

Foreign Agricultural Service Global Market Analysis International Production Assessment Division Web: <u>https://ipad.fas.usda.gov</u>

September 13, 2021



Brazil Corn 2020/21: A Delayed Start in Planting and Severe Drought Reduce Yields

USDA estimates total corn production for marketing year (MY) 2020/21 in Brazil at 86.0 million metric tons (mmt), 16 mmt (16 percent) below last year's record crop. Total harvested area, for all three corn crops, is estimated at a record 19.8 million hectares (mha), up 1.3 mha (7 percent) from the previous year's record area of 18.5 mha. Yield is estimated at 4.34 tons per hectare (t/ha), 21 percent below last year's crop (Figure 1) and 17 percent lower than the 5-year record of 5.35 t/ha. Severe drought in key second-season corn regions led to the decrease in yields.

Brazil Corn Growth and Seasons

Brazil is the third largest global producer for corn after the United States and China. Corn production in Brazil has increased about 145 percent over the past 20 years compared to about 43 percent for the US (Figure 2). Most of this increase has come from their second-season, or *safrinha*, corn crop which is now about 75 percent of the total corn production for Brazil. Corn is grown during three seasons, with the first crop comprising about 23 percent, the second crop about 75 percent and the third crop about 2 percent of total corn production. Area for the first crop decreased steadily over the past 20 years, losing acreage to soybean (Figure 3b), while the second-season crop area has increased exponentially (Figure 3a).

First-season corn is grown in the southern and eastern states from October through early January with exact planting dates dependent on the arrival of rains. The *safrinha* crop is planted primarily in the center-west states and a few southern states following the soybean harvest from January through February (Figure 4). The third-season corn crop is concentrated in the northeastern states.

Overview of the MY 2020/21 Season

Earlier planted first-season corn suffered from a lack of soil moisture, during the La Niña induced drought from September to November, 2020, which reduced yields. The later planted corn displayed higher yields profiting from plentiful rainfall.

With regards to the second-season crop, the delays in soybean planting and harvest (see <u>Brazil Soybeans 2020/21: Another Season with a Record Harvest, June 2021</u>) led to significant delays in *safrinha* planting of 1 to 2 weeks (Figure 5). This delay in the center-

west states placed a significant portion of the *safrinha* crop at greater risk of moisture stress towards the end of the season. State sources estimate that several states had over 40 percent of the *safrinha* crop planted outside the ideal planting window, thus placing it at higher risk from unfavorable weather.

Below normal precipitation in several major *safrinha* crop states, particularly in the states of Paraná and Mato Grosso do Sul, caused acute drought conditions, depleting soil moisture during critical crop development stages. This mid-season drought severity is depicted in the 3-month standardized precipitation index (SPI, Figure 6a) from mid-April through mid-July. The SPI closely mirrors low vegetation biomass, as measured by the satellite-derived Percent of Average Seasonal Greenness (PASG) index (Figures 6a and 6b). The PASG index compares the 3-month vegetation conditions from this season to a long-term average and is an indicator of accumulated biomass, which is a good proxy for yield prospects. The 3-month PASG for the 2020/21 season shows lower biomasss than a similar time period for 2019/20. State reports confirmed the drought conditions in the fields. From late April to mid-May, the crop rated in good condition plunged from 92 to 40 percent in Paraná as reported by the state agency, Departamento de Economia Rural (SEAB/DERAL). In the state of Mato Grosso do Sul, the crop reported in good condition dropped from 13 percent to 1 percent from early May to late June (Federação da Agricultura e Pecuária de Mato Grosso do Sul, FAMASUL). Furthermore, three frost events from late June to late July exacerbated the already dire situation for the safrinha corn crop in the southern region.

In contrast, the situation was mixed in the largest *safrinha* producing state, Mato Grosso (about 45 percent of *safrinha* production). The central and northern regions received sufficient rainfall, however, the southeastern region displayed low vegetation vigor due to rainfall deficits. Southern Goiás exhibited similar crop conditions as southeastern Mato Grosso with eastern Goiás displaying the sharpest yield declines comparable to the state of Minas Gerais (Figure 6).

The top six *safrinha* corn producing states all experienced dry conditions during most of the growing season with the greatest yield losses in Mato Grosso do Sul and Paraná. Comparison of current season yields to the previous year reveals reductions in all centerwest states (Figure 7). The largest reductions of over 40 percent are in the belt from Minas Gerais to Paraná. This season's yields are even significantly below the 5-year average for most states except for Mato Grosso which was only about two percent below the 5-year average. In contrast to the center-west region, the northeastern states of Piauí and Maranhao exhibit higher yields than the 5-year average. State-level production and yield estimates by the *Companhia Nacional de Abastecimento* (CONAB, September 9, 2021 report) indicate the lowest yields in the past decade for several *safrinha* corn states (Figure 11b; Paraná, Mato Grosso do Sul, São Paulo, Minas Gerais), or the second lowest yields (Goiás).

Area, Yield, and Production Trends

Area increases have been the largest driver for Brazil corn production in the last 10 years, specifically the larger *safrinha* crop acreage. Yield trend, however, for the *safrinha* crop has stayed relatively flat. Area expansion for *safrinha* corn ranged from 1 to 15 percent in the center west in comparison to last season, with the largest area gains over the decade occurring in the states of Mato Grosso and Goiás (Figures 8 and 9). With respect to production, all the center-west states show declines compared to the previous season. Nevertheless, Paraná almost doubled production and Goiás tripled production over 10 years (Figures 8 and 9), excluding the two recent consecutive seasons.

The 10-year yield trend for the *safrinha* crop remains relatively flat, in comparison to the first-season crop, because of intermittent drought years for the *safrinha* crop (Figure 10). Years with reduced *safrinha* crop yields are associated with inadequate moisture (SPI levels from D2 to D4 or severe to exceptional drought) during the growing season as illustrated for Paraná and Goiás (Figure 11). Paraná's yields correspond to the amount of crop area under a drought regime; this season shows the lowest yield in a decade with almost 50 percent of cropland area under extreme or exceptional drought (Figure 11a). Previous low-yielding years: 2010/11, 2017/18, and 2019/20, also displayed significant cropland areas under D2 to D4 drought regimes. Likewise for Goiás, the recent seasons (2015/16, 2017/18 and 2020/21) with dips in yield correspond to years when large areas of cropland were impacted by drought conditions (Figure 11).

In summary, overall corn yield for Brazil MY 2020/21 is the second lowest in a decade although the area planted was a record. The previous lowest yield was in 2015/16 when drought similarly affected the *safrinha* crop (Figure 11). Harvest commenced in June and continues through September.



Figure 1. Brazil Total Corn Area, Yield and Production time series chart. Source USDA PSD Online.



Top 3 Global Corn Producer Trends

Figure 2. Global corn production trends for the three largest national producers. Brazil corn production increase over 20 years is estimated using the record 2019/20 season. Source: USDA PSD Online.



(a) Second-crop, or *safrinha*, production has increased steadily over time, whereas the first-season corn has declined.



Brazil Corn: First-Season Corn Area versus Soybean Area over 20 Years

(b) The first-season crop area has declined over 20 years, losing acreage to soybean.

Figure 3. Trends in the first-crop and second-crop corn production over 20 years. Source: CONAB.



Figure 4. Corn production in Brazil for the first and second season corn crops. Source: IBGE.

USDA

Foreign Agricultural Service

states; the example above is for Mato Grosso. Source: IMEA.

Safrinha Corn 2020/21 Planting Progress **Comparison to Soybean Harvest** EVOLUÇÃO DO PERCENTUAL DE ÁREA COLHIDA DE SOJA EM MATO GROSSO 99,83% 98.23% Soybean Harvest 100,00% 90,00% Mato Grosso 99,40% 80,00% 70,00% 60,00% 50% Mínimo - Máximo (5 anos) 50,00% Média 5 anos 40,00% 30,00% Safra 19/20 20,00% Safra 20/21 10,00% 0,00% 01/jan 08/jan 15/jan 29/jan 21/mai 22/jan 05/fev 26/fev 16/abr 23/abr 12/fev 19/fev 05/mar 09/abr 30/abr 07/mai 14/mai 12/mai 19/mar 26/mar 02/abr EVOLUÇÃO DO PERCENTUAL DE ÁREA SEMEADA DE MILHO EM MATO GROSSO 100,00% 100,00% **Corn Planting** 100,00% 99,98% Mato Grosso 90,00% 80,00% 70,00% 60,00% 50% Mínimo - Máximo (5 anos) 50,00% Média 5 anos 40,00% 19/20 30,00% 20/21 20,00% 10,00% 0,00% 01/jan 08/jan 15/jan 22/jan 29/jan 05/fev 12/fev 02/abr 09/abr 26/mar 16/abr 19/fev 26/fev 05/mar 12/mar 19/mar 07/mai 23/at 30/at

U.S. DEPARTMENT OF AGRICULTURE Figure 5. Soybean harvest delay cascaded into a *safrinha* corn planting delay in 2020/21 in several

Source: IMEA



Brazil Safrinha Corn: Drought and Vegetation from April 16 – July 15







Figure 6. (a) Below normal precipitation in principal second crop areas (particularly in the states of Paraná and Mato Grosso do Sul) resulted in drought conditions, shown by the 3-month Standardized Precipitation Index, during critical crop development stages. (b) Dry conditions resulted in low vegetation biomass as measured by the satellite-derived Percent of Average Seasonal Greenness (PASG) index. Vegetation vigor this season in areas affected by drought was even lower than the previous year.

Source: UCSB CHIRPS, USDA/NASA MODIS PASG



Figure 7. Yield percent difference from the 2020/21 season to the 2019/20 season and the 5-year average. Source: CONAB.



Figure 8. Area and Production differences from the 2019/20 season to the 2020/21 season. Source: CONAB.



Figure 9. Corn area and production trends over the last decade. The largest area and production increases occurred in Mato Grosso. Area increases have been the lowest in the south where available land is scarce. Source: CONAB NOTE: ha = hectares, mt = metric tons.



Figure 10. Corn yield and trend yield for the first and second-season crops over 10 years. Source: CONAB.



Drought Impacts on Yield

(b)

Figure 11. (a) Standardized Precipitation Index (SPI) during critical months in Paraná and Goiás (b) Corn yields for the largest six *safrinha* states over 10 years. This season's yields in most major *safrinha* states are expected to be the lowest in a decade. Source: UCSB CHIRPS, CONAB.

Author contact information:

Sunita Yadav-Pauletti Sunita.Yadav-Pauletti@usda.gov

For more information and to access FAS databases and reports please visit:

Current World Agricultural Production Reports <u>https://www.fas.usda.gov/data/world-agricultural-production</u>

Production, Supply and Distribution Database (PSD Online) https://apps.fas.usda.gov/psdonline/app/index.html#/app/home

Global Agricultural Information Network (Agricultural Attaché Reports) https://www.fas.usda.gov/databases/global-agricultural-information-network-gain

Crop Explorer https://ipad.fas.usda.gov/cropexplorer/

Global Agricultural and Disaster Assessment System (GADAS) <u>https://geo.fas.usda.gov/GADAS/index.html</u>