romaine) to cover contractual arrangements in the event of weather anomalies.

Fresh Vegetable Imports Satisfy 32 Percent of Availability

Over the past 2 decades (1998-2020), the volume of fresh vegetable imports increased 187 percent and import share of availability increased 120 percent. The volume of fresh-market vegetable imports (excluding potatoes) rose 76 percent between 1998-2000 and 2008-10 and increased 63 percent between 2008-10 and 2018-20. As a result, over the past 2 decades, the average import share of aggregate fresh vegetable availability (an indicator of consumption) rose 14 percent during 1998-2000, 22 percent during 2008-10, and 32 percent during 2018-20 (see figure 3).

Figure 3
Fresh vegetable import volume and import share of availability, 1998-2020



Source: USDA, Economic Research Service calculations using U.S. Department of Commerce, Bureau of the Census data.

Driving Factors Behind Rising Fresh Vegetable Imports

Several factors fuel annual increases in fresh vegetable import volume. These factors encompass the supply and demand side of vegetable markets as well as the general economic environment.

Production Cost Differential by Country: On the supply side stark differences exist in the cost of producing (COP) fresh-market vegetables between the United States and the primary foreign supplier, Mexico. For most crops, Mexico maintains a comparative COP advantage due largely

to differences in wage rates. The minimum wage in Mexico was less than 60 pesos ($4.75 U.S.) per day in 2010 but rose sharply. Mexico's National Minimum Income Committee announced the minimum daily wage rate was set at 141.7 pesos (about $6.80 U.S.), an increase of 15 percent as of January 1 of this year. In the Free Trade area of the northern border states, the minimum daily wage was set at 213.39 pesos ($10.24 U.S.). For the first time, the national daily minimum in Mexico will also cover agricultural workers.

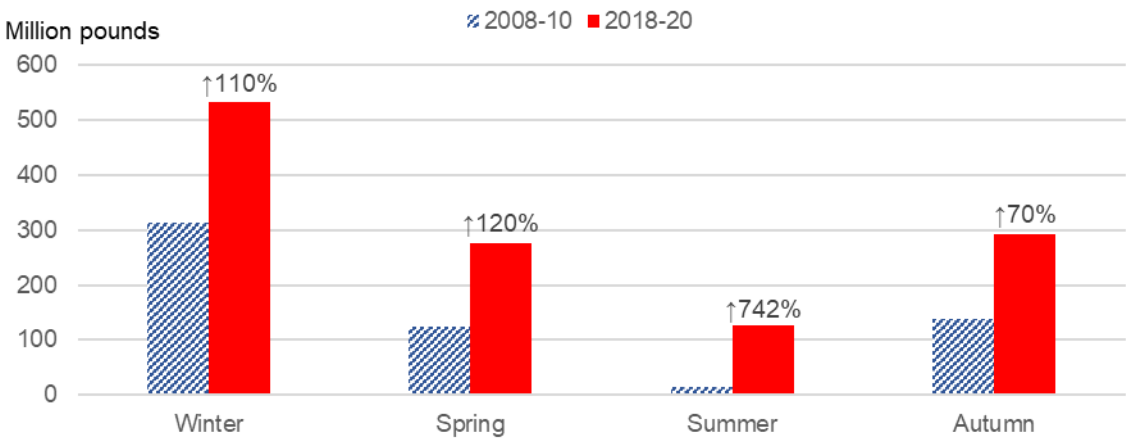
In the United States, the daily minimum wage (based on the $7.25/hour Federal minimum) would be $58 per day. According to the USDA/National Agricultural Statistics Service (NASS) Farm Labor Survey, though, agricultural worker hourly wage rates are well above the Federal minimum wage, with the average across all farm occupations now about $15 per hour, or $120 per day. This discussion is simply to point out the wage rate differentials between the countries and is not meant to indicate the actual labor compensation. As in the U.S., it is likely that most experienced farm workers in Mexico make more than the daily minimum wage.

Seasonal Demand and Market Window Creep: For decades, the drive toward year-round availability of virtually all fresh vegetables was a key driving force behind rising fresh vegetable imports. As disposable incomes rose and diet and health-conscious eating became more popular, consumers pushed for consistency in supermarket produce offerings. The old standard of summer vegetables vs. winter vegetables faded away as imports filled in where and when domestic production was inadequate and/or too costly.

Market window creep is an extension of seasonal demand and refers to the increasing volume of fresh vegetable imports entering during the start or end of the traditional domestic production seasons. The previous market window "discipline" began to fray after importers found their traditional market windows maturing. So, they began to branch out, sending volume earlier than usual (encroaching on the end of the previous season) while also extending their shipping season into the start of the following season. A comparison of the average import volume from 2008-10 to 2018-20 for bell peppers from Mexico provides a good example of market window creep in the summer months (see figure 4). Bell pepper import volume from Mexico in the summer months increased by 742 percent from 2008-10 to 2018-20, even though summer is historically the primary marketing window for domestic producers.

Figure 4

Bell pepper seasonal import volume from Mexico and average percentage change, 2008-10 vs. 2018-20

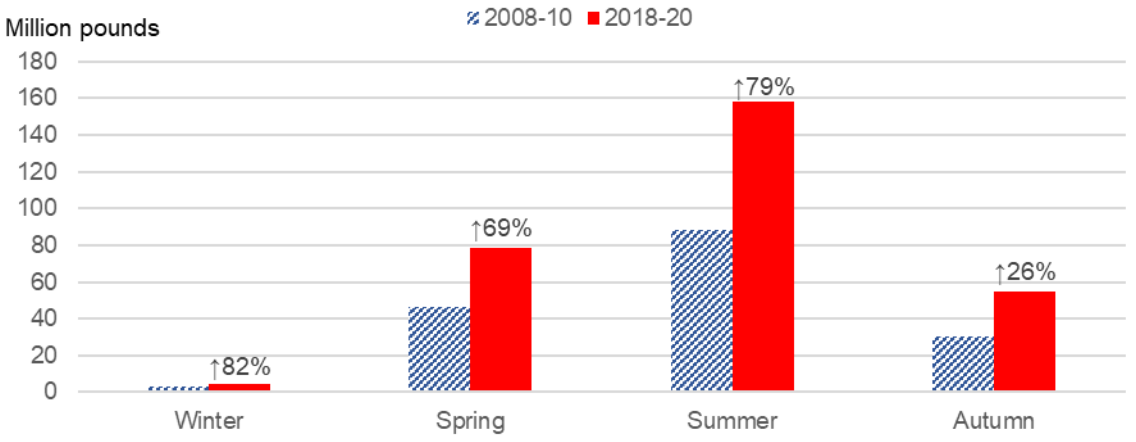


Source: USDA, Economic Research Service calculations using U.S. Department of Commerce, Bureau of the Census data.

A comparison of the average import volume from 2008-10 to 2018-20 for bell peppers from Canada shows import volume in the summer months are the most predominant with a 79 percent increase from 2008-10 to 2018-20 (see figure 5).

Figure 5

Bell pepper seasonal import volume from Canada and average percentage change, 2008-10 vs. 2018-20



Source: USDA, Economic Research Service calculations using U.S. Department of Commerce, Bureau of the Census data.

Previously, imports complemented U.S. production during the winter, autumn, and early spring months when domestic supplies were limited. However, imports increasingly intrude into the beginning or end of market windows for many vegetables. This, in turn, exerted downward U.S. price pressure during market windows which once featured lower volume and attendant higher prices.

Over the past decade, growth in the volume of fresh vegetable imports increased outside of the traditional cold-month windows. Comparing the change in two 3-year periods (2008-10 and 2018-20) shows that the share of annual imports arriving during the winter months of January-March declined from 33.5 percent to 30.3 percent (see table 2). In the meantime, the share of imports arriving during each of the other three seasons increased, with the greatest annual share gain coming during the autumn (October-December) and summer (July-September).

Table 2. Fresh vegetable[1] seasonal volume of imports

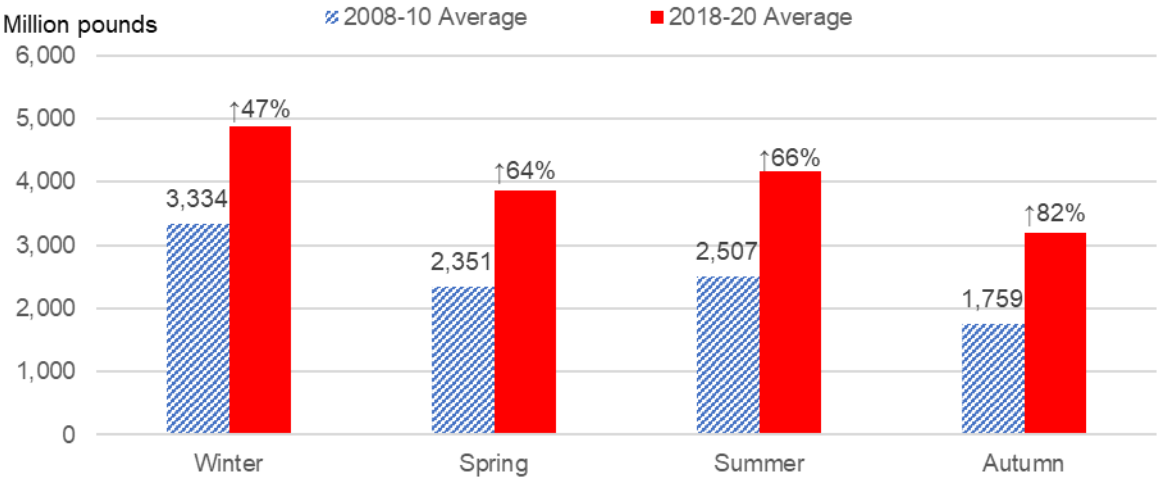
Years (units)	Winter[2]	Spring[3]	Summer[4]	Autumn[5]
2008-10 Average (million pounds)	6,669	4,702	5,014	3,518
2018-20 Average (million pounds)	9,773	7,722	8,320	6,387
2008-10 Annual share (percent)	33.5	23.6	25.2	17.7
2018-20 Annual share (percent)	30.3	24.0	25.8	19.8
2008-10 vs. 2018-20 Annual share change (percent)	-3.2	0.4	0.6	2.2

1/ Excludes potatoes. 2/ Winter months are January-March. 3/ Spring months are April-June. 4/ Summer months are July-September. 5/ Autumn months are October-December.

Source: USDA, Economic Research Service calculations using U.S. Dept. of Commerce, Bureau of the Census data.

The aggregate import volumes of fresh vegetables (excluding potatoes) in the autumn and summer months are increasing more rapidly than in the winter when U.S. domestic production is at its lowest. On average, summer imports between 2008-10 and 2018-20 increased by 66 percent and autumn imports increased by 82 percent in the same period. Imports during the winter months, January-March, and spring have also increased but at lower percentages than summer and autumn (see figure 6).

Figure 6
Fresh vegetable seasonal import volume and average percentage change, 2008-10 vs. 2018-20

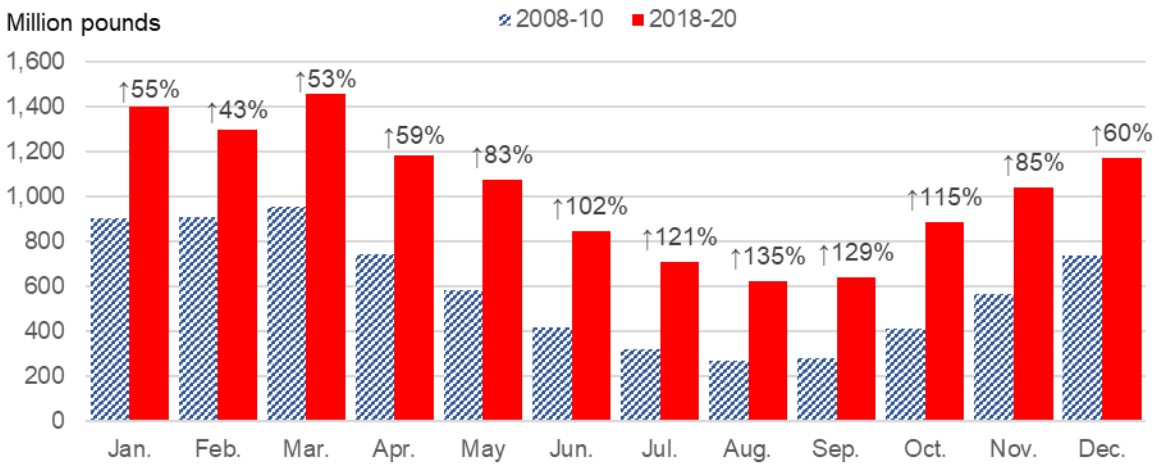


Source: USDA, Economic Research Service calculations using U.S. Department of Commerce, Bureau of the Census data.

The increasing trend of imports in the summer months did not affect the winter predominance of import volume but if the same trends continue, a steady level of imports irrespective of the season could potentially be common.

The increasing shift in imports to the summer months (July-September) is most pronounced in imports from Mexico, with imports increasing more rapidly in summer than in any other season. For example, the average import volume from Mexico during 2008-10 to 2018-20 increased 135 percent in August (see figure 7).

Figure 7
Mexico fresh vegetable average monthly import volume and percent change, 2008-10 vs. 2018-20



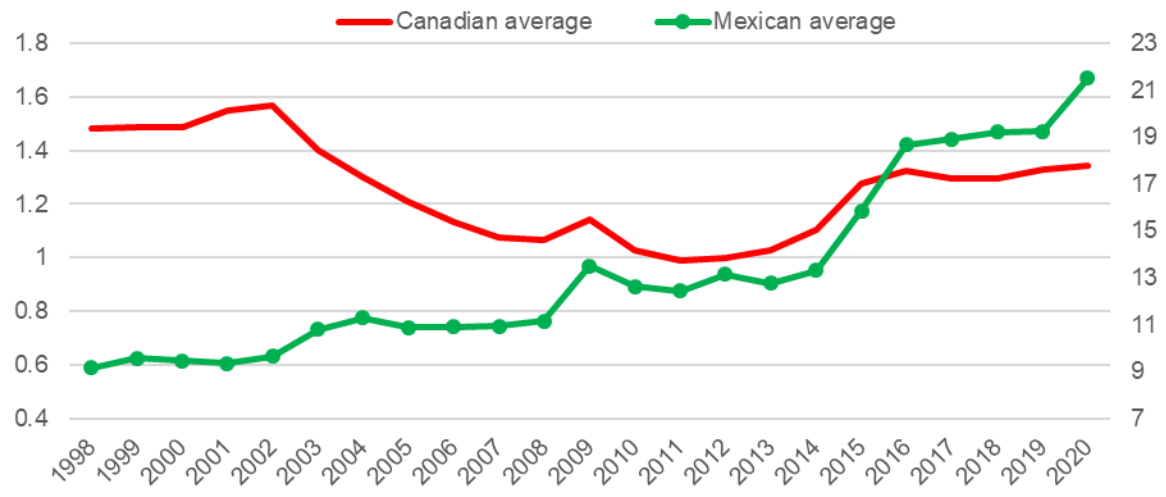
Source: USDA, Economic Research Service calculations using U.S. Department of Commerce, Bureau of the Census data.

Broader Offerings: Rising incomes and more sophisticated palates educated by the culinary media, led a travel-minded populace ton look for new produce items or those items consumed while visiting other countries. Meat with potatoes is now supplemented by such combinations as tofu with bok choy, jackfruit with spinach salad, eggplant with cauliflower, grilled lentil or portabella burgers with scaloppini squash. The average well-stocked supermarket produce department now features hundreds of Price Look-Up (PLU)[1] codes for many varieties of vegetables such as peppers and squash. Much of this variety is now courtesy of imports (especially during the cooler months) and may include different varieties of chile peppers, squash, and tropical vegetables.

[1] The PLU code is a 4- or 5-digit number that is primarily used on fresh produce items and will typically appear on a small sticker applied to an individual piece of fresh produce. The PLU code identifies produce items based upon the commodity, variety, and size group.

Exchange Rates: The trends in exchange rates among three North American nations over the past decade indicates the U.S. dollar strengthened appreciably vis-à-vis the Canadian dollar and the Mexican peso (figure 8). Assuming equivalent pricing, a stronger U.S. dollar makes U.S. imports less expensive and can allow the same amount of currency to purchase a greater volume of products. The U.S. dollar to peso exchange rate trended higher over the past 20 years, with a dollar worth an average of 12.63 pesos in 2010 and 21.50 pesos in 2020—a 70 percent gain. Similarly, 1 U.S. dollar traded for 1.03 Canadian dollars in 2010 and 1.34 Canadian dollars in 2020—a 30 percent increase.

Figure 8
Average Canadian/US exchange rates and Mexican/US exchange rates, 1998-2020

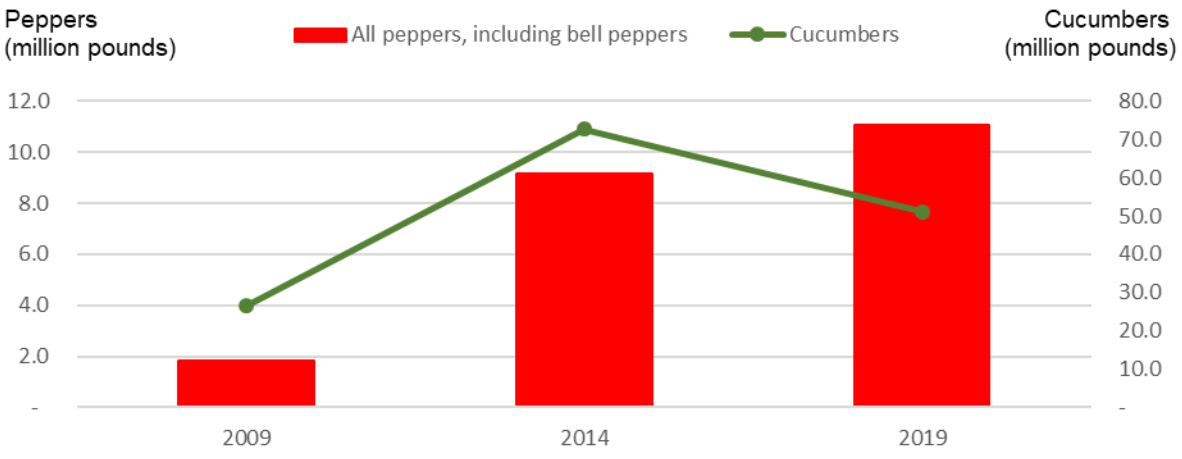


Note: Canadian dollar and Mexican pesos compared to one U.S. dollar, annually, not seasonally adjusted.
Source: USDA, Economic Research Service calculations using Federal Reserve Bank of St. Louis, Economic Research Division data.

Rising incomes: Gains in consumer incomes over time helped fuel demand for more expensive premium products such as organic vegetables and greenhouse tomatoes, peppers, and cucumbers. In the case of protected culture, the U.S. industry responded to the rising demand for products produced using protected culture. According to the 2019 Census of Horticulture, U.S. greenhouse pepper production rose 508 percent since the 2009 survey and U.S. greenhouse cucumber production increased 92 percent (see figures 9 and 10). Meanwhile, 2020 imports of greenhouse bell peppers and cucumbers are up 44 and 36 percent, respectively, since 2014. Despite soaring increases in domestic greenhouse production over the past decade, greenhouse imports still dominate the market in terms of volume. According to *Market News* shipment data, growers in Canada and Mexico as well as other nations are

actively involved in expanding this market. However, the predominance of greenhouse imports is difficult to catch up to and some domestic producers may be reluctant to make the large investment required for such projects until consumer demand is viewed as less than transitory. It is also possible that available data underreport domestic involvement in this industry to some extent.

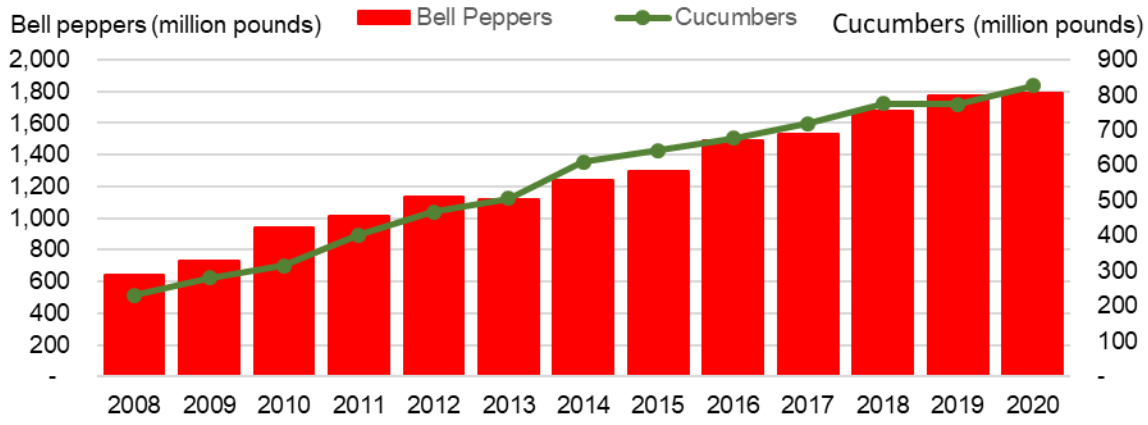
Figure 9
U.S. greenhouse pepper and cucumber production, 2009, 2014, and 2019[1]



1/ Growers shift the area of crops grown in any given year for market-based reasons and Census data is a 1-year observation captured every 5 years.

Source: USDA, Economic Research Service calculations using National Agricultural Statistics Service, Census of Horticulture data.

Figure 10
Fresh greenhouse bell pepper and cucumber imports, 2008-20



Source: USDA, Economic Research Service calculations using U.S. Department of Commerce, Bureau of the Census data.

Population trends: Import volume can also be tied to population trends. The population in the United States grew at an average annual rate of 0.7 percent over the past decade. Perhaps of

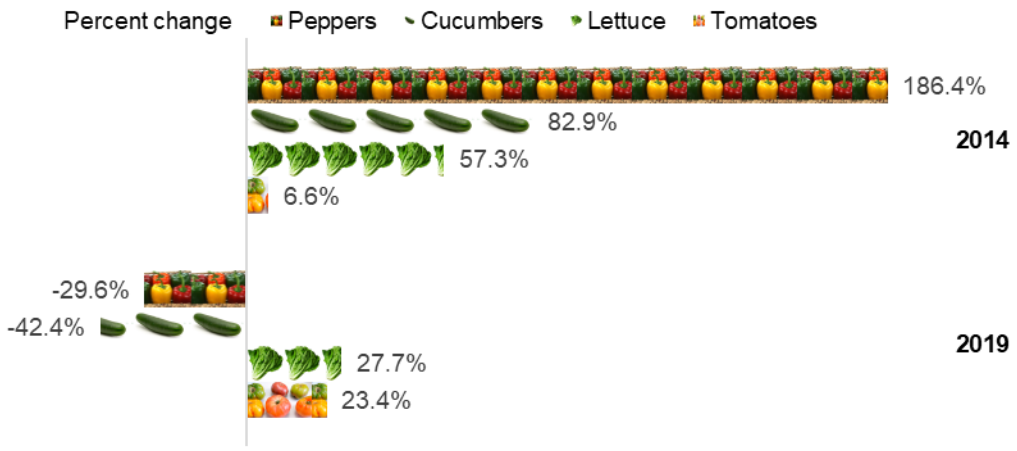
more importance are shifting demographic trends within the U.S. Most of the population growth is within Hispanic and Asian communities with average annual growth rates of 2.7 and 3.9 percent respectively over the past decade. National Health and Diet surveys documented the greater consumption of vegetables within these groups. The appearance in specialty and mainline supermarkets of various tropical and specialty vegetables formerly unknown in the U.S. may be partly the result of immigrants bringing their tastes and preferences with them. Many of these vegetables enter the retail channel via imports. For example, chayote is a gourd that is often grouped with squash. Chayote is native to Mexico and Guatemala but is also grown in the southern U.S.

Trade Agreements: Fresh market vegetables move easily and tariff-free within the North American market under the United States-Mexico-Canada Agreement (USMCA). Other trade agreements such as the U.S.-Peru Free Trade Agreement and the Dominican Republic-Central America-United States Free Trade Agreement (CAFTA-DR) also liberalized trade in most fresh vegetables. Over time, this resulted in increased bilateral trade with the United States and vaulted Peru and Guatemala into the top five foreign sources of fresh vegetables.

The Nature of Import Competition Now Broader

The net result of rising imports is notable, with impacts ranging from stable domestic field-grown vegetable acreage and production for the past decade to declines in those measures. According to the 2017 Census of Agriculture, total vegetable acreage declined 2.8 percent since 2012 and 4.1 percent since 2007. However, the decline was centered in processing acreage with fresh vegetable acreage up 4.1 percent from 2012 to 2017 after a decline of the same amount from 2007 to 2012. About half of the gain in fresh area since 2012 was due to increased area for sweet potatoes, cauliflower, and carrots. Reflecting changes in preferences and increased personal incomes, consumer demand for premium vegetables continues to rise. The 2019 Organic Census reports organically produced vegetable acreage was up 20.4 percent between 2016 and 2019. However, the 2019 Census of Horticulture indicated that area devoted to protected culture vegetable production was mixed for the selected vegetables reported, with cucumber and pepper areas down by 42.4 and 29.6 percent, respectively, while lettuce and tomato protected culture area was up by 27.7 and 23.4 percent, respectively (see figure 11).

Figure 11
Greenhouse area change in production, 2014[1] and 2019[2]



1/ 2014 percent differences compared to 2009. 2/ 2019 percent differences compared to 2014.

Source: USDA, Economic Research Service calculations using National Agricultural Statistics Service, Census of Horticulture data.

Although the fresh vegetable production industry has long battled the ever-present pressure of rising imports, the nature of competition broadened from a largely cost/price-based archetype. Although cost/price remains the primary competitive force in most markets, for trade-competitive crops such as field-grown bell peppers and cucumbers, rising consumer incomes allowed consumers to focus more on taste and preferences rather than price. For example, even though organic and greenhouse-produced vegetables frequently carry heavy price premiums, their share of fresh vegetable purchases continue to expand. These non-price preferences include attributes that interest consumers such as new varieties, colors, flavors, sizes, and the embrace of sustainable/organic-culture.

Import Shares of Selected Commodities

Over the past several decades, U.S. growers of fresh field-grown warm-season vegetables have had ongoing concerns with import competition. This competition was initially most intense during the December-April period when cool weather limits domestic production largely to Florida. Many studies detailing the nature of competition between Mexico and Florida in the winter fresh vegetable market were published over the years. The crops involved largely included tomatoes, bell peppers, squash, cucumbers, snap beans, and eggplant. Although it is not feasible to cover all markets in this article, this section focuses on the impact of imports on a few of the lesser-studied markets that also affect growers in areas outside of Florida.

Bell Pepper Import Shares

U.S. production of nonpungent (bell) peppers for all uses averaged 1.1 billion pounds during 2018-20. The fresh market accounts for about 80 percent of U.S. production with the remainder earmarked for various processing uses. California, Florida, New Jersey, and Georgia are the leading producing States, averaging about 80 percent of U.S. bell pepper output during 2018-20. California dominates the processed product subsector, reflecting its status as the top bell pepper producing State and the presence of frozen vegetable producing firms and major vegetable dehydrating firms.

Bell peppers are produced and marketed year-round, with domestic shipments peaking during May and June and import shipments highest during the winter months. As with fresh tomatoes and fresh cucumbers, both domestic and import bell pepper growers increasingly use protected culture (e.g., high-tech greenhouses, tunnels, hoophouses, etc.), with conventional field-grown production beginning to shrink.

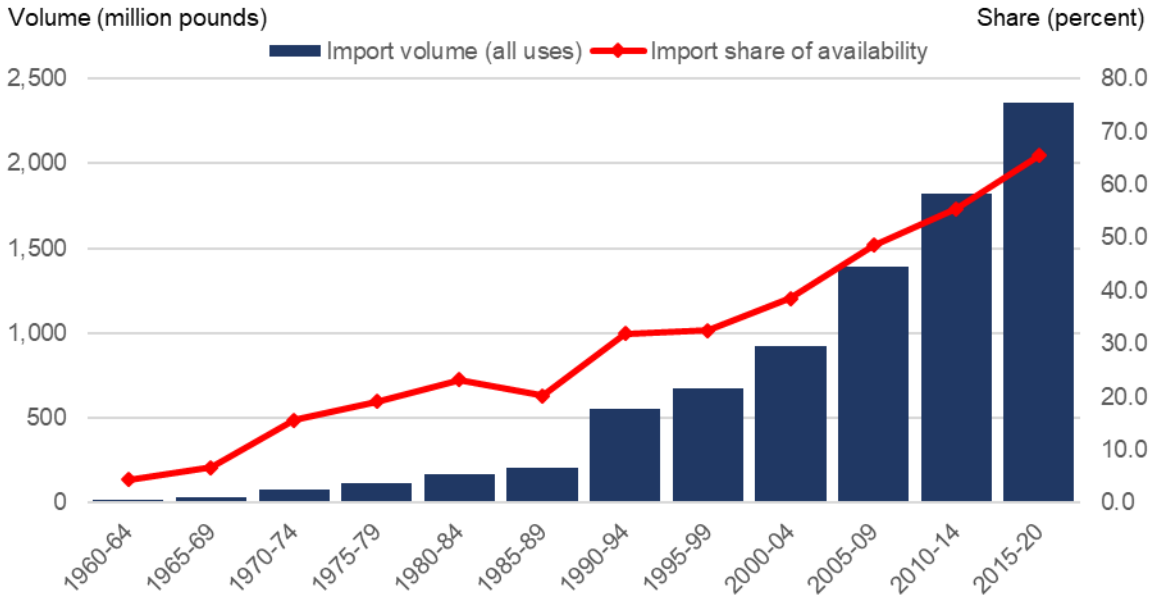
Per capita availability of bell peppers for all uses averaged 10.8 pounds during 2010-20—up 21 percent from the previous decade. Bell pepper availability posted double-digit gains each decade since the 1960s. Since records began in 1919, bell pepper availability never posted a decade-average decline, either rising or remaining steady compared with the average of the previous decade. According to consumer diet surveys, about two-thirds of all bell peppers are purchased at retail establishments and consumed at home with the remainder sourced through various foodservice venues.

Imports of fresh bell peppers totaled 1.17 billion pounds in 2020—up 1 percent from 2019 despite the pandemic. Mexico remains the leading foreign source and year-round supplier, averaging 77 percent of annual volume during 2018-20. Canada, also a year-round supplier, provides about 18 percent of import volume. Greenhouse-produced bell peppers accounted for 54 percent of import volume during 2018-20 with Mexico (68 percent), Canada (24 percent), and the Netherlands (3 percent) the top greenhouse bell pepper suppliers. Greenhouse share, which was 51 percent during 2010-12, has slowly risen due partly to rising incomes, concern over food safety and sustainability, and more competitive pricing for greenhouse products (which must compete with organically produced field-grown products).

The average import share of availability in the U.S. bell pepper market (all uses) rose each decade since at least the 1960s (see figure 12). In 2020, imports (fresh and processed) accounted for 69 percent of domestic availability, up from 51 percent in 2010. During the 2010s, import share averaged 59.7 percent compared with 43.6 percent in the 2000s and 32.3 percent

in the 1990s. During the 2010s, strong demand propelled average total (fresh and processed) import volume up 79 percent (fresh alone rose 107 percent) from the 2000s average. At the same time, domestic field-grown production fell 8 percent during the 2010s.

Figure 12
Bell pepper import volume and import share of availability, 1960-2020



Source: USDA, Economic Research Service calculations using U.S. Department of Commerce, Bureau of the Census data.

Cucumber Import Shares

U.S. production of cucumbers for all uses averaged 0.6 billion pounds during 2018-20. The fresh market accounts for about 30 percent of all field-grown cucumbers produced in the United States during 2018-20. The 2017 Census of Agriculture reported Florida, Michigan, Georgia, North Carolina, California, Texas, and New York as the leading fresh market cucumber States, accounting for about 75 percent of U.S. cucumber harvested acres. Per capita use of all fresh cucumbers averaged 7.4 pounds during the 2010s—up 16 percent from the previous decade with the decade's gains spurred largely by the popularity of seedless varieties. Driven by the enduring popularity of salads, fresh cucumber use is on an upward trend since the 1960s. The field-grown crop had an average annual farm value of $148 million during 2017-19. Florida is the leading supplier of fresh field-grown cucumbers, accounting for about one-third of annual U.S. utilized production. Florida is also the sole domestic supplier of field-grown cucumbers during late winter and early spring, with winter production very low since cucumbers are not tolerant of the cool spells common even in south Florida.

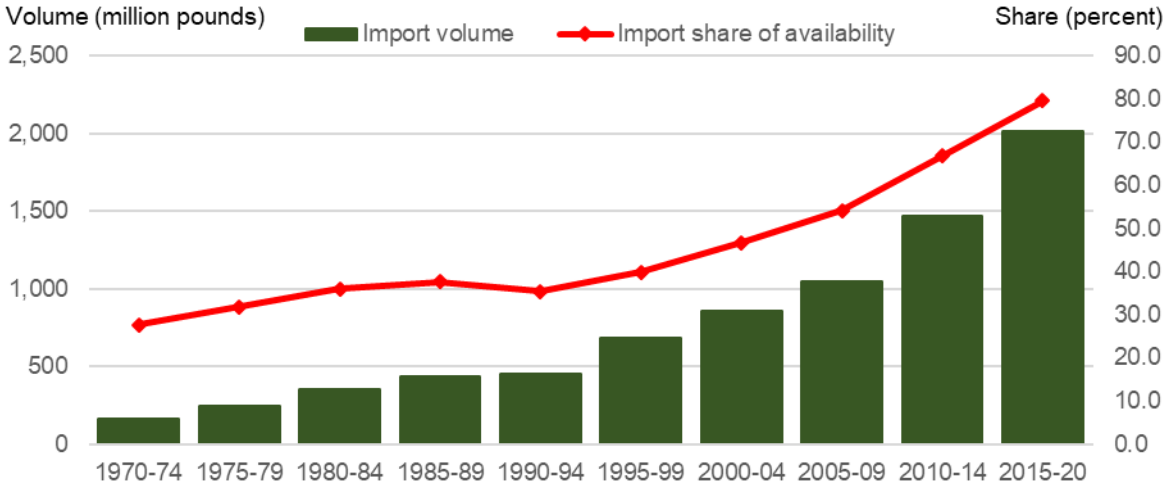
U.S. cucumber production for all uses totaled 1.3 billion pounds in 2020, with 25 percent earmarked for the fresh market. According to the 2017 Census, Florida, Michigan, Georgia, and North Carolina are the leading cucumber States, harvesting over 60 percent of the Nation's fresh market acres. During 2017-19, only about 1 percent of fresh-market volume was exported. U.S. production is supplemented by ever-rising imports, which now account for more than three-fourths of domestic availability—up from less than one-half in 2000. Growers and shippers of fresh-market cucumbers sell less than 20 percent of their crop through foodservice venues.

The 2019 Census of Horticulture reports U.S. production of greenhouse cucumbers totaled 51.0 million pounds. This was down from 72.6 million pounds in the 2014 Census and up from 26.5 million pounds in 2009. Greenhouse production accounts for about 11 percent of U.S. domestic cucumber production, up from 10 percent in 2014 and 3 percent in 2009. Greenhouse import share, which was 15 percent during 2010-12, is slowly rising for many of the same reasons cited for bell peppers. However, consumers also find favor with the long, thin-skinned, homogeneous European seedless varieties, the small thin-skinned Persian cucumbers, and mini (Kirby) cucumbers, each of which are commonly grown in domestic and foreign greenhouses.

Imports of fresh cucumbers totaled 2.19 billion pounds in 2020 and are projected to increase slightly in 2021 despite the pandemic. Mexico remains the leading foreign source of fresh cucumbers, averaging 80 percent of annual volume during 2018-20. Canada, also a year-round supplier due to an extensive greenhouse industry, provided 16 percent of import volume during 2018-20. Greenhouse-produced cucumbers accounted for 18 percent of import volume during 2018-20, with Mexico (48 percent of the total) and Canada (49 percent) nearly splitting the market.

Prior to 2005, domestic fresh cucumber production exceeded import volume annually. Since then, imports continued to trend higher and exceeded domestic output (which trended lower) annually. Import penetration in the U.S. fresh cucumber market is trending upward since at least the 1970s (Figure 13). In 2020, imports accounted for 87 percent of domestic availability, up from 61 percent in 2010. Over the previous 5 years (2015-19), fresh cucumber imports increased an average of about 5 percent annually. During the 2010s, import share averaged 73.1 percent compared with 50.4 percent in the 2000s and 37.6 percent in the 1990s. Reflecting rising domestic demand for cucumbers, import volume continued on a long-run (60 year) upward trend, crowding out domestic field-grown production which plummeted 54 percent from a decade earlier during the 2010s.

Figure 13
Cucumber import volume and import share of availability, 1970-2020



Source: USDA, Economic Research Service calculations using U.S. Department of Commerce, Bureau of the Census data.

Squash Import Shares

U.S. production of squash for all uses averaged 0.4 billion pounds during 2018-20. Fresh-market squash accounts for about 70 percent of all field-grown squash produced in the United States during 2018-20. Utilized production of all squash (summer and winter types) fell 2 percent (based on comparable States provided by NASS) to 693 million pounds in 2020. About 71 percent of the squash grown in the United States is used in the fresh market. The 2017 Census of Agriculture reported Florida, California, Michigan, New York, New Jersey, Georgia, North Carolina, Texas, Massachusetts, Washington, Ohio, and Tennessee as the leading fresh-market squash States averaging about 70 percent of U.S. squash harvested acres. In Michigan, the top fresh squash producing State, winter squash (e.g., butternut and Hubbard) accounts for two-thirds of the total squash harvesting area. Summer squash (e.g., yellow straight-neck and zucchini) accounts for about 53 percent of the squash grown domestically. Summer squash is primarily grown in Florida, California, and Michigan, while winter squash is primarily grown in Michigan, New York, and California.

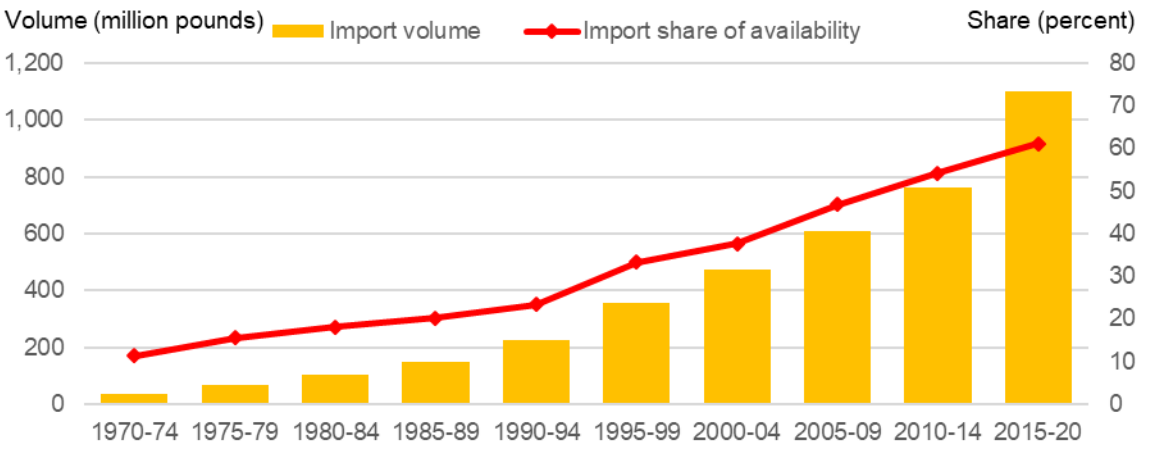
Driven by expanding imports and seemingly endless varieties, per capita availability of squash trended upward for decades. Although down slightly in 2020 due partly to the pandemic, per capita availability in 2019 was the highest in more than 60 years. Imports, which increased slightly by 0.3 percent in 2020, more than doubled since 2010 and more than tripled since the late 2000. Exports are minor and account for less than 1 percent of supply. Total availability was

down less than 1 percent in 2020 to 1.9 billion pounds while favorable demand pushed shipping-point prices up 68 percent to 93 cents per pound.

Imports of fresh squash totaled 1.2 billion pounds in 2020 and are projected to increase in 2021. Mexico remains the leading foreign source of fresh squash, averaging 81 percent of annual volume during 2018-20. Average squash import volume in 2018-20 was 80 percent higher than the 2008-10 average.

Import penetration in the U.S. squash market (all uses) is trending upward since at least the 1970s (figure 14). In 2020, imports accounted for 64 percent of domestic availability, up from 52 percent in 2010. Over the previous 5 years (2015-19), fresh squash imports increased an average of about 6 percent annually. During the 2010s, import share averaged 57 percent compared with 42 percent in the 2000s and 28 percent in the 1990s. Imports trended higher over the last few decades, (reflecting favorable domestic demand for squash), apparently crowding out domestic production which dropped 7 percent from a decade earlier during the 2010s.

Figure 14
Squash import volume and import share of availability, 1970-2020



Source: USDA, Economic Research Service calculations using U.S. Department of Commerce, Bureau of the Census data.

Snap Beans

U.S. production of snap beans for all uses averaged 0.6 billion pounds during 2018-20. Utilized production of all snap beans fell 9 percent to 1,477 million pounds in 2020. About 20 percent of the snap beans grown in the United States was used in the fresh market during 2018-20.

The 2017 Census of Agriculture reported Florida, Georgia, Tennessee, California, Texas, North Carolina, New Jersey, Ohio, and New York as the leading fresh-market snap bean States,

making up about 80 percent of harvested acres. Grown in every State, some 16,414 farms (2017 Census of Agriculture) produce fresh-market snap beans—down 20 percent from 2012. Florida remains the leading fresh-market source, with about 10 percent of the fresh crop. Florida has several regional shipping seasons, with commercial snap bean shipments generally beginning in mid-October and continuing through June. Florida is the primary domestic supplier from November to April, with volume supplemented mostly by Mexican imports. Georgia ships fresh snap beans during the spring and fall and is the primary domestic supplier in May, June, and October.

Snap beans are available year-round, with the peak season from May through October. Many commercial fresh-market bush varieties are specially bred to take advantage of mechanical harvesting, which is accomplished in one pass over the field (the plants are destroyed in the process). Virtually all beans for processing are machine harvested. The ability of larger growers to use mechanical harvest for fresh-market beans is likely a leveling factor in helping to slow losses in domestic market share.

Per capita availability of fresh-market snap beans trended lower since 2007. After rising for 2 consecutive decades, average fresh snap bean per capita availability declined 17 percent during the 2010s.

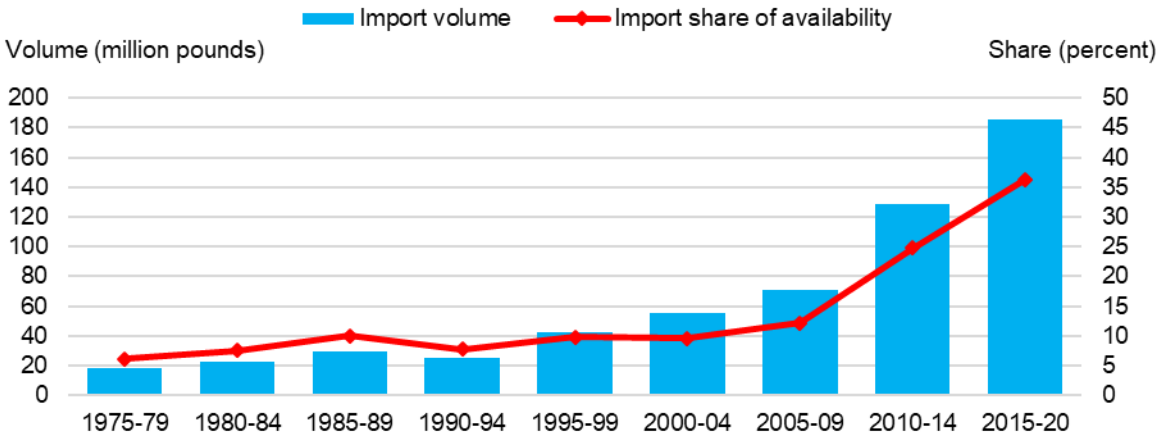
Some of this decline may reflect changing population dynamics, with past diet and health surveys indicating that people of Hispanic descent consume fresh snap beans at less than national average rates. With the population base for this racial group expected to continue expanding over the next several decades, the ability of the industry to entice more Hispanic consumers to eat snap beans may be a key to reigniting demand.

Through the early 2000s, the United States was a net exporter of fresh-market snap beans. However, for each of the past 15 years, the U.S. was a net importer of fresh snap beans, with the deficit expanding as domestic production shrinks. Fresh snap bean import volume rose 111 percent between 2008-10 and 2018-20.

Like a decade earlier, during 2018-20, the majority (83 percent) of fresh snap bean import volume entered from Mexico. Fresh imports are strongest December through March when U.S. production is limited by cool weather and weakest in the summer during the height of the domestic season. Under North American Free Trade Agreement (NAFTA), 2002 was the final year Mexico faced a tariff on fresh snap beans sent to the United States ($0.07/kg). The tariff was in place January through May, and November through December.

Import penetration in the U.S. fresh snap bean market rose over the past decade (figure 15). In 2020, imports accounted for 45 percent of domestic availability, up from 19 percent in 2010. Over the previous 5 years (2015-19), fresh snap bean imports increased an average of 6 percent annually. Prior to 2008, import share rarely exceeded 10 percent and usually did so due to a weather event. However, following the removal of the tariff, import share began to creep higher and quickly doubled by 2010 to 21 percent of availability. Imports trended higher while domestic production trended lower throughout the 2010s and imports of fresh snap beans now represent nearly one-half of availability.

Figure 15
Snap bean import volume and import share of availability, 1975-2020



Source: USDA, Economic Research Service calculations using U.S. Department of Commerce, Bureau of the Census data.

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