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Report Name: Drought Conditions in Mexico and Its Effect on Agriculture

Country: Mexico

Post: Monterrey ATO

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Report Highlights:

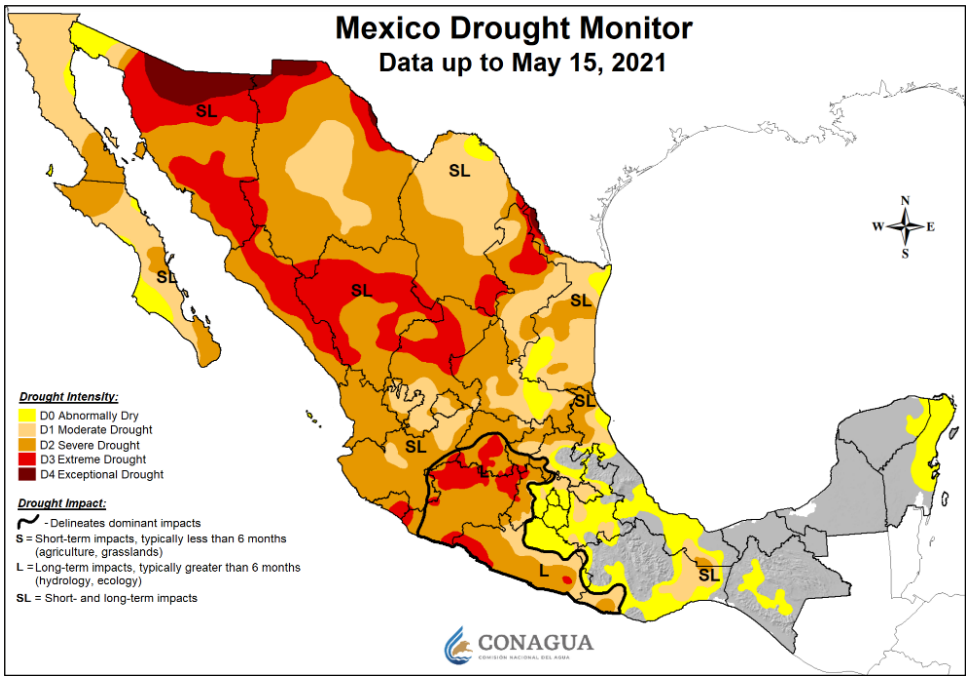
Increased water demand for both human consumption and agricultural production, along with lagging water management practices and lack of contingency plans has resulted in a rapid depletion of water reserves in Mexico, particularly in Northern Mexico. The forecast of high temperatures in the summer have triggered warnings of possible water shortages affecting urban and rural communities. This report includes a general analysis of how these shortages might affect agricultural production in Mexico.

Introduction

FAS Mexico has followed recent information reported by national media on the ongoing drought conditions affecting the Mexican territory since mid-2020 to the first half of 2021. These reports, based primarily on reports prepared by the Mexican Water Commission (CONAGUA) and climate forecasts of the Mexican Weather Service (SMN), refer to rains in 2020 that were three percent below the yearly average. This can be considered normal, given historic rain fluctuations, but during 2020 in particular a noticeable increase of urban/residential water demand due to the COVID-19 pandemic and a similar surge in the demand by agricultural production resulted in a rapid depletion of Mexico's water reserve throughout the country's dams, many of which (68 percent) are currently below half of their capacity. The forecast of high temperatures in the upcoming summer season have triggered the concern of national and state authorities, who warn that possible water shortages may affect urban and rural communities in the near future. This report includes a general analysis of how these shortages might affect agricultural production and trade in Mexico.

1. Current drought situation

Half of Mexico is considered to have an arid or semi-arid climate, which makes it susceptible to suffer cyclical drought conditions. Mexico's rainy season begins on June 1, typically aligned with the Atlantic hurricane season, which ends on November 30. There are some slight regional variations, with early and late rains in some states, particularly those in Northern Mexico. The latest CONAGUA report (Map 1) shows that, as of May 15, 2021, 75 percent of the Mexican territory was affected by some degree of drought conditions, up from 55 percent reported on December 31, 2020.



Map 1. Mexico's latest drought conditions.
Source: CONAGUA's Drought Monitor Report, released on May 20, 2021. Translated by ATO Monterrey.

When including abnormal dry conditions (category D0, which is not considered in the official drought definition), the affected area adds up to 85 percent. Of particular concern is the increase in territory affected by the more severe drought categories: extreme drought (D3), which has gone from covering 9 percent of Mexico's territory at the start of 2021 to 15 percent in mid-May. Meanwhile, exceptional drought (D4) has gone from 0.65 percent to over 2 percent in the same period (Table 1).

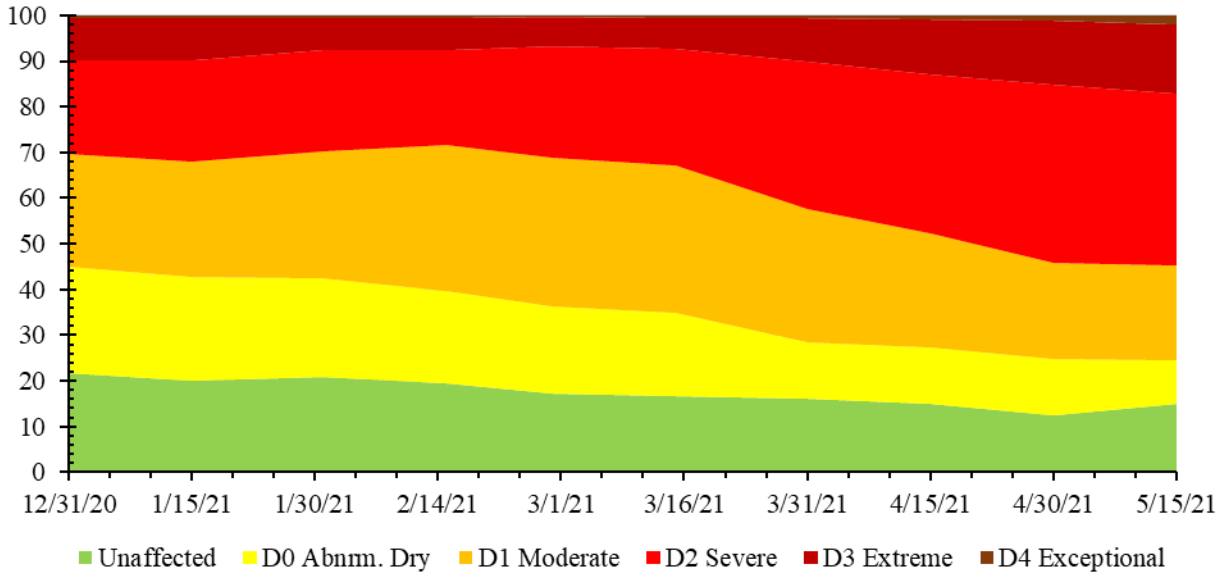


Table 1. Evolution of the percentage of Mexican territory affected by drought conditions in 2021.
Source: ATO Monterrey based on data published on CONAGUA's Drought Monitor Report, released on May 20, 2021.

CONAGUA also reports on the evolution of drought conditions in previous years (Table 2). Despite the predictability of the drought cycles, conditions can change significantly, and now larger areas are suffering dry conditions as rain cycles/patterns shift. Lakes, rivers, and lagoons dry out in some areas, while water concentrates unexpectedly in other regions.

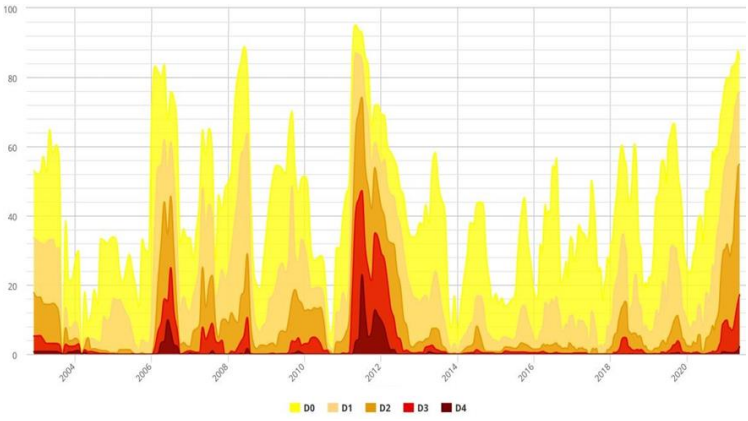
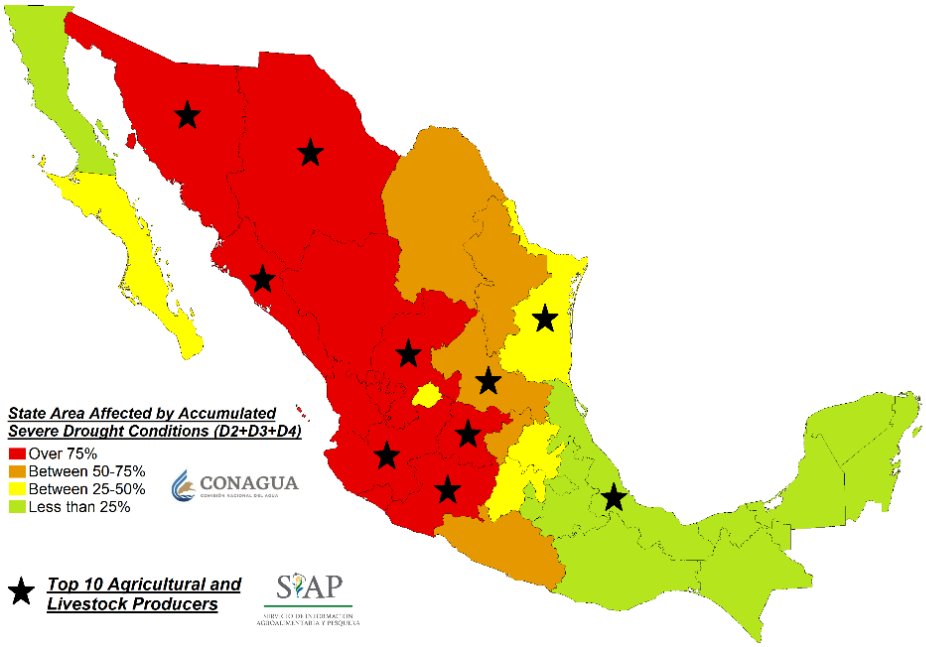


Table 2. Historic percentage of Mexican territory affected by drought conditions.
Source: CONAGUA's Drought Monitor Report, released on May 20, 2021.

States like Sonora, Sinaloa, Chihuahua, Jalisco, Michoacan, Zacatecas, Guanajuato, and Chihuahua, which are top producing states in several agricultural categories such as livestock, grains, legumes, and fruits and vegetables, are suffering the most from the dry conditions. These states report the largest affected areas by severe, extreme, and exceptional drought conditions. For example, Sinaloa and Durango reported 100 percent of their territory affected, although no exceptional drought (D4) conditions were recorded. Meanwhile, livestock powerhouses Sonora and Chihuahua report the largest areas affected by exceptional drought, with 17 percent and 4 percent, respectively. Map 2 shows the accumulated affected area reported by each state according to CONAGUA's latest report and highlights the top 10 agricultural and livestock producing states, using information from Mexico's Agri-Food and Fisheries Information Service (SIAP). These 10 states represent between 60-70 percent of the total Mexican agricultural and livestock production. Given that less than 30 percent of Mexico's agricultural land uses irrigation systems, the sector can be deeply affected by changes in the rain conditions or its timing, and changes in water demand affecting dams/reservoirs.



Map 2. State area affected by accumulated severe drought conditions and agricultural relevance.
Source: ATO Monterrey, with information from CONAGUA's Drought Monitor and SIAP's Agricultural Production Data.

2. Drought and water reserves; shortages in sight?

According to CONAGUA's 2018 Water Statistics, 76 percent of the country's water is used for agriculture production, 14 percent for human consumption, and the remaining 10 percent is used by industry and electricity generation. Water is stored in a huge network of almost 6,500 dams and reservoirs throughout the country, of which 676 are owned/managed by CONAGUA. Of this total, 210 dams account for 92 percent of the country's water reserves and are constantly monitored. In the latest

report, 68 percent of the 210 monitored dams were below 50 percent, with 8 of the top 10 reservoirs (in terms of volume) at less than half of their capacity (Table 3). Also, 78 dams are below 25 percent of their capacity, which is considered critical in terms of operability. In an exceptional case, two dams in Sinaloa, with a combined maximum operational capacity of over 6 billion m^3, are currently reporting 340 million m^3, just 5.5 percent of their capacity.

Dam [Official Name]	State	Max. Capacity (million m3)	Current Volume (million m3)	Percent
Angostura [Belisario Dominguez]	Chiapas	13,169.63	7,304.91	55.47 percent
Malpaso [Nezahualcoyotl]	Chiapas	9,317.39	6,173.54	66.26 percent
Chapala	Jalisco	8,126.41	3,885.81	47.82 percent
Temascal [Presidente Aleman]	Oaxaca	6,898.19	2,139.63	31.02 percent
Infiernillo	Michoacan	4,843.75	1,312.49	27.10 percent
Adjuntas [Vicente Guerrero]	Tamaulipas	3,910.69	1,470.15	37.59 percent
Mahone [Miguel Hidalgo]	Sinaloa	3,096.63	139.34	4.50 percent
Humaya [Adolfo Lopez Mateos]	Sinaloa	3,086.61	200.63	6.50 percent
Oviachic [Alvaro Obregon]	Sonora	3,023.14	876.25	28.98 percent
Lago Toronto [La Boquilla]	Chihuahua	2,893.57	648.34	22.41 percent

Table 3. Current volume of Mexico's 10 largest dams (in terms of capacity).
Source: CONAGUA's National Water Information System, with data of May 24, 2021.

Human activity has definitely impacted the availability of water in Mexico. News articles cite how poor water management, weak or non-existent urban development planning and supervision, deforestation, and destruction of wetlands for agricultural production have seriously affected the way water is obtained, stored, and distributed. As explained above, drought cycles indeed are changing but according to CONAGUA, the situation was aggravated last year by the increase of urban and agricultural water demand given the COVID-19 sanitary contingency. For example, with more of the population quarantined at home, residential use rose.

One particular issue made headlines in 2020, quickly evolving into a political issue and highlighting the sensitivity of possible water shortages in the near future. As part of a 1944 water treaty between the United States and Mexico, a series of annual water "deliveries" are required in order to balance each country's rights for the tributaries of the main rivers that serve as border between the two countries: the Colorado and the Rio Grande. The United States provides Mexico every year with about 1.9 billion m^3 from the Colorado river basin, while Mexico has to deliver a yearly amount of 430 million m^3 from the Rio Grande basin. The treaty allows Mexico to consolidate its deliveries in five-year cycles, the latest ending in 2020, in which Mexico was running short of its allocation. In order to avoid potential retaliations, the federal government planned to use water from a dam located in the state of Chihuahua, but local agricultural associations rejected the proposal, claiming that agricultural workers, facing severe drought conditions at the time, were counting on the reservoir for the upcoming cycle. As the conflict escalated, Mexico managed to secure an agreement with the United States, using water from

neighboring dams, which affected the supply of cities in Coahuila, Nuevo Leon, and Tamaulipas. In the end Chihuahua kept its water, but the tension remains as water is becoming scarce in northern Mexico.

The fact that the regions currently facing severe drought conditions are the ones with modern agricultural production techniques has helped alleviate the ongoing drought impact, but it will eventually take its toll. Mexico's previous extreme droughts, in 1996 and 2011, caused major losses in several crops, including those destined for export markets. Mexican cattlemen were forced to sell their livestock, disrupting inventories, and causing a lengthy recovery. For example, goat production in the state of Coahuila, which was about to begin exports to the United States and the Middle East, was severely impacted, and said export plans were delayed for more than 5 years.

Uncertainty is another key element to consider, as farmers and cattlemen are complaining about the lack of support programs caused by the federal government's austerity measures. Crop and animal insurance, technical assistance, credits for repopulating animal inventories, and disaster-aid programs are no longer in place, or their budgets have been drastically cut over the past two years. Several state and local government entities have filed for federal assistance or declarations of a state of emergency, which would allow them to access emergency funds from different government agencies.

3. Specific state/regional impact

In this section, some specific analysis is presented by state/regions, and some of the products affected by the drought conditions. This information is gathered from available information shared by FAS Mexico network of contacts in the agricultural sector. First-hand evidence is hard to obtain given the restricted mobility due to the COVID-19 pandemic, but the information provided is considered reliable, although some exact numbers might not coincide between sources.

Livestock: Cattle seems to be the agricultural activity making the most headlines as farmers announce reductions in animal inventories of 40 percent in Sonora and Chihuahua. Drought conditions have mildly impacted the cattle of top producing states like Jalisco, Veracruz, and San Luis Potosi. However, the lack of rain and dry weather has hit other important states, like Sonora, Sinaloa, Coahuila, Tamaulipas, and Chihuahua, and water shortages have modified the patterns/mechanics of livestock operations. Animal inventories are drastically depleting, for example in Sonora, where over 300,000 head have been sacrificed or sold to other states and that number is expected to reach 426,000 by July when the rain season typically begins. However, those animals were expected to be slaughtered or sold anyway but over a longer period of time. Cattlemen in Chihuahua are facing market prices roughly 20 percent below average given the lack of water and the fact that animals are not reaching the optimal weight so producers are forced to export as much cattle as possible to reduce their expenses. See USDA's Global Agricultural Information Network (GAIN) for FAS Mexico's latest Livestock & Products report for additional information.

Grains: Drought conditions have also impacted the top producing states for corn (Sinaloa), sorghum (Tamaulipas), and wheat (Sonora). In Sinaloa, as white corn growers see water levels in dams drop to as

low as 11 percent in average as of May 15, production estimates are revised downwards, from 5.5 million MT initially, to 4.8 million MT. Lack of rain and a dry environment have also affected Tamaulipas, so the current fall/winter cycle is expected to reach 7.8 million MT, down from 8.3 million of the previous cycle. With sorghum, Tamaulipas, which accounts for 80 percent of the sorghum in the fall/winter cycle, has suffered a "perfect storm" this season: frost damage, delayed planting, lack of rainfall, and depletion of water reservoirs. This has resulted in a production estimate of 952,000 MT, almost half of the production reported in the previous cycle. Finally, the effect on wheat production in Sonora is yet to be seen, but given that farmers have reduced planting due to water supply uncertainty, an estimated loss of wheat production is between 150,000 to 160,000 MT. See USDA GAIN reports for FAS Mexico's latest Grain & Feed report for additional information.

Cotton: Production for the current cycle in the top states of Coahuila, Durango, Tamaulipas, and Chihuahua is unlikely to be affected, since according to producers, irrigation water is sufficient for the remainder of the planting cycle, with harvest beginning in August. Interestingly, drought conditions and winter storms in early 2021 drove affected corn and sorghum producers to shift to cotton. However, if summer rains are sparse and the water supply continues to decrease, producers may be forced to reduce planted area for the following cycle. See USDA GAIN reports for FAS Mexico's latest Cotton & Products report for additional information.

Other products: As drought conditions are reported in several states, reports of their agricultural production impact are highlighted by local and regional media. In horticultural products, in some cases like grapes in Sonora, apples and pecans in Chihuahua, avocados in Michoacan, and citrus in Nuevo Leon and Veracruz, any effects may not be seen until upcoming cycles, especially if the rainy season is not favorable and water reservoirs do not recover. Still, mango producers in Sinaloa are reporting potential reductions between 30-50 percent, although it depends on the variety. Vegetables seem to remain unaffected however, since these type of crops in the affected regions have higher level of technology, with greenhouses and irrigation systems providing protection and efficiently using water.

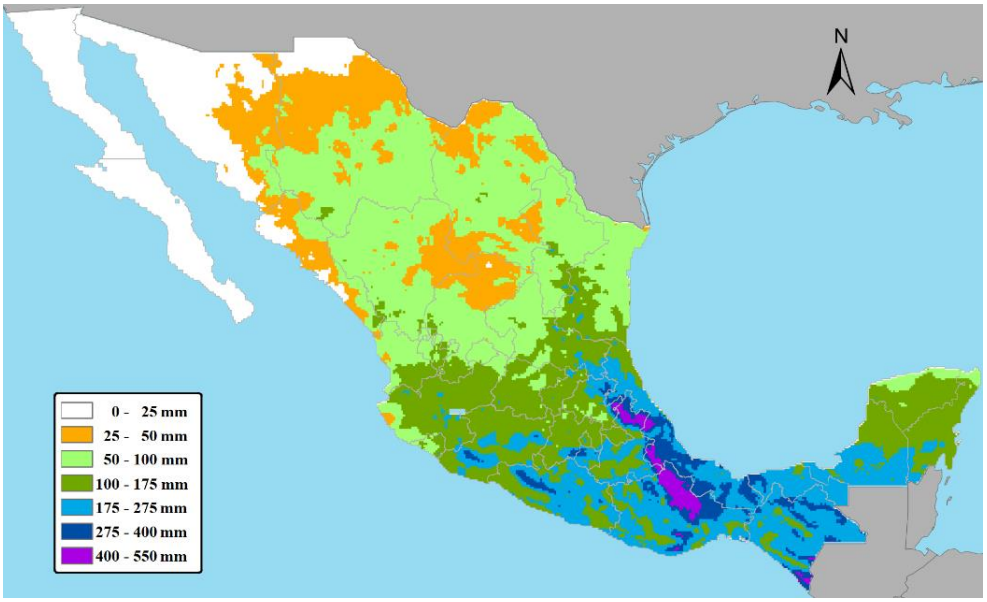
Dry beans producers in Zacatecas are expecting up to 60 percent reductions in planting, while Chihuahua growers estimate planting about 70,000 hectares in June/July, about 30 percent below the average planted surface area. For sugar and coffee, even though top producing areas in Central-South Mexico are not as affected by drought conditions as the Northern states, overall climate changes are causing low yields and reduced planted surface, thus affecting production models, creating stress on current plantations, and forcing growers to adjust to new weather patterns with little or no available financial support. See USDA GAIN reports for FAS Mexico's latest Citrus, Avocado, Coffee, Sugar, and Fresh Deciduous Fruit reports for additional information.

4. Weather outlook and conclusions

As explained in Section 1, the rainy season in Mexico was expected to start on June 1 and some isolated areas have received enough precipitation that indicates an optimistic outcome. The recently published NOAA forecasts for the 2021 Atlantic and Pacific hurricane seasons, which preview a slightly above-

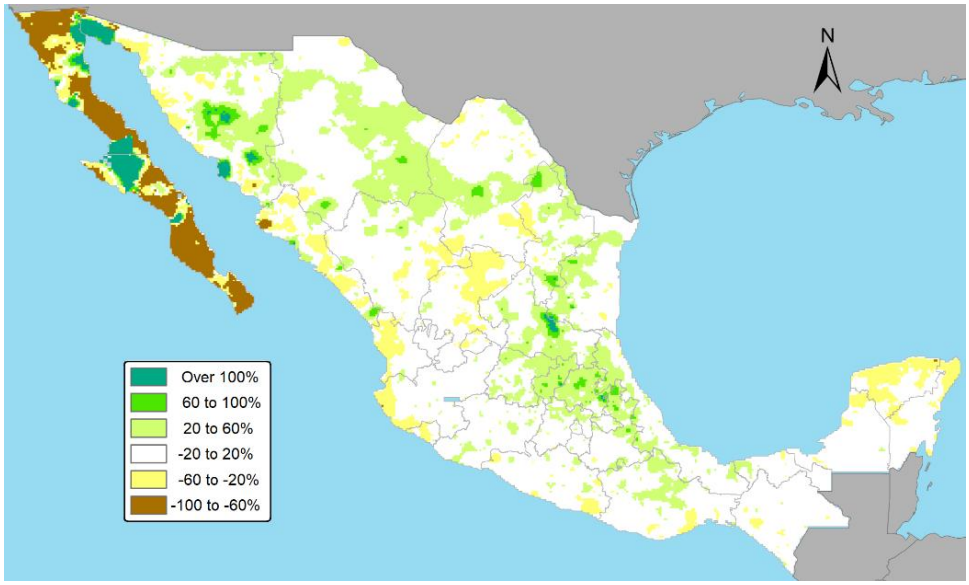
average (in number and strength) storm/hurricane activity in the Atlantic and a marginal below-normal activity in the Pacific, are not enough of a guarantee that the drought conditions will be resolved. There is still concern that the water deficit will continue to expand unless significant changes take place on how water is managed in Mexico.

Mexico's National Forestry, Agricultural, and Fisheries Research Institute (INIFAP) published its rain forecast for June 2021 (Map 3). While precipitation is expected in most of the drought affected areas, Northwestern Mexico will likely struggle early in the rain season.



Map 3. Rain forecast, in mm, for June 2021.
Source: INIFAP's April-June 2021 Seasonal Forecast.

INIFAP also presented a comparison of the expected rains for June and the month's historic average from 1981-2010 (Map 4). Aside from the Baja peninsula, the rest of the country will face an average rain season, which might not be enough to offset the current water deficit.



Map 4. June 2021 rain forecast versus historic average [1981-2010].
Source: INIFAP's April-June 2021 Seasonal Forecast. Translated by ATO Monterrey.

As explained in Section 3, current drought conditions and water shortages are expected to have a negative impact on states that are essential for Mexico's domestic and export-oriented agricultural production, particularly those in Northern Mexico. It is unclear if the upcoming rainy season will be enough to sustain the planned crops or if it will have a long-term effect on future cycles.

In terms of market opportunities, if indeed some agricultural production is reduced due to the drought conditions and potential water shortages, Mexico will have to look into foreign suppliers of the "short" commodities. Traditionally, the United States is seen as the primary option, although there has been a particular interest in diversifying the supply chain. The Mexican government often opens quotas (*cupos*, in Spanish) for countries that can supply emergency stocks of agricultural products with special tariff exceptions. Rice, beans, wheat, and pork meat have seen these quotas applied in different occasions although even with the preferential treatment, these commodities may still not be able to match the price, logistics, and quality of U.S. products.

For livestock, given the current reduction in cattle either by death/slaughter or sale, there will likely be opportunities for suppliers of genetic material and live cattle as soon as Mexican cattlemen begin to repopulate their stocks in Sonora and Chihuahua. Once again, the geographic advantage of having a shared border with the United States gives U.S. exporters potential business opportunities in the near future.

FAS Mexico will follow-up on this situation and will publish additional analysis of specific affected products or regions as well as any announcements that may create business opportunities for U.S. exporters.

For More Information

FAS/Mexico Web Site: We are available at http://www.mexico-usda.com.mx or visit the FAS headquarters' home page at http://www.fas.usda.gov for a complete selection of FAS worldwide agricultural reporting.

Attachments:

No Attachments.