

Economic Research Service | Situation and Outlook Report

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Sugar and Sweeteners Outlook: July 2023

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U.S. Supply Increased in 2022/23 and 2023/24; Mexican 2022/23 Campaign Done

In the July 2023 World Agricultural Supply and Demand Estimates (WASDE) report, the U.S. sugar supply in 2022/23 is raised from last month on higher imports which offset the reduction in domestic sugar production, while total use is lowered on the observed slowdown in pace of sugar delivered for human consumption. Thus, the 2022/23 ending stocks are increased and the resulting stocks-to-use ratio is 14.44 percent, up from last month's 13.13 percent. The sugar supply in 2023/24 is raised on larger beginning stocks, domestic sugar production, and imports. The 2023/24 total use is lowered to match the downward adjustment made for 2022/23. Imports from Mexico are residually lowered in accordance with the sugar suspension agreements that set the 2023/24 ending stocks-to-use ratio to 13.5 percent.

Mexico's 2022/23 campaign has concluded, and sugar production is adjusted downward to 5.224 million metric tons (MT), the lowest in the last decade. Imports by Mexico in 2022/23 are raised, which translates to an increase in U.S.-bound sugar exports; however, the increased export volume would still fall short of the March U.S. Needs calculation. For 2023/24, sugar production is expected to rebound to 5.9 million MT, unchanged from last month.

U.S. Outlook Summary

U.S. Sugar Supply in 2022/23 and 2023/24 Increased

In the July 2023 *WASDE* report The U.S. sugar supply in 2022/23 is raised by 82,000 short tons, raw value (STRV) from last month to 14.581 million on higher imports offsetting the reduction in domestic sugar production (table 1). Total sugar use in 2022/23 is lowered by 75,000 STRV to 12.740 million on the observed slowdown in the delivery pace of sugar for food use. Thus, the 2022/23 ending stocks are increased by 157,000 STRV to 1.841 million, and the resulting stocks-to-use ratio is 14.44 percent, up from last month's 13.13 percent. Total sugar imports in 2022/23 are raised by 139,000 STRV from last month to 3.519 million as the combined increases in imports of World Trade Organization (WTO) tariff-rate quota (TRQ) raw sugar (after USDA's July 10 announcement), high-tier sugar, and Mexican sugar offset the reduction in re-export program imports.

The sugar supply in 2023/24 is raised by 292,000 STRV from last month to 14.459 million on larger beginning stocks, domestic sugar production, and imports. Total use in 2023/24 is lowered to 12.740 million STRV to match the downward adjustment made for 2022/23. Most of the increase in imports is attributed to the additional specialty refined sugar TRQ after USDA announced the 231,485-STRV quota on July 5. Imports from Mexico are residually lowered by 90,000 STRV to 1.486 million in accordance with the sugar suspension agreements to set the 2023/24 ending stocks-to-use ratio to 13.5 percent.

Table 1: U.S. sugar: supply and use by fiscal year (October/September), July 2023

Items	2021/22		2022/23			2023/24	
	Final	June	July	Monthly	June	July	Monthly
		(estimate)	(estimate)	change	(forecast)	(forecast)	change
			1,00	0 short tons	raw value		
Beginning stocks	1,705	1,820	1,820	0	1,683	1,841	157
Total production	9,157	9,298	9,242	-56	9,127	9,199	72
Beet sugar	5,155	5,171	5,147	-24	4,950	5,022	72
Cane sugar	4,002	4,127	4,095	-32	4,177	4,177	0
Florida	1,934	2,015	1,983	-32	2,034	2,034	0
Louisiana	1,944	2,034	2,034	0	2,092	2,092	0
Texas	124	78	78	0	51	51	0
Total imports	3,646	3,380	3,519	139	3,358	3,420	62
Tariff-rate quota imports	1,579	1,730	1,868	138	1,413	1,644	231
Other program imports	298	250	125	-125	250	125	-125
Non-program imports	1,769	1,400	1,526	126	1,696	1,651	-45
Mexico	1,379	1,150	1,176	26	1,576	1,486	-90
High-duty	390	250	350	100	120	165	45
Total supply	14,508	14,498	14,581	82	14,168	14,459	292
Total exports	29	35	35	0	35	35	0
Miscellaneous	81	0	0	0	0	0	0
Total deliveries	12,578	12,780	12,705	-75	12,780	12,705	-75
Domestic food and beverage use	12,470	12,675	12,600	-75	12,675	12,600	-75
To sugar-containing products re-export program	80	80	80	0	80	80	0
For polyhydric alcohol, feed, other alcohol	27	25	25	0	25	25	0
Commodity Credit Corporation (CCC) for ethanol	0	0	0	0	0	0	0
Total use	12,688	12,815	12,740	-75	12,815	12,740	-75
Ending stocks	1,820	1,683	1,841	157	1,353	1,719	367
Private	1,820	1,683	1,841	157	1,353	1,719	367
Commodity Credit Corporation	0	0	0	0	0	0	0
Stocks-to-use ratio (percent)	14.3	13.1	14.4	1.3	10.6	13.5	2.9

Source: USDA, World Agricultural Outlook Board, World Agricultural Supply and Demand Estimates (WASDE).

Beet Sugar Production in 2022/23 Lowered as Campaign Winds Down

The fiscal year 2022/23 beet sugar production is reduced 24,000 STRV from last month to 5.147 million, which is comparable to 2021/22's 5.155 million. With the crop year campaign concluding in July and beet slicing completed, except in California, the processors' estimate of sliced beets (30.535 million short tons), sugar from beets sliced (4.690 million STRV), and sugar from molasses (360,000 STRV)—published in the USDA, Farm Service Agency (FSA) Sweetener Market Data (SMD) report—were incorporated this month (table 2). Consequently, the 2022/23 crop year production is up by 15,000 STRV from last month to 5.050 million. Note, however, that the 39,000-STRV estimate for sugar produced from imported beets was zeroed

out since this amount has already been accounted for within the processors' estimates. Thus, the net result is a 24,000-STRV reduction in the crop year production to 5.050 million. With the early production estimate in August–September 2023 unchanged at 633,000 STRV, the fiscal year 2022/23 beet sugar production is also lowered by 24,000 STRV to 5.147 million.

Table 2: Beet sugar production calculations, 2020/21-2023/24

	2022/23	2022/23	Monthly	2023/24	2023/24	Monthly
	June	July	change	June	July	change
Sugarbeet production (1,000 short tons) 1/	32,574	32,574	0	33,348	33,876	529
Sugarbeet shrink (percent)	6.98	6.26	-0.72	6.83	6.83	0.00
Sugarbeet sliced (1,000 short tons)	30,300	30,535	235	31,070	31,563	493
Sugar extraction rate from slice (percent)	15.44	15.36	-0.08	14.66	14.66	0.00
Sugar from beets sliced (1,000 STRV) 2/	4,678	4,690	13	4,555	4,627	72
Sugar from molasses (1,000 STRV) 2/	357	360	3	360	360	0
Crop year sugar production (1,000 STRV) 2/	5,035	5,050	15	4,915	4,987	72
AugSep. sugar production (1,000 STRV)	537	537	0	633	633	0
AugSep. sugar production of subsequent crop (1,000 STRV)	633	633	0	633	633	0
Sugar from imported beets (1,000 STRV) 3/	39	0	-39	35	35	0
Fiscal year sugar production (1,000 STRV)	5,171	5,147	-24	4,950	5,022	72

STRV = short tons, raw value.

Beet Sugar Production in 2023/24 Raised on Larger Acreage

The beet sugar production forecast in fiscal year 2023/24 is raised 72,000 STRV from last month to 5.022 million based on larger acreage offsetting lower yield expectation. This would be 125,000-STRV (2 percent) lower than the 2022/23 updated production of 5.147 million.

The June 30 National Agricultural Statistics Service (NASS) *Acreage* report included updates on planted area indicating that growers reportedly planted 1.129 million acres in the spring, which is about 18,000 more than they intended in the NASS March *Prospective Plantings* report. The 2 States in the Red River Valley (RRV) region saw the largest addition in planted areas—Minnesota at 11,000 acres and North Dakota with 6,000 (table 3). The additional acres were likely planted to offset the possibility of reduced sugarbeet yields due to weather events, such as snowstorms, that did not allow for timely field preparation. Planting typically occurs in late April to mid-May to allow the sugarbeets sufficient time to deposit sugar.

^{1/} USDA, National Agricultural Statistics Service.

^{2/} August-July.

^{3/} Sugar from imported beets in 2022/23 are already included in the crop year production. Typically, this component is separated for projections and included in total once full crop year slice is available.

Source: USDA, Economic Research Service; USDA, World Agricultural Outlook Board; USDA, Farm Service Agency.

The NASS *Acreage* report also provided the initial forecast for the 2023/24 harvested acreage of 1.111 million acres, an increase of 27,000 acres from last month, reflecting a 98-percent planted-to-harvested ratio that is in line with recent trend.

Table 3: Forecast of sugarbeet planted area in 2023/24

Region and State	March 2023	June 2023	Differe	ence
	Prospective	Acreage report		
	Plantings report			
	1,000	acres	1,000 acres	Percent
Great Lakes	133	134	1	1
Michigan	133	134	1	1
Upper Midwest	647	664	17	3
Minnesota	433	444	11	3
North Dakota	214	220	6	3
Great Plains	126	123	-3	-2
Colorado	23	22	-1	-4
Montana	24	24	0	0
Nebraska	49	47	-2	-4
Wyoming	30	30	0	0
Far West	205	208	2.7	1
California	18	18	0	0
ldaho	175	177	2	1
Oregon	10	10.5	1	5
Washington	1.8	2	0	11
U.S. Total	1,111	1,129	18	2

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

The forecast for the national sugarbeet yield is lowered to 30.5 tons per acre from last month's 30.8. The reduction is based on the necessity to plant the additional acres to compensate for potential yield reduction from the slow planting progress before the ideal mid-May period. Beet processors will conduct initial pre-harvest field samples in mid to late July, which will provide an objective insight of the crop. The first official USDA sugarbeet yield forecast will be released by NASS in its August *Crop Production* report. The forecast for sugarbeet shrink, sucrose recovery, and early season production are carried over from last month.

Sugarbeet Planted Acreage Has Been Mostly Flat

The 2023/24 forecast of 1.129 million of acreage planted is 31,000 lower (3 percent) than last year's 1,160 million (table 4). The largest declines are expected in North Dakota (31,000 acres; 12 percent) and Montana (10,000 acres; 29 percent). The reduction is primarily due to the closure of the Sidney Sugars beet sugar processing plant that took in sugarbeets grown in in

western Dakota and eastern Montana,¹ as well as the overall difficult planting conditions in Montana.

Table 4: Sugarbeet planted area, 2018/19-2022/23

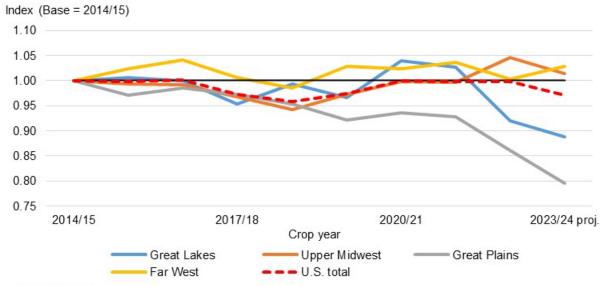
Region and State	2018/19	2019/20	2020/21	2021/22	2022/23	2023/24	Annual c	hange
						forecast	(2022/23–2	2023/24)
				1,000 acres			1,000 acres	Percent
Great Lakes	150	146	157	155	139	134	-5	-4
Michigan	150	146	157	155	139	134	-5	-4
Upper Midwest	617	637	654	653	685	664	-21	-3
Minnesota	415	425	433	427	434	444	10	2
North Dakota	202	212	221	226	251	220	-31	-12
Great Plains	147	143	145	144	133	123	-10	-8
Colorado	26	25	24	24	23	22	-1	-6
Montana	44	42	44	44	34	24	-10	-29
Nebraska	46	44	46	44	47	47	0	0
Wyoming	32	32	31	31	29	30	1	2
Far West	199	208	207	209	202	208	5	3
California	25	25	24	24	18	18	0	0
ldaho	163	171	171	173	173	177	4	2
Oregon	9	10	10	11	9	11	1	12
Washington	2	2	2	2	2	2	0	0
U.S. total	1,113	1,133	1,162	1,161	1,160	1,129	-31	-3

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

Beet processors typically plant to utilize factory capacity given their expected yield. As seen in figure 1, the total acreage planted to sugarbeets in the United States has been mostly flat over the last decade as area expansion in some States is offset by reduction in others. In recent years, only the Upper Midwest and Far West sugarbeet growing regions saw area expansion. While area expanded in the Great Lakes region during 2020/21 and 2021/22, recent weather-related challenges and competition from alternative crops took acreage away from sugarbeets. The Great Plains region's planted area has been declining since 2014/15, and more so recently partly due to the downward trend in contracted acres for Sidney Sugars and the factory's closure.

¹ In recent years, sugarbeets that feed this factory were grown on about 20,000 acres in eastern Montana and western North Dakota. See the special article on the February 2023 *Sugar and Sweeteners Outlook* report about the closure.

Figure 1 Index of U.S. sugarbeet planted acres, by region, 2014/15–2023/24



proj. = projected.

Note: The States in each region are as follows: Great Lakes (Michigan), Upper Midwest (North Dakota, Minnesota); Great Plains (Colorado, Montana, Nebraska, Wyoming); and Far West (California, Idaho, Oregon, Washington). Soure: USDA, Economic Research Service calculations using USDA, National Statistics Service data.

Cane Sugar Production Down in 2022/23

The fiscal year 2022/23 cane sugar production is lowered by 32,000 STRV from last month to 4.095 million, all on Florida's account. The production estimate of 2.034 million STRV in Louisiana and 78,000 STRV in Texas are carried over from last month. Despite the decrease, the total 2022/23 cane sugar production is expected to be 93,000-STRV (2 percent) more than last year (4.002 million) and if realized, would be the third largest behind 2020/21 (4.142 million) and the 2023/24 forecast (4.177 million).

Given that the Florida campaign ended in June, the *WASDE* report reflected the processors' downward adjustment to their sugar production by 32,000 STRV to 1.983 million STRV on lower-than-expected acreage and recovery rate. This would be the second consecutive year since 2015/16 that the State's production fell below 2 million STRV. The State's 2022/23 harvest was slowed by hurricanes between September and November 2022, leading the processors to extend their campaign beyond the ideal April finish, and into May and June.

Forecast for Record-High Cane Sugar Production in 2023/24 Unchanged

The fiscal year 2023/24 cane sugar production of 4.177 million STRV is unchanged from last month, with 2.034 million coming from Florida, 2.092 million from Louisiana, and 51,000 from Texas. The forecast for each State is consistent with the processors' submitted projections in the *SMD* and has already anticipated the NASS forecast of sugarcane harvested area for sugar and seed in its June *Acreage* report. The over-the-year sugar production increases in Florida and Louisiana offset the decrease in Texas, such that if realized, the 2023/24 forecast would be a new record, overtaking 2020/21's 4.142 million STRV by 35,000 STRV (1 percent) (figure 2).

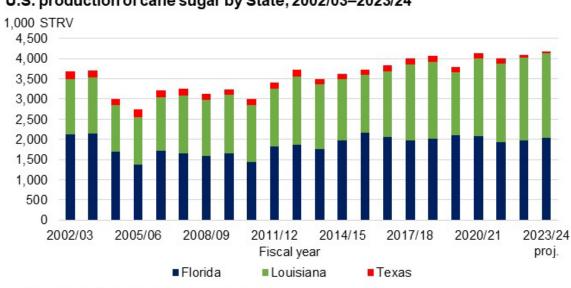


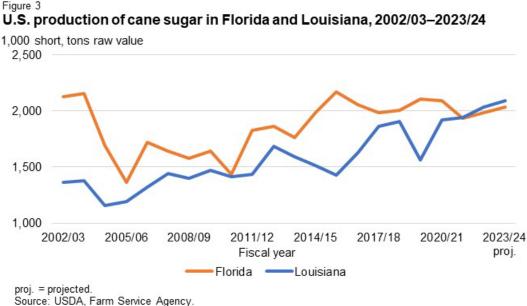
Figure 2
U.S. production of cane sugar by State, 2002/03–2023/24

STRV = short tons, raw value; proj. = projected. Source: USDA, Farm Service Agency.

Florida's forecast of 2.034 million STRV would be 51,000-STRV larger (3 percent) larger than the newly revised 2022/23's 1.983 million and reflects a return to a production level for the State that is typically above 2 million under normal weather conditions (figure 3).

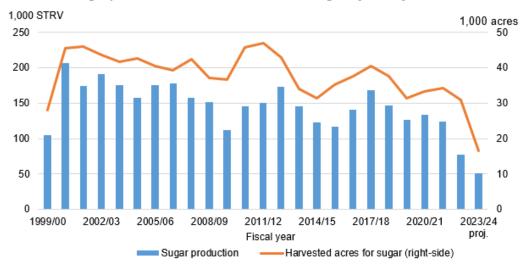
Louisiana's forecast of 2.092 million STRV would be 58,000-STRV larger (3 percent) than last year's 2.034 million. This implies that Louisiana would have produced more sugar than Florida for 3 consecutive fiscal years (2020/21 to 2023/24), driven mostly by area expansion that offsets the State's yield that tends to be lower than Florida's. Without competitive alternative

crops, high sugar prices encouraged growers to expand cane area, mostly in parishes farther north. This was made possible by the adoption of higher yielding varieties that can better withstand late-season frost conditions from December to January. In addition, there are research efforts to breed sugarcane varieties for crop longevity. This could increase the number of new shoots emerging from cropped plants, or ration crops, and reduce the area for seed, translating to expanded harvested area for sugar production. Improved risk management offerings such as availability of crop and hurricane insurance plans and presence of harvest groups also reduced the high entry costs for potential growers (e.g., investment in cane-specific harvest tractors).



The 2023/24 Texas production outlook is unchanged at 51,000 STRV, which would be 27,000-STRV lower (34 percent) than last year's 78,000 STRV and the lowest since 1991/92 (figure 4). The historic low production is mainly driven by the processor's lower forecast of harvested acreage for sugar, which at 16,442 acres would only be about half of last year's 30,900 acres. Growers in the Rio Grande Valley, who rely mainly on irrigation to produce sugarcane, have reduced acreage, reportedly due to the uncertainty of the timing of water releases from Mexico under the Utilization of Waters of the Colorado and Tijuana Rivers and of the Rio Grande (1944 Water Treaty).

Figure 4
Texas cane sugar production and harvested acres for sugar, by fiscal year, 1999/00–2023/24



STRV = short tons, raw value; proj. = projected. Source: USDA, National Agricultural Statistics Service; USDA, Farm Service Agency.

Sugar Imports in 2022/23 Revised Upwards

Total sugar imports in 2022/23 are raised by 139,000 STRV from last month to 3.519 million as the combined increases in imports of TRQ raw sugar, high-tier sugar, and Mexican sugar offset the reduction in re-export program imports (figure 5). If realized, the revised import volume would be the third largest behind 2019/20 (4.165 million STRV) and 2021/22 (3.646 million).

The 2022/23 WTO raw sugar TRQ imports are raised by 138,000 STRV from last month to 1.413 million after USDA announced the increase on July 10. Since the U.S. Trade Representative has not yet announced the country allocations, the shortfall from this action is yet to be determined, thus the 2022/23 total shortfall remains at 132,000 STRV. With the volume unchanged from last month under the WTO refined sugar TRQ (241,000 STRV) and free trade agreements at (213,000), the total quota sugar imports are also raised by 138,000 STRV to 1.868 million. Depending on the shortfall magnitude, this year's importation of quota sugar can potentially be the second largest behind 2019/20's 2.152 million STRV.

The 2022/23 imports from Mexico are increased by 26,000 STRV from last month to 1.176 million based on larger expected supply from imports in the Mexican balance sheet. This volume would still be 130,000-STRV lower (10 percent) than the March U.S. Needs of 1.306

million STRV and about 203,000-STRV lower (15 percent) than last year's 1.379 million. High-tier tariff imports in 2022/23 are increased by 100,000 STRV to 350,000 upon confirmation of raw sugar entry in June and on a higher expected pace of refined sugar imports for the last guarter of the fiscal year.

Re-export imports are reduced by 125,000 STRV based on slower-than-expected pace and resulting data reconciliations performed by USDA and the U.S. Department of Homeland Security, Customs and Border Protection.

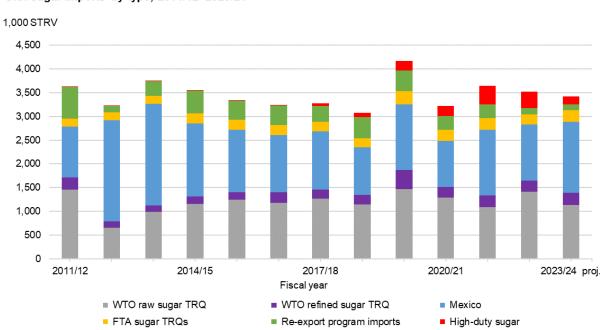


Figure 5
U.S. sugar imports by type, 2011/12–2023/24

STRV = short tons, raw value; FTA = free trade agreement; WTO = World Trade Organization; TRQ = tariff-rate quota; proj. = projected. Source: USDA, Foreign Agricultural Service.

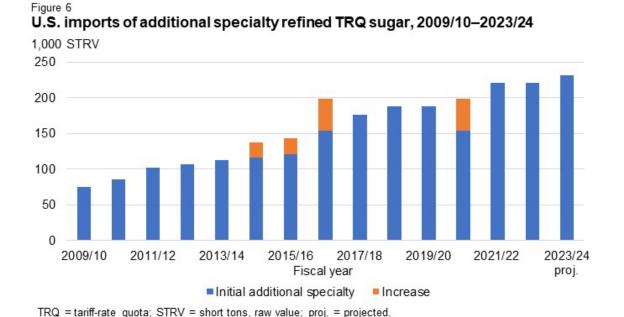
Sugar Imports in 2023/24 Also Raised

The 2023/24 forecast for total sugar imports is raised by 62,000 STRV from last month to 3.420 million as the increases in additional specialty refined sugar TRQ (figure 6) and high-tier imports—discussed in more detail below—counteract the reduction of imports expected from the re-export program and from Mexico.

Re-export program imports are reduced by 45,000 STRV from last month to 125,000, which is in line with the reduction made for 2022/23. Imports from Mexico are lowered by 90,000

STRV from last month to 1,485,900 million based on the anticipated, initial 2023/24 U.S. Needs calculation by the Department of Commerce using the July *WASDE* to achieve an ending stocks-to-use ratio of 13.5 percent.

On July 5, the USDA announced the fiscal year (FY) 2024 raw and refined sugar TRQs at the minimum levels consistent with WTO commitments–1,231,497 STRV² and 24,251, respectively–which were already accounted for in the May *WASDE*. The increase in this month's TRQ volume result from USDA's announcement on the same *Federal Register* of the FY 2024 quota for additional specialty refined sugar TRQ (mostly comprised of organic sugar) at 231,485 STRV. This would represent an 11,000-STRV increase (5 percent) from last year and continues the upward trend since 2010. As seen in figure 6, between 2009/10 and 2023/24, imports of additional specialty sugar have increased by 156,000 STRV (209 percent). This translates to an average yearly increase of about 10,400 STRV (14 percent annual growth). Given that specialty sugar TRQ is on a first-come, first-served basis, it will be opened in several tranches to allow for orderly marketing throughout the year consistent with prior years' procedure.



² The minimum WTO raw and refined sugar TRQ commitment levels in metric tons, raw value (MTRV) terms are 1,117,195 and 22,000, respectively.

Source: Office of the Federal Register, Federal Register.

High-tier imports in 2023/24 are increased by 45,000 STRV from last month to 165,000 in anticipation that the increased monthly pace in refined sugar imports observed in the past 2 years would continue. Thus, the monthly pace of high-duty refined sugar imports in 2023/24 are projected at 13,750 STRV, which is about 90 percent of the rate for 2022/23. Note that the high-duty raw sugar entries are projected at zero. The WASDE recognizes high-duty raw sugar imports only after being entered into the United States.

Sugar Deliveries Lowered in 2022/23 and 2023/24

Sugar deliveries for food and beverage use in 2022/23 are lowered by 75,000 from last month to 12.6 million. Despite this month's reduction, the estimate for food use would still be larger than last year's 12.470 million by 130,000 STRV (1 percent), reflecting an annual growth of 1 percent that is above the long-term trend (dashed red line) (figure 7). Total use in 2022/23 is lowered by the same amount to 12.740 million STRV. Both numbers are carried over to the 2023/24 forecast.

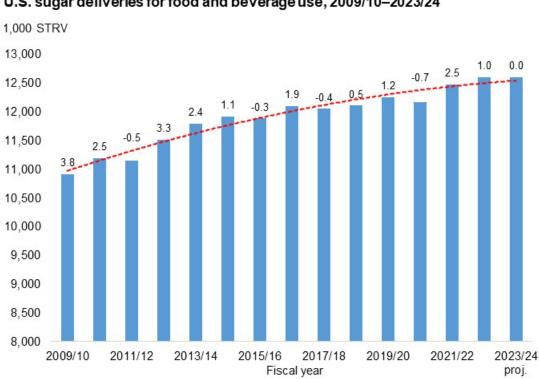


Figure 7 U.S. sugar deliveries for food and beverage use, 2009/10-2023/24

STRV = short tons, raw value; proj. = projected.

Note: The dashed red line represent the long-term trend line. Numbers on top of the bars represent the annual growth rates (percent).
Source: USDA, Economic Research Service calculations using data from USDA, Farm Service Agency.

This month's reduction was based on observed slowdown in pace particularly in the beet sugar sector (table 5). *SMD* data through May indicate that beet sugar deliveries are down by 285,000 STRV (8 percent) from last year. This reduction offsets the over-the-year increases in the delivery of cane sugar (199,000 STRV or 5 percent) and sugar for direct consumption (66,000 STRV or 11 percent). The *SMD* data, published with a 2-month lag, corroborated industry reports on slower-than-expected deliveries against contracts particularly for bulk sugar that was first observed in April. In addition, beet sugar ending stocks in May, just as in April, are larger than both last year and the 5-year average, the first 2 consecutive months that happened since October 2022 (figure 8).

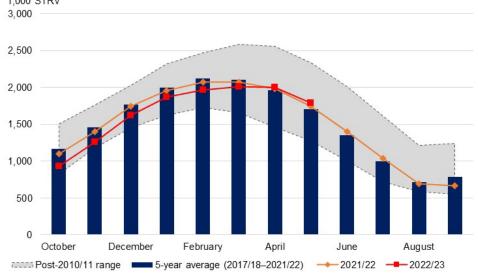
Table 5: Food and beverage deliveries, October-May, 2017/18-2022/23

	2017/18	2018/19	2019/20	2020/21	2021/22	2022/23 est.	Annual o	hange
		1,	000 short to	ns, raw value	e (STRV)		1,000 STRV	Percent
Beet sugar processors	3,487	3,320	2,973	3,238	3,565	3,280	-285	-8
Cane sugar refiners	3,964	4,132	4,332	4,163	4,141	4,340	199	5
Non-reporter (direct consumption)	438	487	767	609	612	678	66	11
Total	7,888	7,939	8,072	8,010	8,318	8,298	-20	0
			Percent	share in tot	al		5-year averag	ge
Beet sugar processors	44	42	37	40	43	40	41	
Cane sugar refiners	50	52	54	52	50	52	52	
Non-reporter (direct consumption)	6	6	10	8	7	8	7	
Total	100	100	100	100	100	100	100	

est. = estimated.

Source: USDA, Economic Research Service calculations using data from USDA, Farm Service Agency.

Figure 8
Sugarbeet processors' total sugar inventories, monthly, 2010/11 to 2022/23
1,000 STRV
3,000



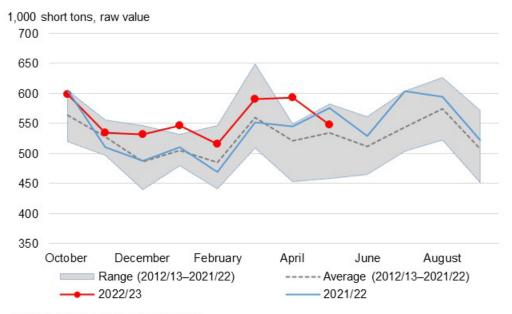
Note: STRV = short tons, raw value.

Source: USDA, Economic Research Service calculations using data from USDA, Farm Service Agency.

While the *SMD* shows only 8 months-worth of delivery data, USDA continues to receive feedback from sugar sellers that several food and beverage companies remain delayed or delinquent in taking contracted commitments and/or have taken the sugar but at lower volumes. Explanations for the slowdown include slower-than-expected food and beverage manufacturers sales likely due to inflation or customers' recession concerns. It can also be possible that the force majeure events in recent years may have motivated manufacturers to reduce their inventory risks by booking extra sugar and/or diversifying sources. The switch from a "just-in-time" business approach to "just-in-case" amid a softening in consumer demand, may have led to more sugar in inventory than manufacturers needed. Another explanation is that the increased pace of high-tier refined sugar imports can be crowding out domestic sugar deliveries.

Conversely, cane sugar deliveries through the first 8 months for the fiscal year remain robust. The volume of sugar that was melted in May (figure 9) and delivered in the same month (figure 10) dipped from last month. Still, cumulative deliveries through May of 4.340 million STRV (table 5) would be the largest since 1991/92. This delivery volume surpasses the prior high in 2019/20 (4.332 million), the year of significant beet crop loss due to weather. Similar with delivery, the cumulative volume of melt through May of 4.460 million STRV is likewise a record (figure 11), corroborating that cane refiners typically melt raw cane sugar when there is a contemporaneous customer delivery to be fulfilled. It is notable that the level of cane refiners' refined sugar stocks is building up (figure 12). Refiners' refined stocks through May 20223 are 83,000-STRV (23 percent) larger than last year and 64,000-STRV (17 percent) larger than the 5-year average. Reportedly, starting in the second quarter of 2023, some cane refiners have been increasing their refined inventory, perhaps in anticipation of demand later in the year.

Figure 9 **Sugarcane refiners' melt, monthly, 2012/13 to 2022/23**

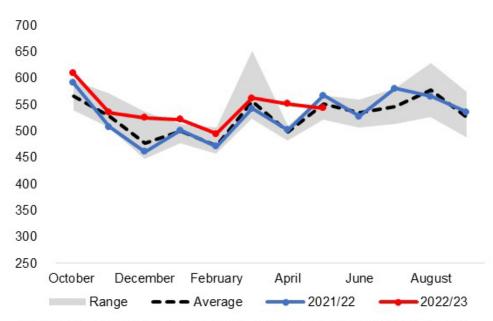


Melt = quantity of raw sugar processed.

1,000 short tons, raw value

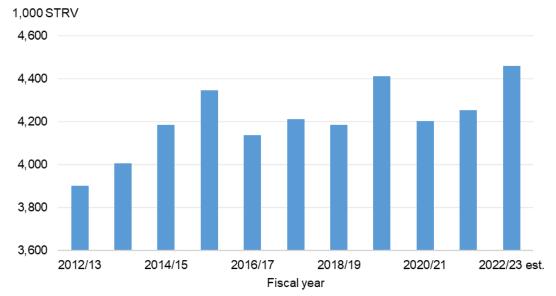
Source: USDA, Economic Research Service calculations using data from USDA, Farm Service Agency.

Figure 10 Cane sugar deliveries, monthly, 2017/18 to 2022/23



Source: USDA, Economic Research Service calculations using data from USDA, Farm Service Agency.

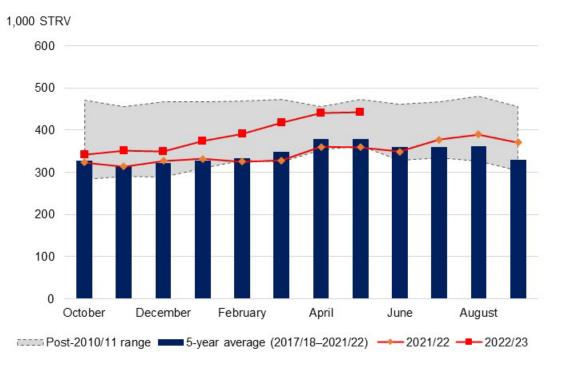
Figure 11 Cumulative sugarcane refiners' melt, October–May, 2012/13–2022/23



STRV = short tons, raw value; est. = estimated.

Source: USDA, Economic Research Service calculations using USDA, Farm Service Agency data.

Figure 12 Sugarcane refiners' refined sugar inventories, monthly, 2010/11 to 2022/23



Note: STRV = short tons, raw value.

Source: USDA, Economic Research Service calculations using data from USDA, Farm Service Agency.

U.S. Sugar–Imperial Merger Upheld by Third Circuit

On July 13, 2023, the Third Circuit—a Federal appeals court—sided with the U.S. District Court of Delaware and denied the Department of Justice's (DOJ) appeal to block the United States Sugar Corporation's (U.S. Sugar) acquisition of United States Sugar Savannah Refinery LLC (Imperial Sugar). The two cane refiners closed their deal on November 28, 2022 after the U.S. District Court of Delaware allowed the acquisition to proceed. However, DOJ's antitrust division appealed by arguing that the deal would eliminate competition among refined sugar companies and increase consumer prices. The Third Circuit upheld the lower court's decision that the DOJ's antitrust division failed to properly define the market that would be harmed.

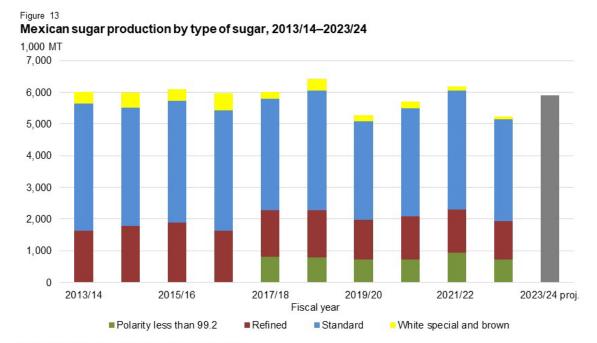
The December 2022 *Sugar and Sweeteners Outlook* provides a timeline of events starting from U.S. Sugar's initial announcement to acquire Imperial Sugar on March 24, 2021.

Mexico Outlook

Sugar Production in 2022/23 Lowered as Campaign Finished

The 2022/23 Mexican sugar production is lowered by 6,000 metric tons, actual weight (MT) from last month to 5.224 million (figure 13; table 6). This number was based on Mexico's National Committee for the Sustainable Development of Sugarcane (CONADESUCA) report for week 39 (week ending on June 24). CONADESUCA typically releases a final production report sometime between July–September, which may contain minor adjustments. The last of the 48 mills (San Rafael de Pucté) finished its campaign on June 18.

This year's 5.224 million MT of sugar production is 961,000-MT lower (16 percent) than last year's 6.185 million (table 7). It is also lower by 54,000 MT (1 percent) compared with 2019/20's 5.278 million, thus making it the lowest Mexican sugar production in the last decade (figure 13). The Special Article section provides a more detailed discussion of the 2022/23 production campaign.



MT = metric tons; est. = estimated; proj. = projected.

Notes: Sugar with polarity less than 99.2 is produced starting in 2017/18 after the terms of the suspension agreements were revised. Breakdown by type is not yet available for 2022/23 and 2023/24.

Source: USDA, World Agricultural Outlook Board, World Agricultural Supply and Demand Estimates (WASDE); Mexico's National Committee for the Sustainable Development of Sugarcane (CONADESUCA).

Table 6: Mexican sugar: supply and use by fiscal year (October/September), July 2023

Table 6. Wexican Sugar. Supply and use by in								
Items	2021/22					2023/24		
		June	July	Monthly	June	July	Monthly	
		(estimate)	(estimate)	change	(forecast)	(forecast)	change	
			1,000 metric	tons, actua	al weight			
Beginning stocks	1,053	964	964	0	880	880	0	
Production	6,185	5,230	5,224	-6	5,900	5,900	0	
Imports	31	45	75	30	45	45	0	
Imports for consumption	7	20	50	30	20	20	0	
Imports for sugar-containing product exports (IMMEX) 1/	24	25	25	0	25	25	0	
Total supply	7,269	6,239	6,264	24	6,825	6,825	0	
Disappearance								
Human consumption	4,113	4,085	4,085	0	4,139	4,139	0	
For sugar-containing product exports (IMMEX)	532	273	273	0	450	450	0	
Other deliveries and end-of-year statistical adjustment	-16	0	0	0	0	0	0	
Total	4,629	4,357	4,357	0	4,589	4,589	0	
Exports	1,676	1,002	1,027	24	1,348	1,348	-1	
Exports to the United States and Puerto Rico	1,180	984	1,006	22	1,348	1,272	-77	
Exports to other countries 2/	495	18	20	2	0	76	76	
Total use	6,305	5,360	5,384	24	5,937	5,936	-1	
Ending stocks	964	880	880	0	887	888	1	
Stocks-to-human consumption (percent)	23.4	21.5	21.5	0	21.4	21.5	0	
Stocks-to-use (percent)	15.3	16.4	16.3	0	14.9	15.0	0	
High-fructose corn syrup (HFCS) consumption (dry weight)	1,291	1,407	1,407	0	1,407	1,407	0	

^{1/} IMMEX = Industria Manufacturera, Maquiladora y de Servicios de Exportación.

Table 7: Mexican final sugar production, 2021/22, 2022/23, and 5-year average

			Difference vs. 2021/22		Difference vs. 5-y	year average	
			5-year				
	2021/22	2022/23	average	Level	Percent	Level	Percent
Area harvested (1,000 ha)	800	806	792	6	1	14	2
Sugarcane processed (1,000 MT)	54,681	47,564	52,718	-7,117	-13	-5,155	-10
Sugarcane yield (MT per ha)	68.37	58.99	67.03	-9.4	-14	-8.0	-12
Extraction rate (percent)	11.31	10.98	11.14	-0.33	-3	-0.16	-1
Total factory yield (MT per sugar ha)	7.73	6.48	7.47	-1.25	-16	-0.99	-13
Sugar production (1,000 metric tons)	6,185	5,224	5,922	-961	-16	-698	-12
By type:							
Refinada	1,362	1,193	1,385	-169	-12	-191	-14
Estándar	3,747	3,229	3,509	-518	-14	-281	-8
Polarity less than 99.2	940	730	799	-210	-22	-69	-9
Blanco especial and mascabado	136	72	230	-64	-47	-158	-69

ha = hectares; MT = metric tons; vs. = versus.

^{2/} Includes exports participating in the U.S. re-export programs.

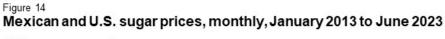
Source: USDA, World Agricultural Outlook Board; Mexico's National Committee for the Sustainable Development of Sugarcane (CONADESUCA).

^{1/} Years included are 2017/18-2021/22.

Source: USDA, Economic Research Service calculations using data from Mexico's National Committee for the Sustainable Development of Sugarcane (CONADESUCA).

Imports by Mexico in 2022/23 Raised on Pace to Date

There have been anecdotal reports that imports into Mexico–even potentially from the United States–are occurring to meet domestic demand and fulfill U.S. and IMMEX contracts. The tight supply situation has been a factor in substantial price hikes for both refined and standard sugar (figure 14), which can incentivize imports.





U.S. = United States.

Note: The breaks in the Mexican sugar price series on June 2020 and January 2021 are due to data unavailability.

Source: USDA, Economic Research Service calculations using data from Intercontinental Exchange, Inc. (U.S. prices),
Servicio Nacional de Información e Integración de Mercados (Mexican prices), and U.S. Federal Reserve Bank (exchange rates).

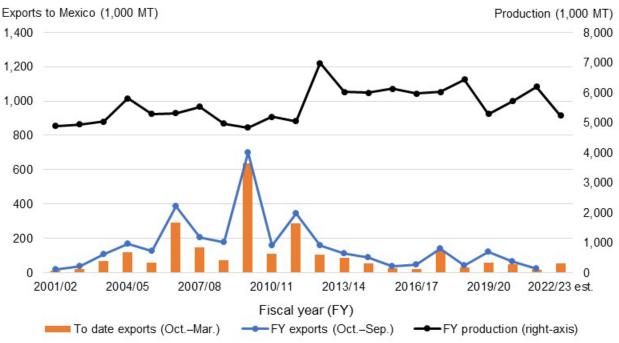
The 30,000-MT upward adjustment in the 2022/23 imports by Mexico for domestic consumption to 50,000 stemmed from the larger-than-expected pace of imports by Mexico based on CONADESUCA reporting and of countries' reported exports to Mexico in the Trade Data Monitor (TDM) database.

Through May, CONADESUCA reported about 41,000 MT of sugar imports into Mexico. This volume is relatively consistent with the 52,000-MT aggregate that exporting countries reported in TDM (figure 15). Both figures already surpassed the official 20,000-MT estimate that CONADESUCA released on April 20. As seen in figure 15, the volume of sugar imports by Mexico tends to be negatively correlated to the level of domestic production.

While not a regular origin in the past, India reported it has exported 24,000 MT to Mexico between October 2022 and May 2023, which is 46 percent of the cumulative total exports (52,769 MT) (figure 16). The next biggest exporter is Guatemala with 16,000 MT (32 percent share), while the U.S. has exported about 4,000 MT (7 percent).

Figure 15

Mexican domestic sugar production and countries' reported sugar exports to Mexico, 2001/02–2022/23



MT = metric tons; est. = estimated.

Source: Trade Data Monitor for countries' exports to Mexico; Mexico's National Committee for the Sustainable Development of Sugarcane (CONADESUCA for production);

Figure 16 Mexican domestic sugar production and countries' reported sugar exports to Mexico, 2001/02-2022/23 1,000 MT 800 ■ India 700 El Salvador ■ Costa Rica 600 Colombia Guatemala 500 US ROW 400 300 200 100 0 2001/02 2004/05 2007/08 2010/11 2013/14 2016/17 2019/20 2022/23 (thru

Fiscal year

May)

MT = metric tons; proj. = projected; ROW = rest of world.

Source: Mexico's National Committee for the Sustainable Development of Sugarcane (CONADESUCA); Trade Data Monitor.

Mexico's 2022/23 Exports to United States Raised But Remain Below the Established Export Limit

Total supply in 2022/23 is raised from last month by 24,000 MT as the minimal adjustment in domestic production (down by 6,000 MT to 5.224 million) is offset by the increase in imports for domestic consumption (up by 30,000 MT to 50,000). The entire 24,000-MT increase is assumed to raise Mexico's total exports in 2022/23 by the same amount to 1.027 million MT. Mexican exports to other countries are adjusted upward by 2,000 MT to 20,000 based on CONADESUCA's actual data through May. Thus, the bulk of the increase (22,000 MT) is added to sugar exports to the United States, bringing the volume to 1.006 million. Despite the increase, U.S.-bound sugar will fall short of fulfilling the March U.S. Needs calculation of 1.118 million MT by 111,000 MT (10 percent).

Domestic Deliveries in 2022/23 Unchanged

The 2022/23 estimates for the 2 delivery destinations—domestic market (4.085 million MT) and companies participating in the *Industria Manufacturera, Maquiladora y de Servicios de Exportación* (IMMEX) program (272,500 MT)—are carried over from last month. Thus, total

domestic sugar delivery remains at 4.357 million MT, which reflects a 271,000-MT reduction (6 percent) from last year's 4.629 million. The bulk of the over-the-year decline (259,000 MT) stems from the reduced expectation of sugar deliveries to IMMEX companies given the historically low 2022/23 sugar production.

Relatively Tighter 2022/23 Ending Stocks

Ending stocks in 2022/23 are likewise unchanged at 880,000 MT, which is equivalent to a 2.3-months' worth of total domestic deliveries (domestic market and IMMEX). The Government of Mexico typically targets ending stocks to equal to 2.5-months' worth of total deliveries. This was changed to 2.3-months' worth in CONADESUCA's April 20 publication of an updated (third estimate) sugar balance for Mexico. If realized, the current year's 880,000-MT inventory would be 85,000-MT lower (9 percent) than 2021/22, and implies the tightest market since 2014/15 when stocks were as low as 811,000 MT.

Outlook for 2023/24 is Higher Production, Lower Exports to United States

The 2023/24 forecast of sugar production for Mexico is 5.9 million MT, unchanged from last month. This would represent an increase of 676,000 MT (13 percent) from 2022/23's record low production of 5.224 million MT. There are concerns regarding the ongoing drought, particularly in the Pacific region. This region includes Jalisco, one of Mexico's top three producing States. However, the softening of prices for fertilizer and other inputs prices is projected to encourage higher application and improvements in crop management compared with last year.

The initial 2023/24 exports by Mexico to the United States are residually calculated based on the anticipated U.S. Needs calculation using the July *WASDE* to achieve a U.S. ending stocks-to-use ratio of 13.5 percent. Given the changes in the 2023/24 U.S. supply-use balance sheet, Mexico's export to the United States under the terms of the suspension agreements are lowered by 77,000 MT from last month to 1.272 million. Despite the reduction, this volume destined for the U.S. market would represent a considerable increase of 342,000 MT (34 percent) from 2022/23's 1.006 million. The 77,000-MT of sugar is instead forecast to be re-routed to the world market, thus leaving the 2023/24 total exports by Mexico unchanged from last month at 1.348 million MT.

With no changes to the rest of the Mexico's 2023/24 supply-use variables, ending stocks are unchanged at 888,000 MT, also roughly equivalent to a 2.3-months' worth of total domestic deliveries.

Special Article: Mexican 2022/23 Sugar Production

During the 2022/23 campaign, 48 mills across 7 producing regions in Mexico made 5.224 million MT of sugar. This volume is 961,000-MT lower (16 percent) than last year's 6.185 million and 54,000-MT lower (1 percent) than the prior record low of 5.278 million in 2019/20. Despite the record-high harvested area in 2022/23, sugarcane yield and sugar recovery were historically low due to 2 factors. First, there were months-long droughts during the growing season (October 2022–April 2023) in many regions and atypical (late) rains during at the start of harvest (November–December 2022). The latter reduced the sun exposure of the sugarcane plants, which in turn negatively affected yields, as well as prevented the timely harvest of sugarcane and its transportation to mills. Second, the high prices of inputs, particularly of fertilizer, led growers to apply significantly lower amounts or forego the input application.

Sugar production declined from last year across all regions except for the Pacific (table 8). The level of production losses range between 62,000–348,000 MT, which translates to a 12–43 percent decline. The largest over-the-year decline occurred in the major-producing regions led by the Northeast (down by 348,000 MT or 36 percent of the total 961,000-MT decline), followed by Córdoba-Gulf (down by 161,000 MT) and Papaloapan-Gulf (down by 129,000 MT). The Northwest, which is the smallest producing region, had the largest over-the-year percent change reduction (43 percent), followed by the Northeast (down by 27 percent) and Córdoba-Gulf region (down by 18 percent).

Cane Yields and Sugar Recovery in 2022/23 At Historic Low

The national sugarcane yield for the 2022/23 campaign averaged 58.99 MT per hectare, about 4 MT per hectare (6 percent) lower than the prior record low of 62.89 in 2019/20 (figure 17). Yields are down across all the producing regions, regardless of whether the region is low- or high-yielding, thereby attesting to the gravity of the yield reduction in 2022/23. Yields averaged as low as 44.20 MT per ha in the Northeast region, reflecting a 16-MT ton reduction (27 percent) from its 2021/22 level. A double-digit yield reduction was also observed in the Southeast region, which was down by 11 MT (16 percent) from last year.

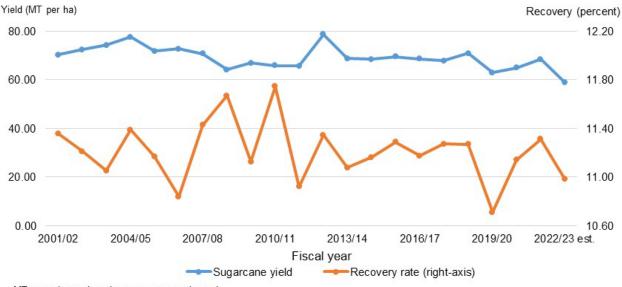
Table 8: Mexican sugar production, 2021/22 and 2022/23, by region

i able 8: Mexican sugar pro	2021/22	2022/23		Percent change
Variable and Region			Ü	· ·
Sugar production (1,000 M	T)			
Córdoba-Gulf	911	750	-161	-18
Central	528	467	-62	-12
Northeast	1,284	937	-348	-27
Northwest	245	139	-106	-43
Pacific	1,010	1,012	2	0
Papaloapan-Gulf	1,304	1,147	-157	-12
Southeast	902	774	-129	-14
Mexico	6,185	5,224	-961	-16
Harvested area (1,000 ha)				_
Córdoba-Gulf	134	130	-3	-2
Central	43	42	-1	-3
Northeast	181	195	14	8
Northwest	32	19	-13	-40
Pacific	104	109	6	5
Papaloapan-Gulf	184	183	-2	-1
Southeast	122	128	6	5
Mexico	800	806	6	1
Yield (MT per ha)				
Córdoba-Gulf	61.59	53.59	-8.00	-13
Central	98.08	90.97	-7.11	-7
Northeast	60.66	44.20	-16.46	-27
Northwest	65.47	61.18	-4.28	-7
Pacific	83.12	78.95	-4.17	-5
Papaloapan-Gulf	65.94	59.99	-5.95	-9
Southeast	68.63	57.88	-10.75	-16
Mexico	68.37	58.99	-9.38	-14
Sugar recovery (percent)				
Córdoba-Gulf	11.07	10.74	-0.33	-3
Central	12.48	12.29	-0.19	-2
Northeast	11.70	10.85	-0.85	-7
Northwest	11.71	11.84	0.13	1
Pacific	11.74	11.75	0.00	0
Papaloapan-Gulf	10.73	10.46	-0.27	-2
Southeast	10.76	10.46	-0.30	-3
Mexico	11.31	10.98	-0.33	-3

MT = metric tons; ha = hectare.

Source: USDA, Economic Reseach Service calculations using data from Mexico's National Committee for the Sustainable Development of Sugarcane (CONADESUCA).

Figure 17
Mexican sugarcane yield and sucrose recovery, 2001/02–2022/23



MT = metric ton; ha = hectare; est. = estimated.

Source: Mexico's National Committee for the Sustainable Development of Sugarcane (CONADESUCA).

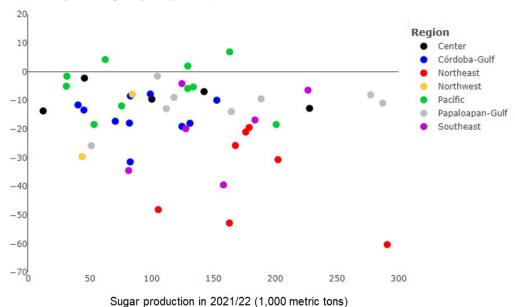
The severity is more apparent when viewed at the mill-level: Except for the 3 mills in the Pacific region (José María Morelos, Quesería, and Tamazula), the rest of the mills have yields that were lower than last year (figure 18). Mills in the Northeast region (red dots), which are among those with large sugar production, appear to experience the largest percent change reduction in yields.

Meanwhile, the national sucrose recovery of 10.98 percent would be the second lowest after 2019/20's 10.71 percent. Sucrose recovery declined in all regions, except the Northwest and the Pacific (table 8). The Northeast led the over-the-year decline, followed by Córdoba-Gulf and Southeast. Recovery rates of 37 out of the 48 mills (77 percent) declined from last year, with mills in the Northeast region (red dots) among those with the largest over-the-year percent decline (figure 19).

As mentioned in the Mexico Outlook section, the poor yield and sucrose recovery reflects the negative effects of weather on the 2022/23 campaign: months-long drought during the growing season (October 2022–April 2023) and the atypical (late) rain during at the start of harvest (November–December 2022). The latter reduced the sun exposure of the sugarcane plants, which then negatively affected yields, as well as prevented the timely harvest of sugarcane and its transportation to mills. In addition, the high prices of inputs, particularly of fertilizer, led growers to apply significantly lower amounts or to forego the input application.

Figure 18
Correlation between sugar production in 2021/22 and percent change in Mexican mills' sugarcane yield between 2021/22 and 2022/23, by region

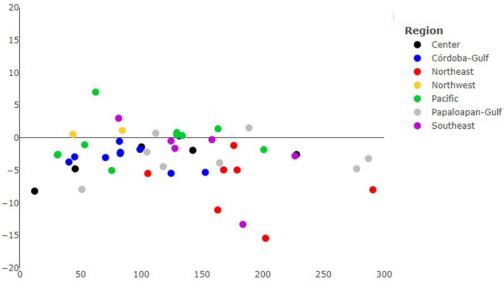
Over-the-year change in yield (percent)



Source: USDA, Economic Research Service calculations using data from Mexico's National Committee for the Sustainable Development of Sugarcane (CONADESUCA).

Figure 19
Correlation between sugar production in 2021/22 and percent change in Mexican mills' sugar recovery between 2021/22 and 2022/23, by region

Over-the-year change in sugar recovery (percent) 20₁



Sugar production in 2021/22 (1,000 metric tons)

Source: USDA, Economic Research Service calculations using data from Mexico's National Committee for the Sustainable Development of Sugarcane (CONADESUCA).

Record-High Harvested Area in 2022/23 Did Not Offset Reduction in Yield and Sugar Recovery

While the yield and recovery are historically low, the 2022/23 harvested area reached an all-time high of 806,257 hectares, slightly surpassing 2018/19's 804,060 hectares by 2,197 hectares (0.3 percent). However, the acreage is relatively lower than the final CONADESUCA estimate (813,831 hectares) published in April 2023, and more so than the initial forecast in November 2022 (832,000 hectares) (table 9).

This may be partly because a large share of mills—30 out of the 48 (63 percent)—ended their campaigns earlier than planned (figure 20). It is likely that the operation costs of harvesting additional acres of low yielding sugarcane plants are greater than the returns from producing and selling the additional sugar. As seen in figure 21, relatively more mills in 2022/23 have shorter campaigns as measured by the number of weekly runs (or corrida). For instance, in 2018/19 (the year with record high sugar production of 6.425 million), there were 40 mills with 25 weekly runs, but in 2022/23, there were only 20 mills. Also, in 2022/23, there has been a noticeably steeper decline in the number of mills as the number of runs increased.

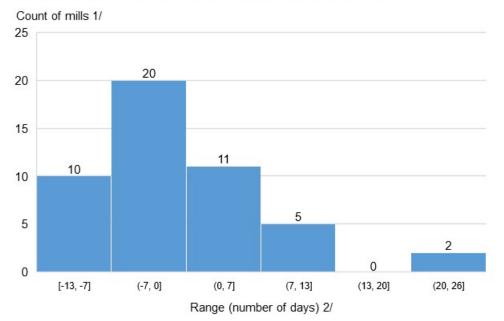
Table 9: Comparison of CONADESUCA's 2022/23 forecasts and actual numbers

		Actual		
	First	First Second Third		
	(Nov. 2022)	(Feb. 2023)	(Apr. 2023)	(Jun. 2023)
Harvested area (1,000 ha)	832	829	814	806
Yield (MT per ha)	64.06	62.37	60.40	58.99
Sugarcane processed (1,000 MT)	53,310	51,703	49,155	47,564
Recovery (percent)	11.30	11.20	11.05	10.98
Sugar production (1,000 MT)	6,026	5,792	5,429	5,224

ha = hectare; MT = metric tons.

Source: Mexico's National Committee for the Sustainable Development of Sugarcane (CONADESUCA).

Figure 20
Histogram of Mexican mills according to the difference in the number of days between their estimated and actual finish date in 2022/23



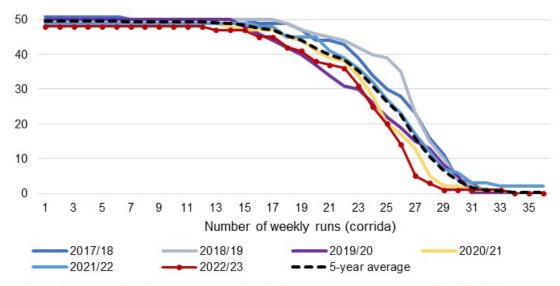
1/ The numbers on the top of the bars are the count of the mills.
2/ The x-axis represents the range in terms of the number of days. A negative

2/ The x-axis represents the range in terms of the number of days. A negative number indicates that the mill finished earlier than expected (and vice versa). Zero means the mill finished on the expected date.

Source: USDA, Economic Research Service calculations using data from Mexico's s National Committee for the Sustainable Development of Sugarcane (CONADESUCA).

Figure 21
Number of mills corresponding to each weekly run (corrida)

Number of mills



Source: Mexico's National Committee for the Sustainable Development of Sugarcane (CONADESUCA).

Production Down Across Sugar Types

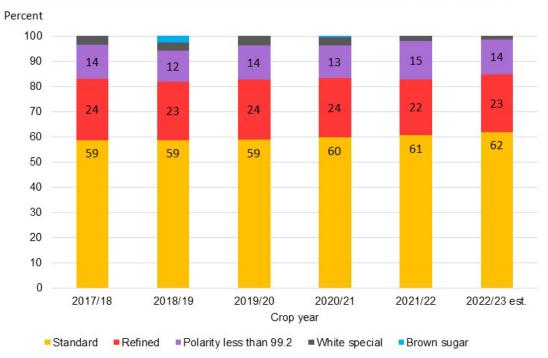
Since 2017/18, the main types of sugar produced in Mexico are refined (*refinada*), standard (*estándar*), with less than 99.2 polarity (or low polarity sugar), while special (*blanco especial*), and brown (*mascabado*). In 2022/23, most of the sugar produced is standard sugar, with 62 percent share of the total 5.224 million MT (figure 22). This share is in line with the range seen in recent years (59 to 61 percent). Refined sugar is next representing 23 percent of the total sugar produced in 2022/23, followed by sugar with less than 99.2 polarity (14 percent), white special (1 percent) and brown sugar (0.03 percent). These shares are also relatively close to prior years, which imply that on the aggregate, Mexican sugar mills tend to maintain the production shares across the sugar types.

In terms of quantity, however, production is down for all the sugar types except for brown sugar (table 10). The largest over-the-year decline occurred in standard sugar production, which is down 518,000 MT (14 percent) to 3.229 million, making it the second lowest behind 2019/20 (3.101 million). Refined sugar production in 2022/23 is down from last year by 169,000 MT (12 percent) to 1.193 million, the lowest since 2017/18. Low polarity sugar is down by 210,000 MT (22 percent) to 730,000, which would be about 52,000-MT lower than the 2022/23 final U.S. Needs amount calculated by the U.S. Department of Commerce in March (782,000 MT).³ While its production volume is smaller than the other types, white special sugar has the largest over-the-year percent decline at 47 percent.

2

³ In March 2023, the Department of Commerce calculated the final 2022/23 U.S. Needs at 1,117,635 MT, of which at least 70 percent (782,344 MT) should be fulfilled with less than 99.2 polarity; 30 percent at most can be fulfilled with sugar greater than 99.2 polarity.

Figure 22
Share of Mexican final sugar production by type of sugar to total, 2017/18–2022/23



Source: USDA, Economic Research Service calculations using data from Mexico's National Committee for the Sustainable Development of Sugarcane (CONADESUCA).

Table 10: Mexican sugar production, by type of sugar, 2017/18-2022/23

	Refined	Standard	White	Brown sugar	Polarity less	Total
			special	_	than 99.2	
			1,0	000 MT		
2017/18	1,462	3,523	210	2	813	6,010
2018/19	1,487	3,766	209	174	789	6,426
2019/20	1,264	3,101	196	3	715	5,278
2020/21	1,348	3,410	183	36	738	5,715
2021/22	1,362	3,747	134	2	940	6,185
2022/23 est.	1,193	3,229	71	2	730	5,224
Difference versus						
2021/22 (MT)	-169	-518	-64	0	-210	-961
Percent difference	-12	-14	-47	0	-22	-16

est. = estimated; MT = metric tons.

Source: USDA, Economic Research Service calculations using data from Mexico's National Committee for the Sustainable Development of Sugarcane (CONADESUCA).

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Abadam, Vidalina. Sugar and Sweeteners Outlook: July 2023, SSS-M-419, U.S. Department of Agriculture, Economic Research Service, July 18, 2023.

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