USDA Foreign Agricultural Service
U.S. DEPARTMENT OF AGRICULTURE

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

September 27, 2022

Commodity Intelligence Report

Europe 2022: Summer Crops Struggle with Heat and Drought; Average Yields for Winter Crops

The combination of extreme heat and a lack of rainfall during the growing season has severely affected the size of the total marketing year (MY) 2022/23 European grain and oilseed crops. In particular, the summer crops of corn, sunflowers, soybeans, and rice have been the most affected by the unfavorable weather. The earlier harvested winter crops fared much better, although they still had to contend with these weather challenges towards the end of their development, particularly during the filling stage, which tempered higher yield possibilities.

During spring, a remarkably persistent, high-pressure system set up a weather block that forced storms away from much of the continent, creating an unusually dry and hot weather pattern. This became the dominant pattern for Europe's spring and summer weather, with many areas recording 10 to 20+ days with temperatures greater than 35°C/ 95°F (Figure 1). Some of the outlying countries, however, were far enough north of the weather system that they benefitted from cooler and wet conditions. These countries, however, are mostly smaller producers along the Baltic and North Sea Coast, and do not contribute extensively to the European Union (EU) total. The countries dealing extensively with heat stress were predominantly the summer crop producing countries.

The prolonged rainfall deficit (Figure 2) and unusually high temperatures (Figure 3) intensified during spring and into the summer months, reaching record high temperatures in many locations, particularly in western Europe, while areas in southern Europe recorded some of their lowest precipitation totals. The low rainfall levels developed into an exceptional drought in many locations (Figure 4).

Europe's MY2022/23 Winter Crops

At the beginning of the winter-growing season, favorable autumn planting conditions initiated good emergence and an early development of winter wheat and rapeseed. A mild winter minimized winterkill losses and winter precipitation was adequate across most of the continent. The fall-sown crops did well and benefited from early conditions, as much of their development occurred prior to the unfavorable onset of late-spring heat and intensifying dryness. Harvesting of wheat began in May in the far south and continued northward with the bulk of the winter wheat and rapeseed crop harvested in June and July. Winter yields were diminished, however, due to unfavorable weather occurring in the later development stages. Dryness during grainfill limited wheat kernel size and lowered rapeseed pod weight. Both wheat and rapeseed crops were harvested with near-average yields, but increased rapeseed area in MY2022 increased its production to the highest level in 5 years, while lower wheat area in MY2022 brought wheat production down slightly below the 5-year average.

The higher-than-normal temperatures accelerated development of autumn-planted crops in some western countries, such as Spain and France by 2 to 4 weeks earlier than normal. Thus, harvest began in August in southern areas, which is unusually early. The hot and dry days, however, allowed harvesting to continue with few delays or interruptions.

Europe's MY2022/23 Summer Crops

Europe's 2022 summer crops, including corn, sunflowers, soybeans, and rice, have been beset with heat and dryness during most of their development. Satellited-derived Percent Average Seasonal Greenness shows August 2022 crop conditions to be below normal (Figure 5). Summer crops are concentrated in the warmer and drier southern and interior areas of Europe. Countries such as France, Italy, Spain, Hungary, and Romania have a high percentage of corn, sunflowerseed, and other summer crops; these countries were particularly affected by the adverse summer conditions. These conditions included constant, above-average temperatures, accompanied by extreme high temperatures. Some of the most severe weather occurred while summer crops were in the sensitive flowering and grainfill stages. Reproduction can be aborted or severely curtailed in summer crops, such as corn and sunflowers, when temperatures reach 38°C (100°F). Temperatures were particularly damaging and reached these levels in areas of western Europe, such as in France (Figure 6), Germany, and Spain. Satellite-derived Normalized Difference Vegetation Index (NDVI) graphs show the deteriorating

conditions of cropland areas in some of the largest corn (and summer crop) producing areas:

Romania (Figure 7)	Hungary (Figure 8)	Po Valley, Italy (Figure 9)	SW France (Figure 10)

Europe's rivers have also been affected by drought as water levels fell significantly, limiting or restricting irrigation supplies. Water restrictions were enacted in many countries, preventing, or minimizing farmers' irrigation options. Many of Europe's navigable rivers had cargo reductions in place due to the low water levels, making logistics more challenging and expensive. Many irrigation canals have become too low to draw water while many reservoirs are far-below normal. These problems are particularly acute in Italy's rice region. Because the rice crop is immersed in water during its cultivation, any water restrictions can be dire. Satellite Imagery comparisons show the decrease in Italy's primary agricultural river, the Po River (Figure 11) in northern Italy. NDVI Imagery also shows the dramatically poorer condition of the vegetation in mid-2022 compared to the previous season (Figure 12). Water from the Po River irrigates fields in Italy's primary corn, rice, and soybean area. Italy is the EU's largest rice and soybean producer.

Romania Crop Travel

FAS/Bucharest staff travelled into southeast Romania during August, where some of the country's most significant corn (Figure 13) and sunflower production (Figure 14) is concentrated. Crop travel corroborated the poor conditions depicted by satellite and weather data. Overall, very dry conditions were found throughout the region, but field variations occurred based on unique circumstances such as management style (conventional tillage versus no till), irrigation, and number of fertilizer applications. In some areas, canal water was too low to use for irrigation. In general, both corn and sunflower were both affected by the heat and drought. Corn had smaller ears than usual and smaller kernel sizes. Sunflower, usually more resilient than corn during a drought, was also suffering. Field observations showed that sunflowers had smaller heads and seeds than usual. Harvest is underway for both crops, with sunflower having begun first, as normal. The season's heat has pushed harvest for both crops forward.

For country-specific area, yield, and production estimates within the European Union (EU), please go to PSD Online at

https://apps.fas.usda.gov/PSDOnline/app/index.html#/app/home, and select "Downloadable Data Sets." Select the zipped file for "EU Countries Area & Production." *(For more information, please contact Bryan.Purcell@usda.gov.)*

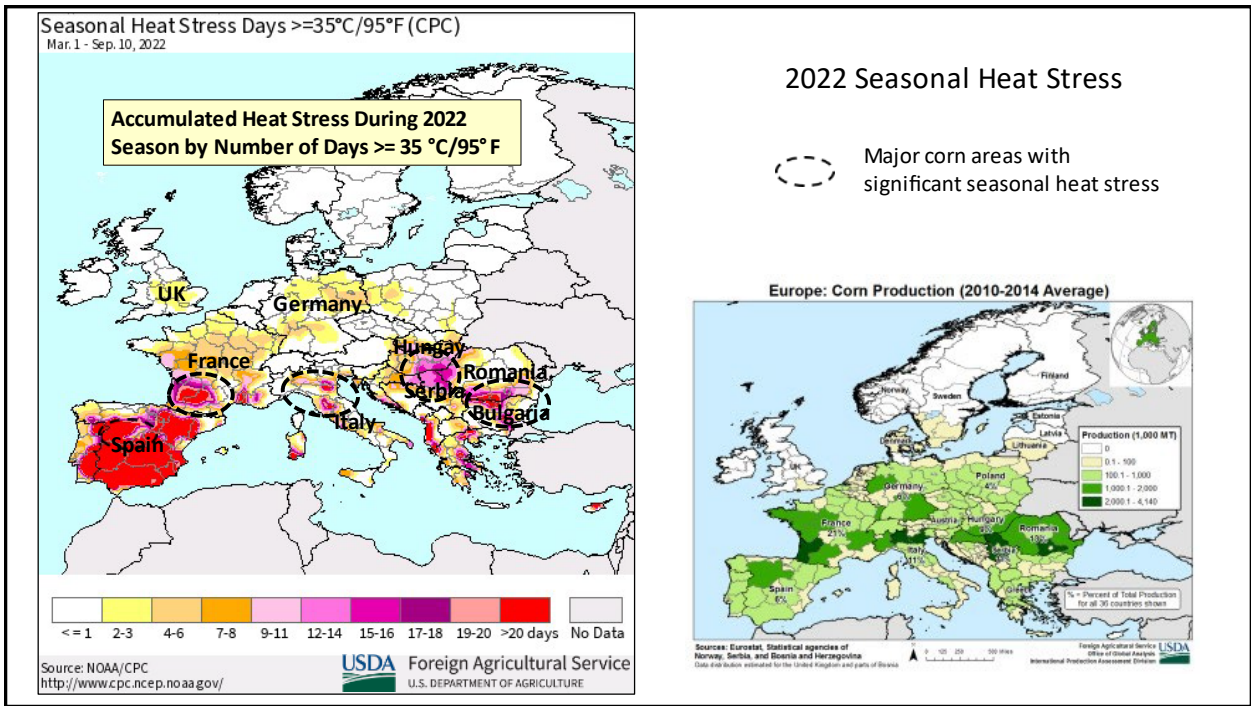

Figure 1. Accumulated Heat Stress During 2022 Season by Number of Days >= 35°C/95°F. Sources: NOAA/Climate Prediction Center and Eurostat.

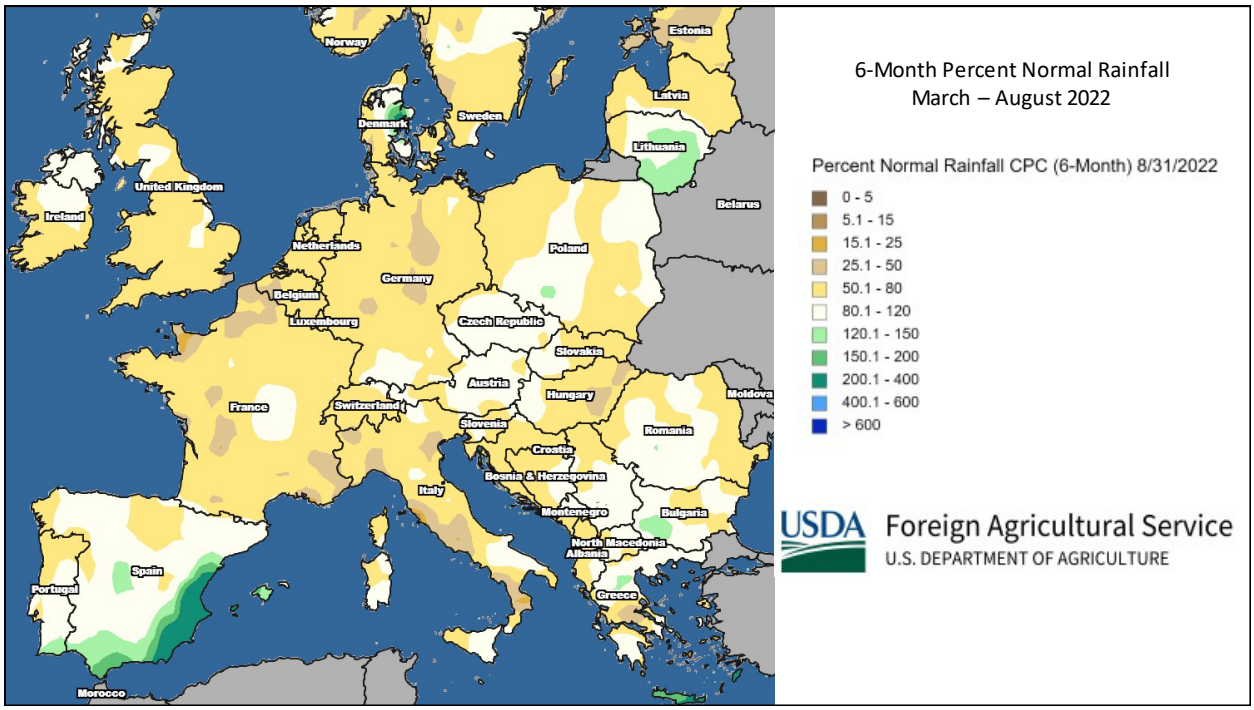

Figure 2. 6-Month Percent Normal Rainfall: March – August 2022. Source: NOAA/Climate Prediction Center

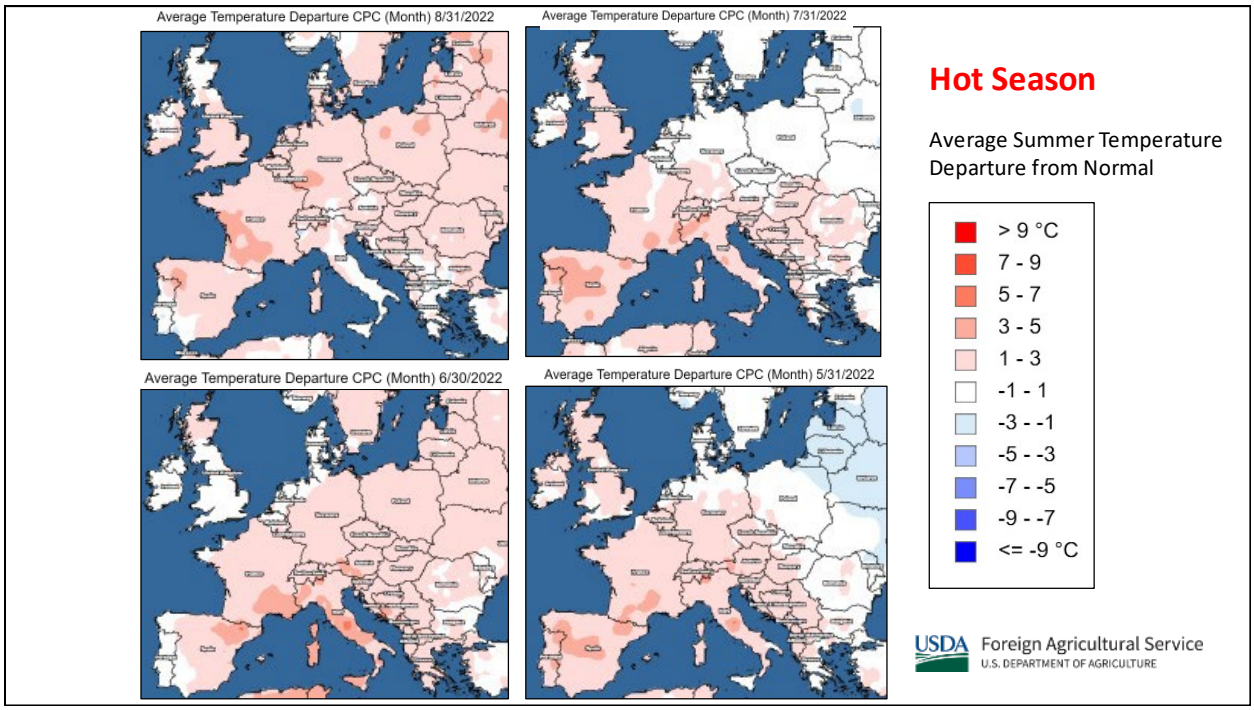

Figure 3. Average Summer Temperature Departure from Normal. Source: NOAA/Climate Prediction Center

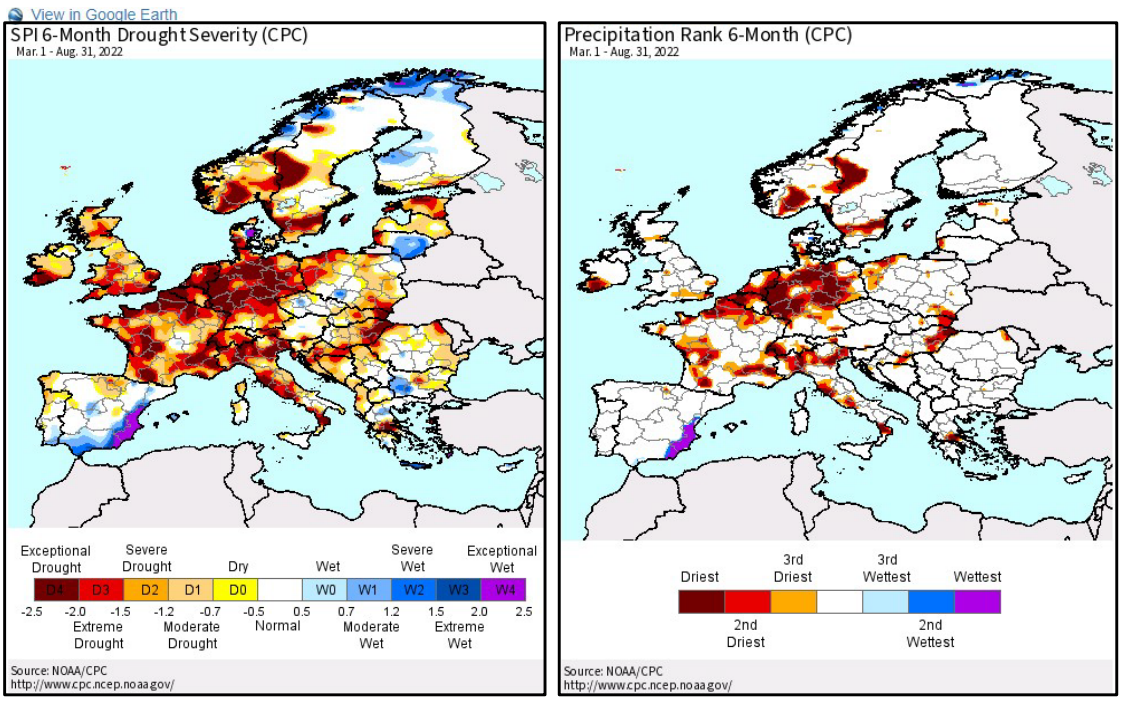

Figure 4. 6-Month Drought Severity and Precipitation Rank. Source: NOAA/Climate Prediction Center

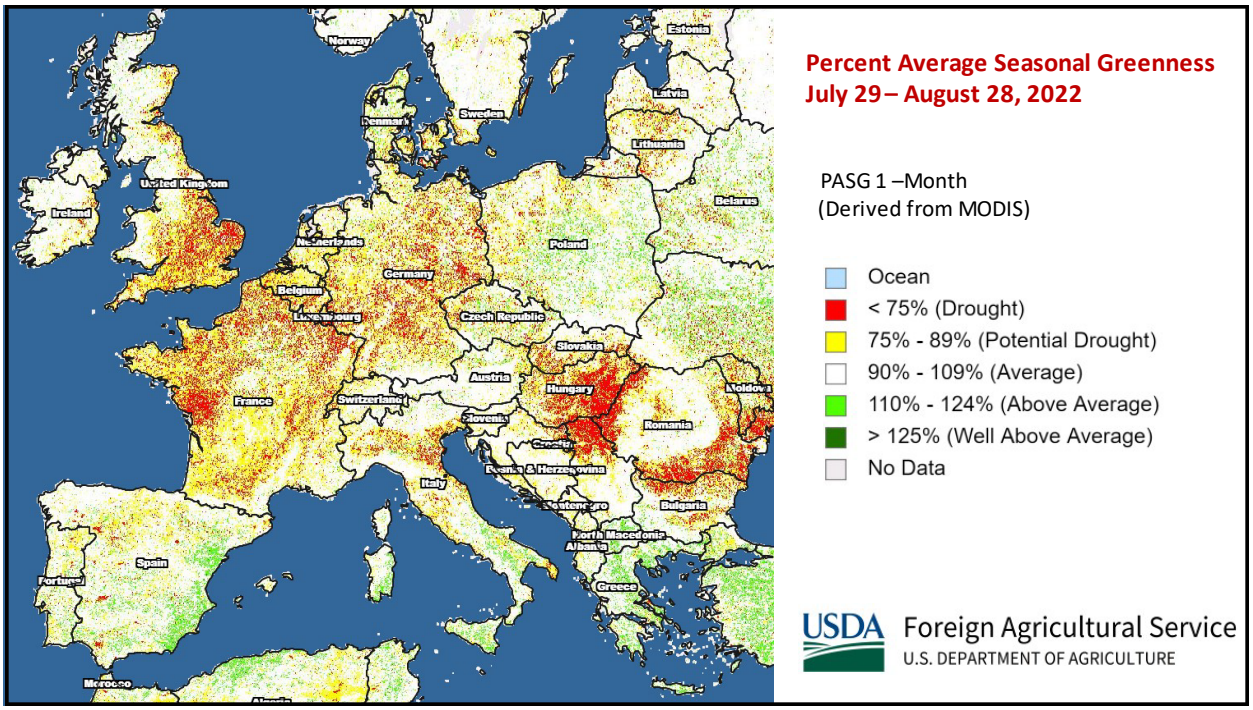

Figure 5. Percent Average Seasonal Greenness (July 29 – August 28, 2022). Source: USDA/NASA Global Agricultural Monitoring

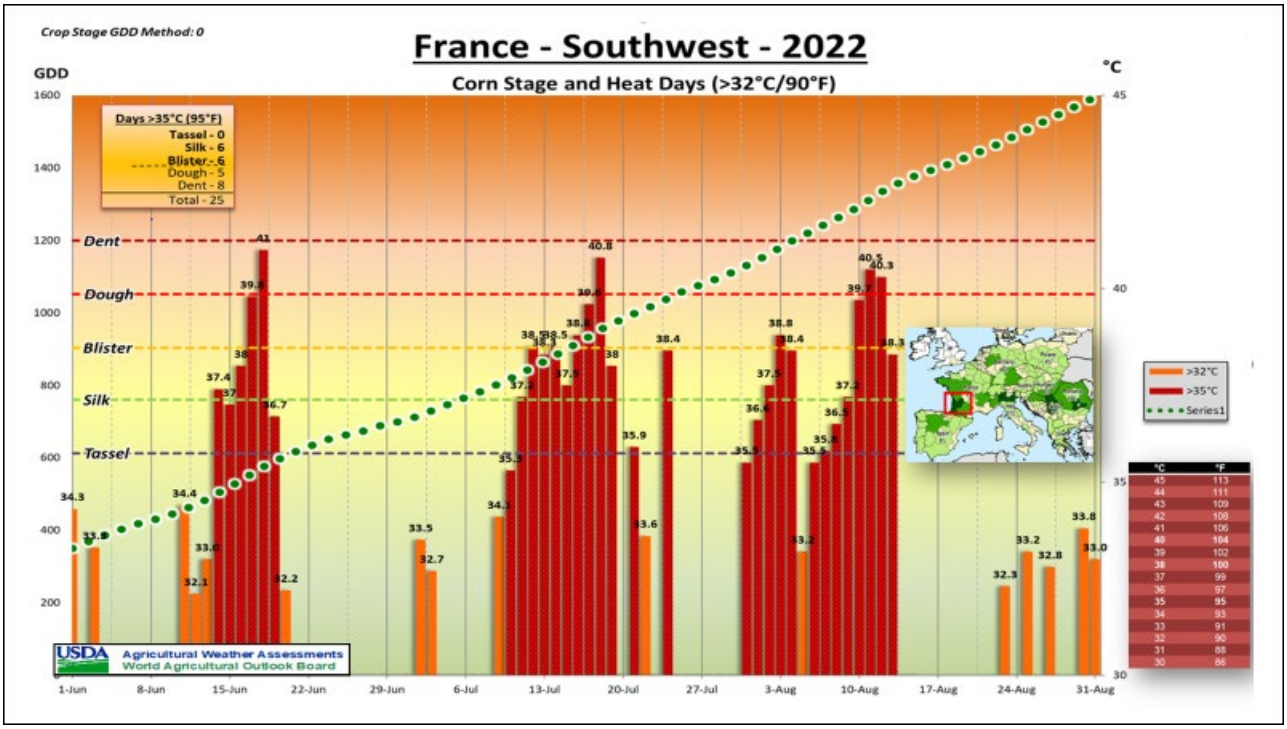

Figure 6. Southwest France Corn Region: Heat Days and Crop Stage. Source: USDA/World Agricultural Outlook Board Agricultural Weather Assessment

Dotted green line shows crop progress by growing degree days (on left axis), while maximum daily temperatures are plotted in columns on the x-axis. Some of the highest temperatures occurred while corn was in the highly sensitive stages of tassel, silk, and blister.

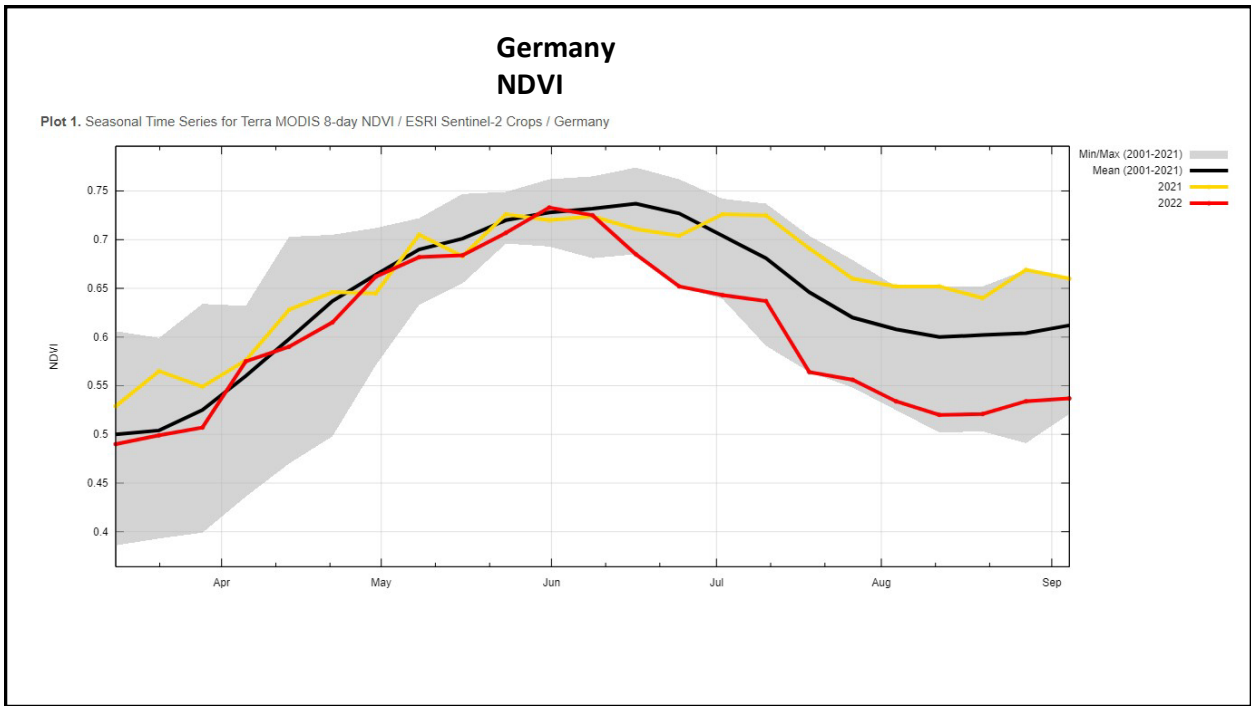

Figure 7. Germany Seasonal NDVI. Source: USDA/NASA Global Agricultural Monitoring NDVI in Germany shows good 2022 crop conditions (red line), until June, when winter rapeseed and winter wheat are mature and nearing harvest. NDVI drops considerably, however, during the late summer months when corn is the dominant summer crop and in need of rain for pollination and grainfill. Germany is typically the EU's 2nd largest wheat producer and the 1st or 2nd largest rapeseed producer.

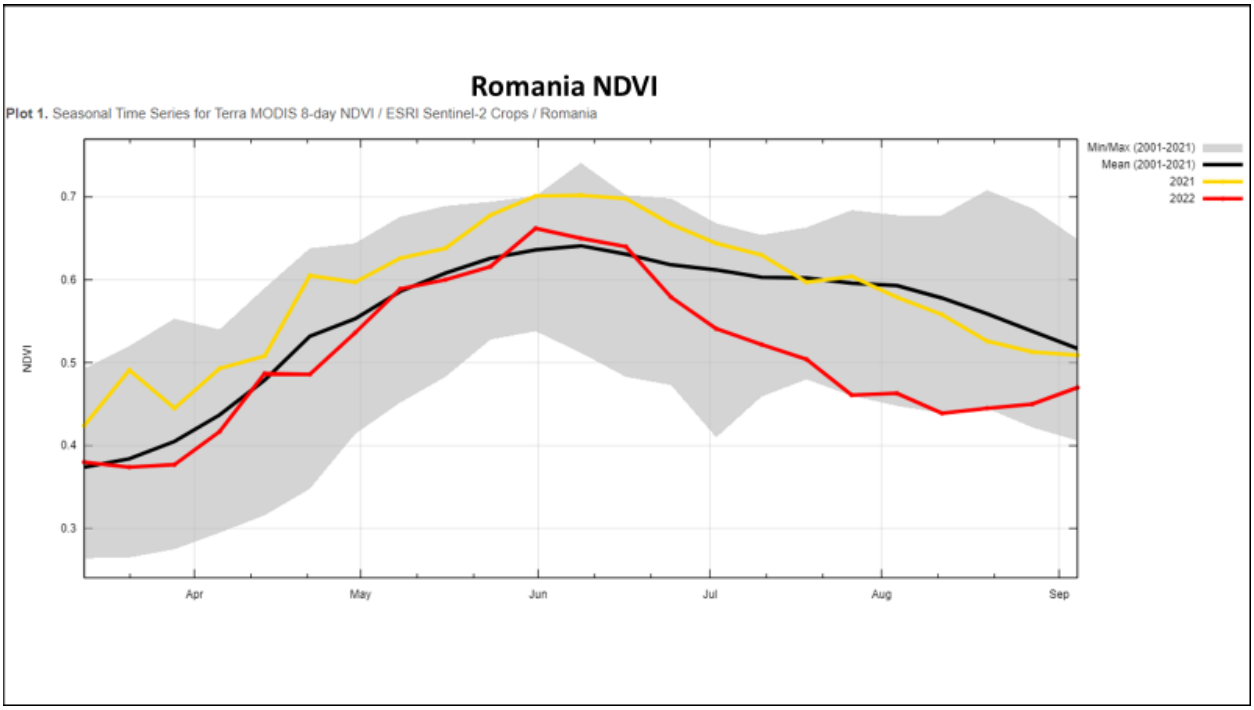

Figure 8. Romania Seasonal NDVI. Source: USDA/NASA Global Agricultural Monitoring NDVI in Romania for 2022 (red line), shows good crop conditions until mid-June, when winter rapeseed and winter wheat are mature and ready for harvest. NDVI drops considerably, however, during the late summer months when corn and sunflowers are the dominant summer crops and in need of rain for pollination and grainfill. Romania is typically the EU's second largest corn producer.

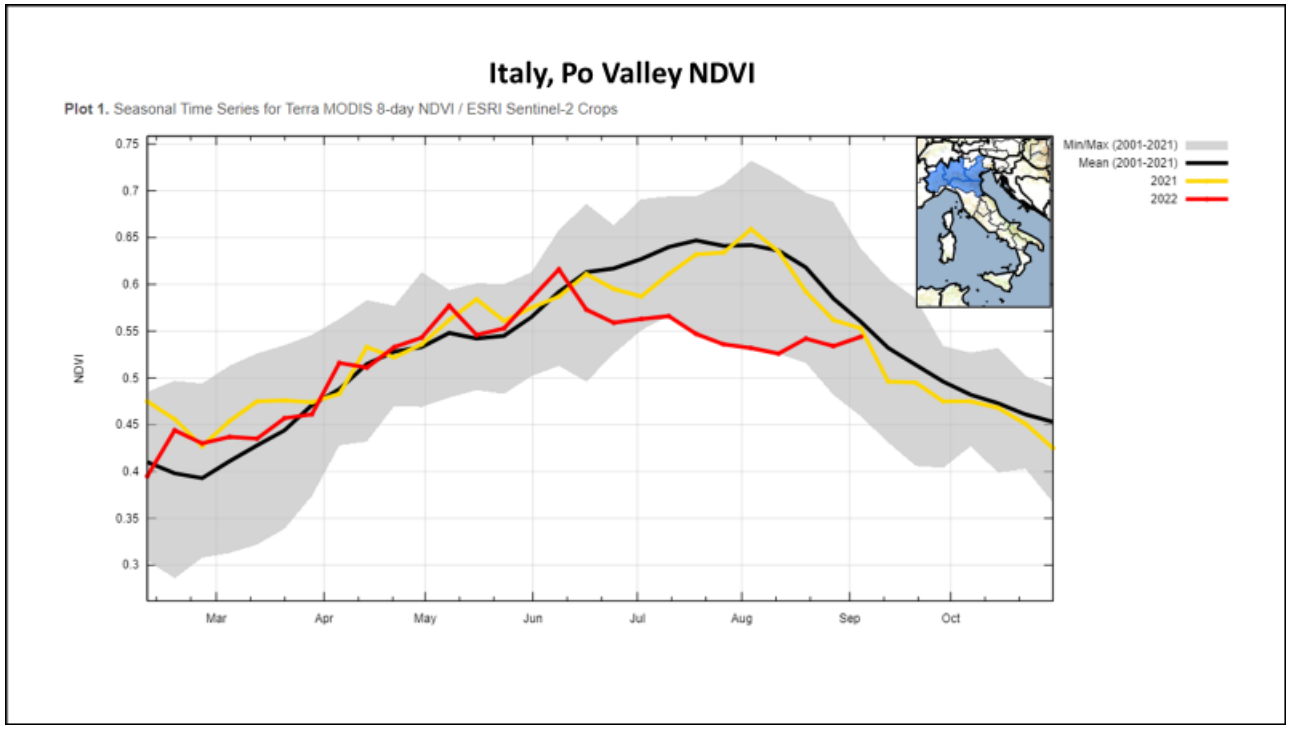

Figure 9. Italy, Po River Valley Seasonal NDVI. Source: USDA/NASA Global Agricultural Monitoring

Poor vegetation conditions in 2022 are depicted in the NDVI graph (red line) of Italy's Po River Valley. This area is Italy's main cropland region. Most susceptible to drought is rice, a crop that is typically immersed in water. All of Italy's rice area is concentrated in this region. With little rainfall and low river levels, the region's rice, corn, and soybeans are all at significant risk.

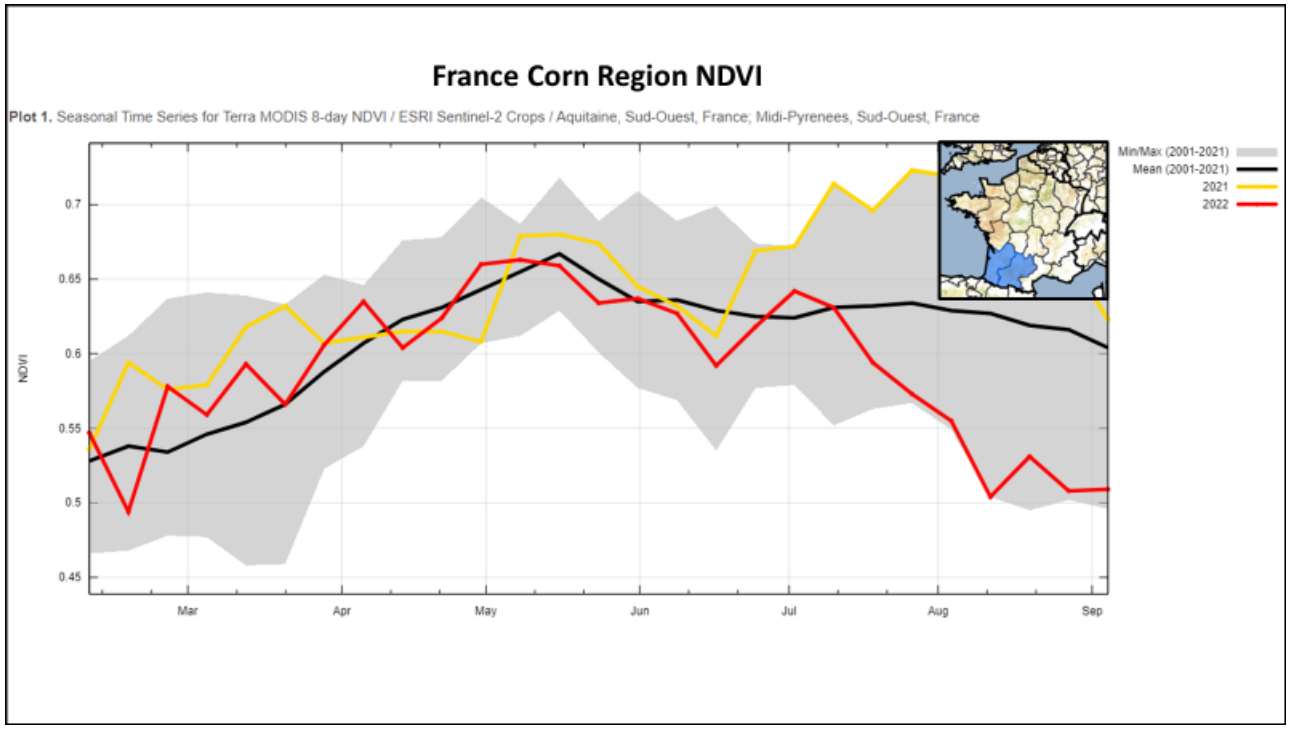

Figure 10. Southwest France Corn Area, Seasonal NDVI. Source: USDA/NASA Global Agricultural Monitoring

Southwestern France is the country's most prominent corn producing region. Drought and heat have taken a significant toll on croplands in this area (primarily corn, but also sunflowers), as shown by the falling red line in the NDVI graph during July and August, critical months for corn development. France is typically the EU's largest corn producer.

Italy's Po River in August 2021 (left) and August 2022 (Right)

Satellite imagery shows a much narrower Po River with less water in 2022 compared to 2021. Severe drought has greatly reduced the flow of the river in Italy's agricultural north. Whether irrigated or not, little water was available for agriculture in the Po River Valley during 2022.

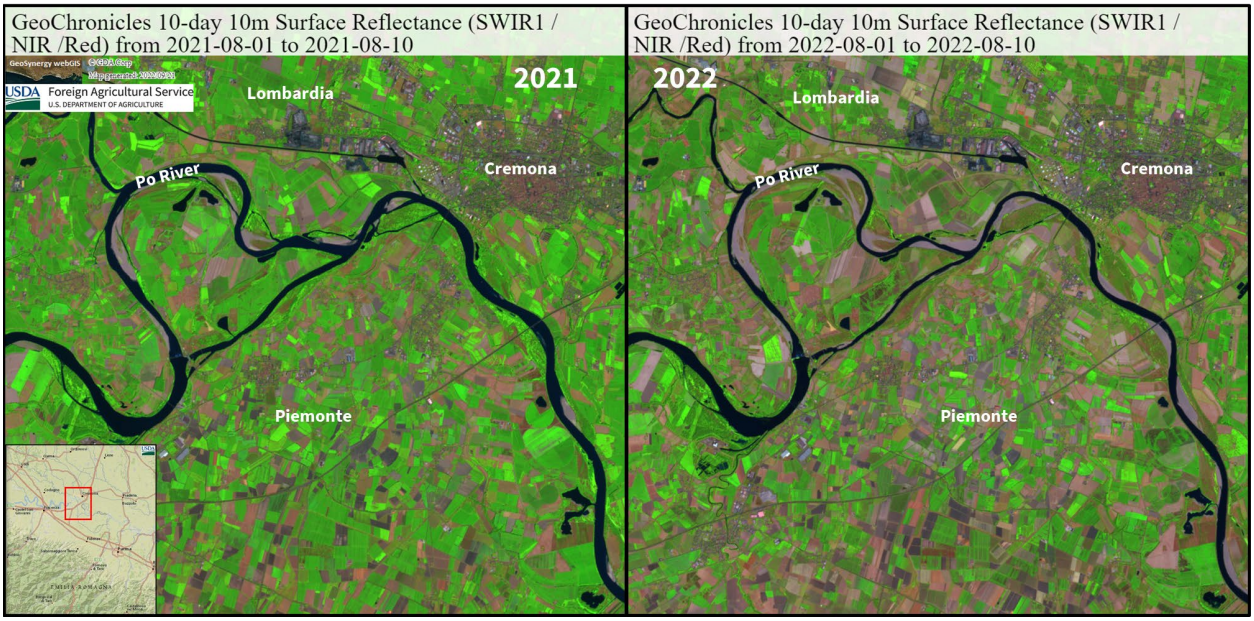

Figure 11. Italy's Po River Volume Decline 2022 Versus 2021. Source: ESA Sentinel-2

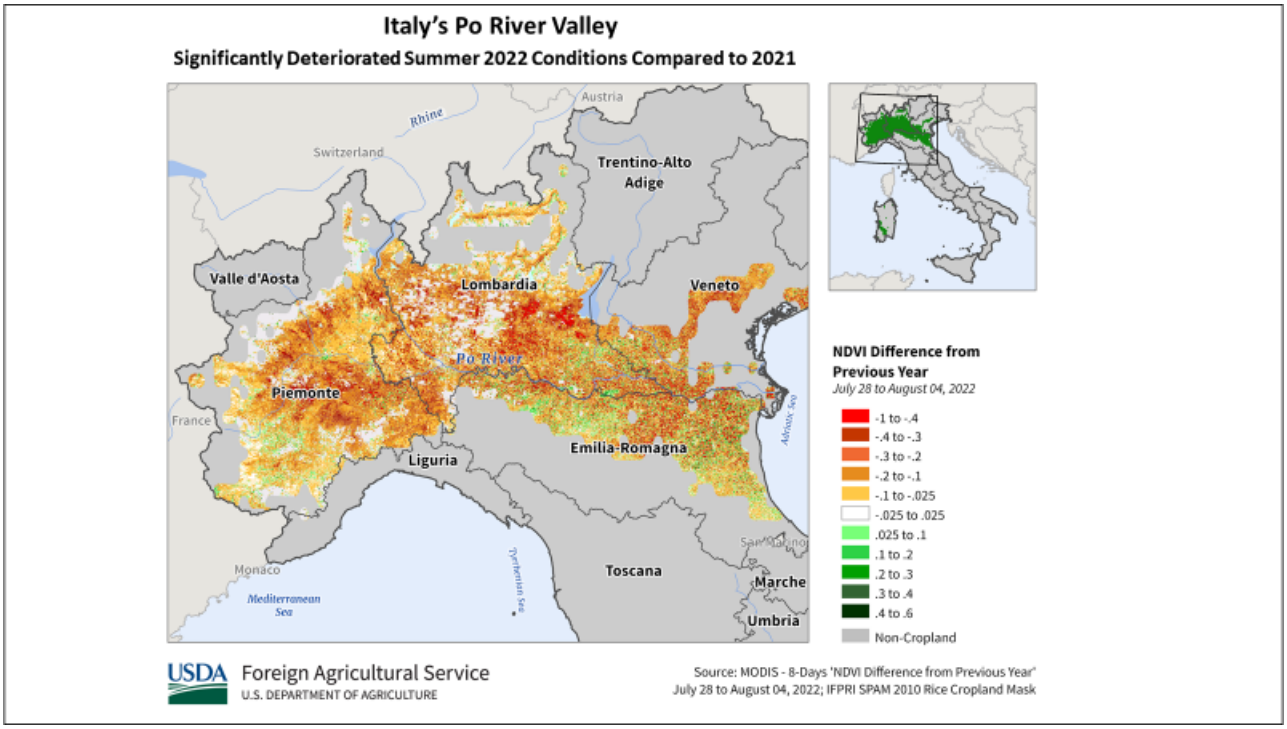

Figure 12. Satellite Image of Italy's Agricultural Po River Valley Area Showing Significantly Deteriorated Summer 2022 Vegetation Conditions Compared to 2021 Conditions. Source: USDA/NASA Global Agricultural Monitoring

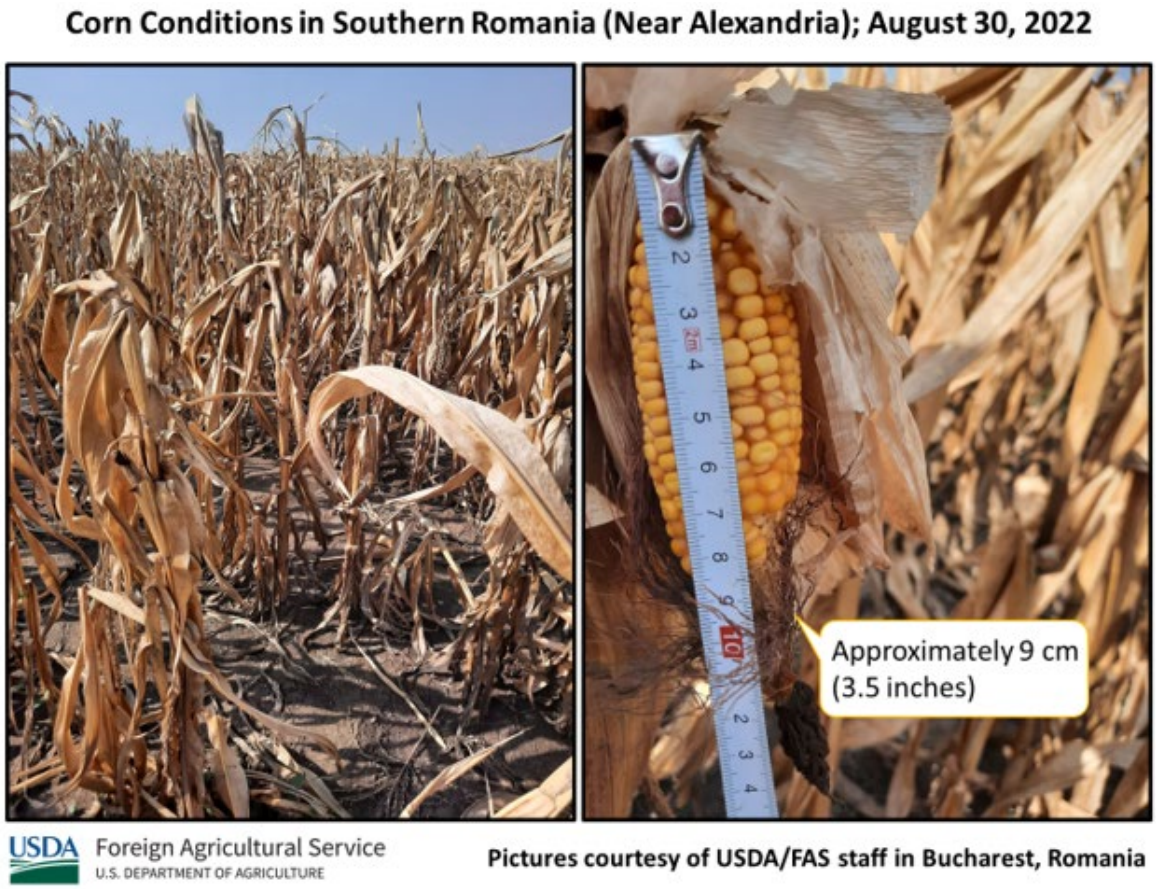

Figure 13. Photographs of Corn in Southern Romania on August 30, 2022. Pictures Show Very Dry Conditions and Small Ears. Source: USDA Foreign Agricultural Service (FAS)

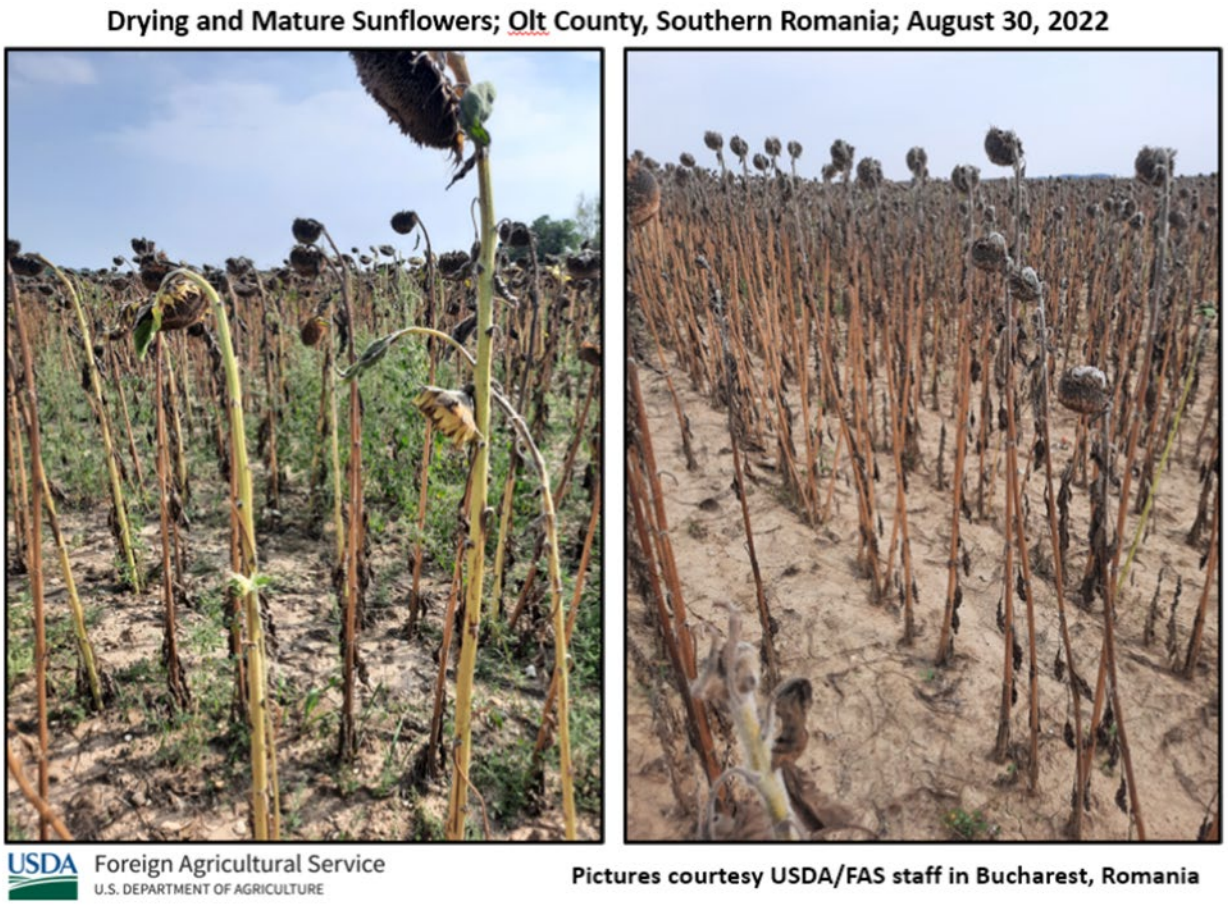

Figure 14. Photographs of Sunflowers in Southern Romania on August 30, 2022. Pictures Show Very Dry Conditions and Small Heads. Source: USDA Foreign Agricultural Service (FAS)

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