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Global Market Analysis
International Production Assessment Division
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Commodity Intelligence Report

Lower MY 2021/22 Grains Production in the Middle East Due to Dryness and Excessive Heat

Overview:

USDA estimates winter crops (i.e., wheat and barley) production for marketing year (MY) 2021/22 lower compared to last year for all major wheat and barley producing countries in the Middle East due to dryness (Figures 1 and 2). USDA groups Turkey, Iran, Iraq, Syria, Saudi Arabia, Lebanon, Yemen, Oman, Israel, and Jordan into the Middle East region.

The Middle East, as a semi-arid to arid region, struggles with limited water availability. Even during regular water years, normal precipitation often is not enough to meet crop water use requirements and satisfy the needs of agriculture. In addition, drought is a common occurrence in the Middle East. Drought and its characteristic lack of rain and above average temperatures can have a damaging impact on crop development and can cause significant yield declines. This chiefly semi-arid to arid region gets most of its precipitation during the cold season (November - April). Several countries in the region have irrigation capabilities (i.e., the GAP region in Turkey, central and southern Iraq, Khuzestan province in Iran, etc.). Water for irrigation is replenished not only through rainfall, but also strongly depends on snow accumulation. Most of the winter grains produced in the region's major producing countries (i.e., Turkey, Iran, Iraq, and Syria), however, are primary grown in rainfed areas.

Typically, winter wheat and barley in the Middle East are planted in October through November and harvested between May and August. Thus, fall and early-winter rainfall are important for planting and crop establishment. Within season crop development and yield formation, however, strongly depend on the amount of water plants get during the spring months.

The 2021 winter crops growing season, which began in October 2020 and ended in August 2021 in the Middle East, was overall unfavorable for crop development largely owing to below-average precipitation that started during planting (Figure 3) and persisted until harvest (Figure 4). In Turkey, and in the major winter crop-producing regions in Iraq and Syria, the period between October and December was drier than normal. The resultant insufficient soil moisture availability consequently delayed planting in some regions and caused poor crop establishment conditions. The region received some sporadic rain in late December and early January that, however, was not adequate to

ease the effect of the below-average precipitation received since the start of the growing season. In addition, above-average temperatures during December limited snow cover (Figure 5). In contrast, Iran had a good-to-excellent start of the water year (Figure 3). Late January brought some much-needed rain that moistened soils in the western and southern parts of Turkey as well as some of the key winter crop regions in Syria. However, several major agricultural areas in central Turkey (i.e., the Central Anatolian Plateau), northeastern Syria (the Al-Hasakah governorate) and Iraq recorded little to no rainfall, which exacerbated the drought. By the end of January, short-term dryness became pronounced in Iran as well. Supplemental February rainfall, however, provided additional soil moisture that allowed crops to partially recover.

Winter crops in Turkey and northern Iran broke dormancy in mid/late-March, benefitting from timely March rains. By mid-April moisture conditions improved in Turkey, but the drought became more evident in eastern Syria and eastern Iran (i.e., the eastern crop areas of Khorasan). However, by the end of April limited rainfall accompanied by above-average temperatures and excessive heat worsened the short-term dryness, impacting the reproductive-to-filling stages of winter wheat and barley across eastern Syria, parts of Iraq, and Iran. The heat wave spread into Turkey. According to the USDA Weekly Weather and Crop Bulletin, vol. 108, no. 19, between May 2 and 8 the temperatures averaged 3° to 6°C above normal from Turkey southeastward into western Iraq and Saudi Arabia. The following week, temperatures over the GAP region (Southeast Anatolia, Turkey), which is a major winter wheat and barley producing area, averaged more than 4.5°C above normal, which was the highest on record over the past 30 years (USDA Weekly Weather and Crop Bulletin, vol. 108, no. 20). Dry and hot weather also persisted into the rest of the region (i.e., Syria, Iran). The untimely summer-like heat and dryness adversely affected the reproductive-to-filling stages of winter wheat and barley. The widespread drought (Figure 6) and accompanying heat continued into the remainder of the growing season, severely hampering winter wheat and barley yield prospects in the Middle East.

Major Producers:

Crop statistics, including area, yield and production estimates for MY 2020/21 (last year) and MY 2021/22 (current year), as well percent change relative to last year and the 5-year average for the region's major producing countries (i.e., Turkey, Iran, Iraq, and Syria), are provided in Table 1. As seen in Table 1, given the lack of adequate soil moisture supplies and excessive heat that prevailed during the current growing season, yields for barley and wheat are below last year's and the 5-year average across the region.

TURKEY

Turkey is the largest grain producer in the region. The MY 2021/22 decline in winter grains production is due to the previously described dry and hot weather. The impact of the insufficient water availability caused by the abnormally low seasonal rainfall and excessive heat is clearly visible in the Normalized Difference Vegetation Index (NDVI) response captured in Figures 7 and 8. Poor vegetation status illustrated by the orange-

brown-red colors in Figure 7 is evident over the two major winter grains producing regions of the Anatolian Plateau (Central Anatolia) and southern Turkey (Southeast Anatolia, GAP). NDVI time series analysis shown in Figure 8 also demonstrate poorer crop conditions this season (red line) relative to last year (yellow line). The lack of adequate soil moisture availability and abnormally high temperatures during the reproductive-to-filling stages hampered crop growth and lowered this season's yields.

IRAN

As a result of the regional dryness and heat, most crop areas in Iran also show poor growing conditions and below normal late-season vegetative development (Figure 9). Some above-average spots are noticed around the Khuzestan province (located in the southwest of the country, bordering Iraq and the Persian Gulf), which has irrigation capabilities. In the major wheat and barley growing regions of the north and northeast, however, the NDVI anomaly values indicate that the crops are under moisture stress, which is indicative of low yield potential.

IRAQ

The main winter grains producing area for Iraq is northern Iraq (Figure 10). This includes the governorates of Ninawa, Arbil, Dahuk, As Sulaymaniyah, and At Ta'min, which account for about 40 percent of winter wheat and about 60 percent of barley production. Winter crops grown in northern Iraq rely primarily on precipitation. Ninawa, the country's leading winter grains producing region, was particularly heavily hit by the drought. Figure 11 shows a spectral reflectance comparison between last season (left plot) and this season (right plot) over the Ninawa governorate. Green colors indicate healthy, well-developed vegetation. The 2021 plot shows minimal to no healthy vegetation and worse vegetation status compared to the same period last year. This suggests lower yield potential compared to last year.

SYRIA

Similar to Iraq, most of the winter grains produced in Syria are grown the northern part of the country. Crops are primarily rainfed. Al-Hasakah, Ar Raggah and Aleppo are the leading wheat and barley producing governorates, accounting for about 80 percent and 90 percent of the wheat and barley production, respectively (Figure 12). Al-Hasakha, the country's top winter grains producing region is located in the most northeastern corner of the country and borders the Iraqi governorate of Ninawa. As illustrated in Figure 13, drought had similar impact on the crops in Al-Hasakha as in the neighboring Ninawa governorate. Spectral reflectance comparisons between last season (left plot) and this season (right plot) show a dramatic difference in the presence of healthy vegetation. As a result, production and yield are estimated lower than last year owing to the unfavorable weather conditions this season.

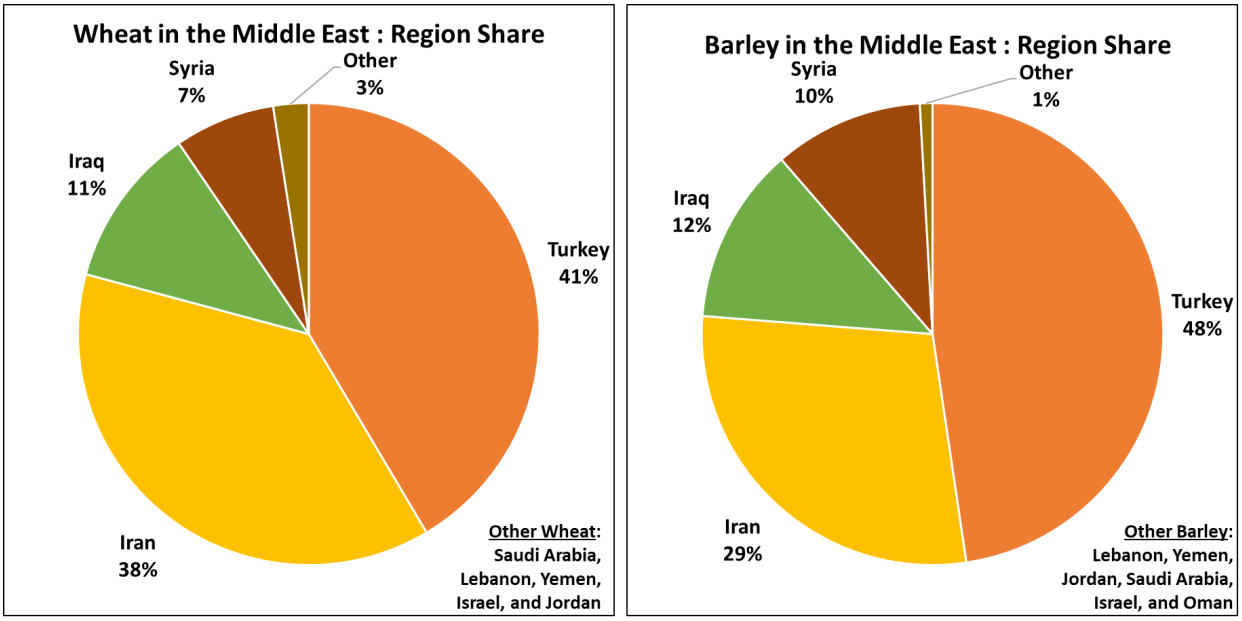

Figure 1. Middle East wheat and barley percent of region share for MY 2021/22. Turkey, Iran, Iraq, and Syria are the region's major winter crop producing countries. Source: USDA PSD Online.

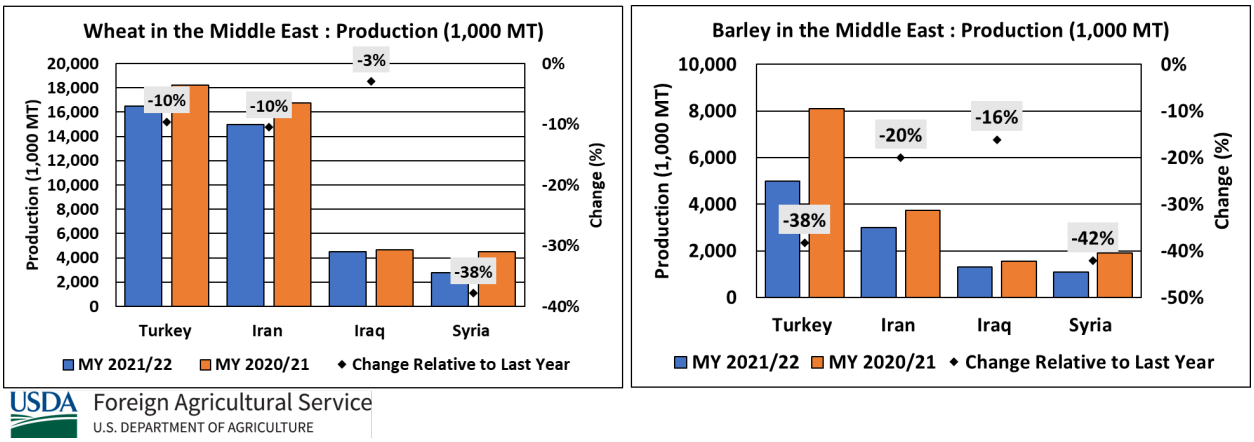

Figure 2. Middle East wheat and barley production for MY 2021/22 (current marketing year) and MY 2020/21 (previous marketing year) based on USDA's September 2021 estimates. Plots show the crop production statistics only for the region's major producing countries, Turkey, Iran, Iraq, and Syria. Source: USDA PSD Online.

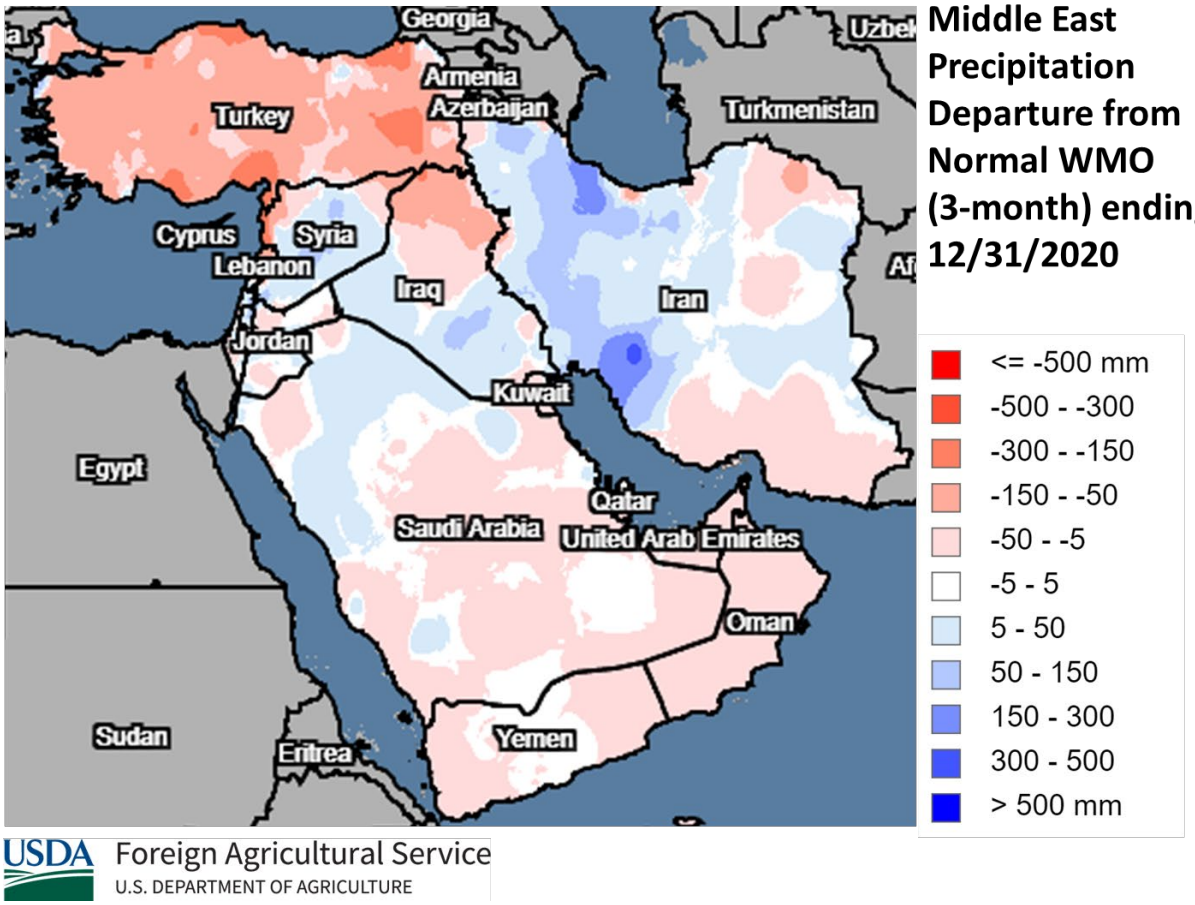

Figure 3. Middle East 3-month precipitation departure from normal ending December 31, 2020. Map captures the fall and early-winter precipitation conditions. Over most of the region during planting and establishment, soil moisture supplies were below average due to insufficient and below-average rainfall. Source: World Meteorological Organization (WMO).

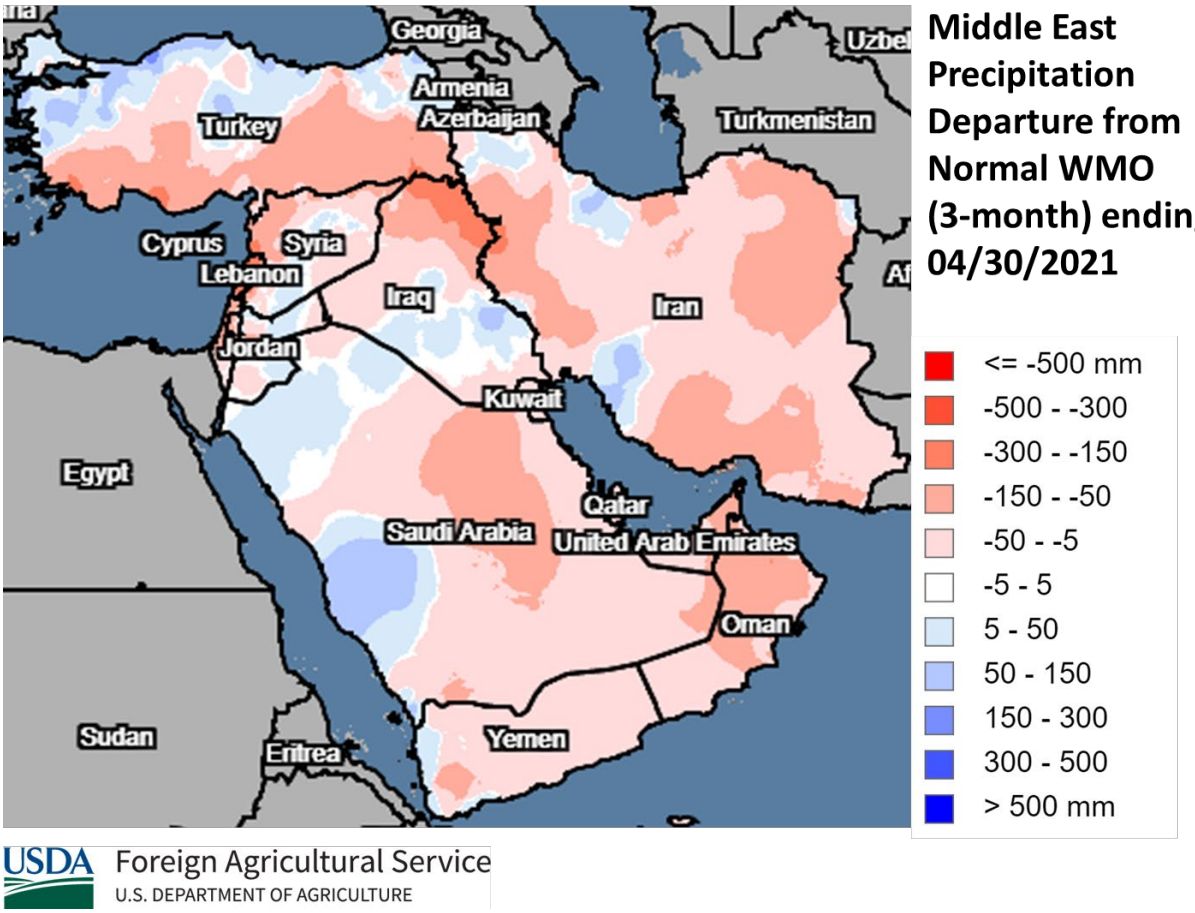

Figure 4. Middle East 3-month precipitation departure from normal ending April 30, 2021. Map captures the late winter and spring precipitation conditions. Precipitation remained below average during emergence and the early growing stages. Source: World Meteorological Organization (WMO).

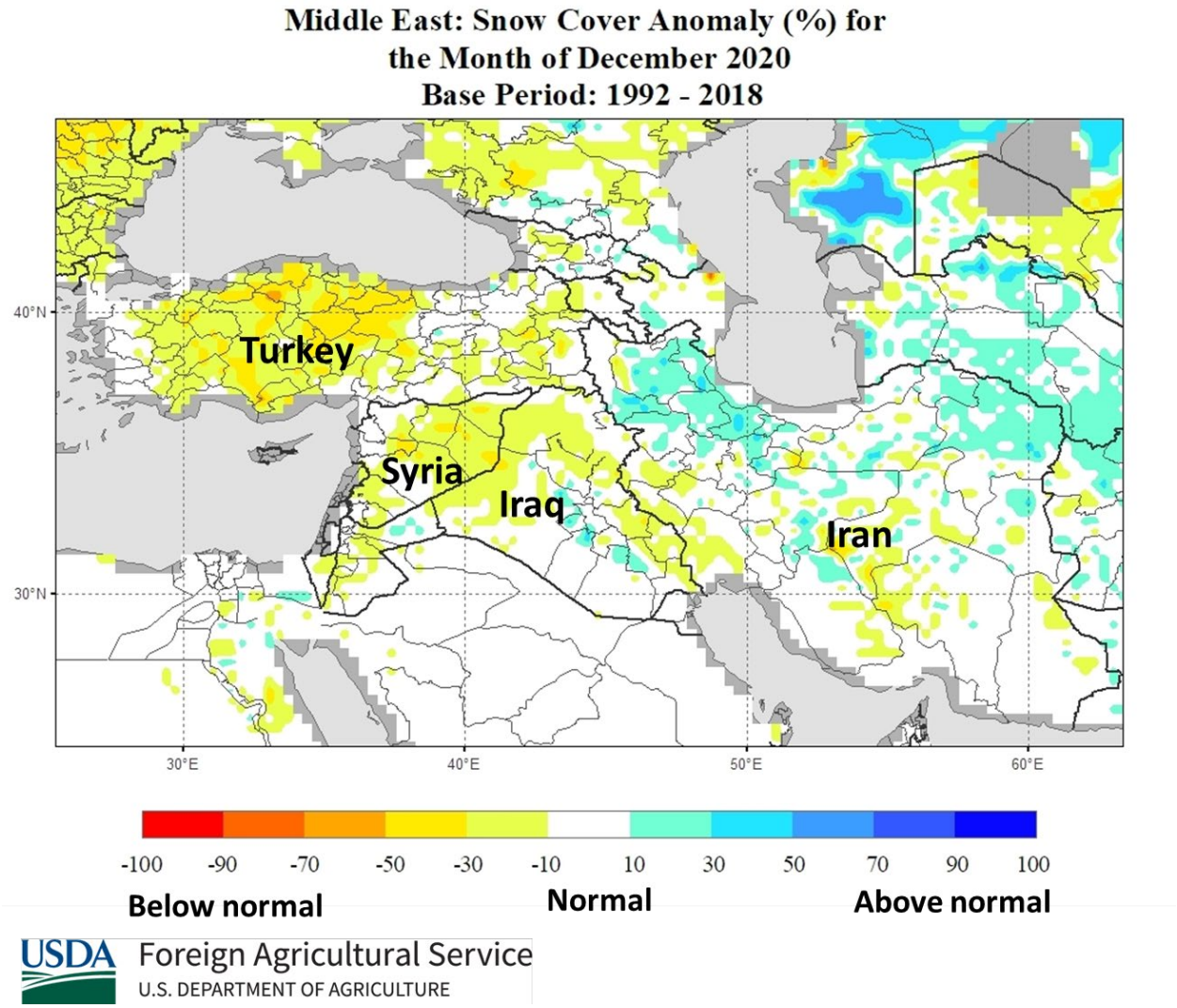

Figure 5. Middle East snow cover anomaly map for the month of December 2020. The negative half of the scale bar denotes below normal snow cover. Source: SSMI.

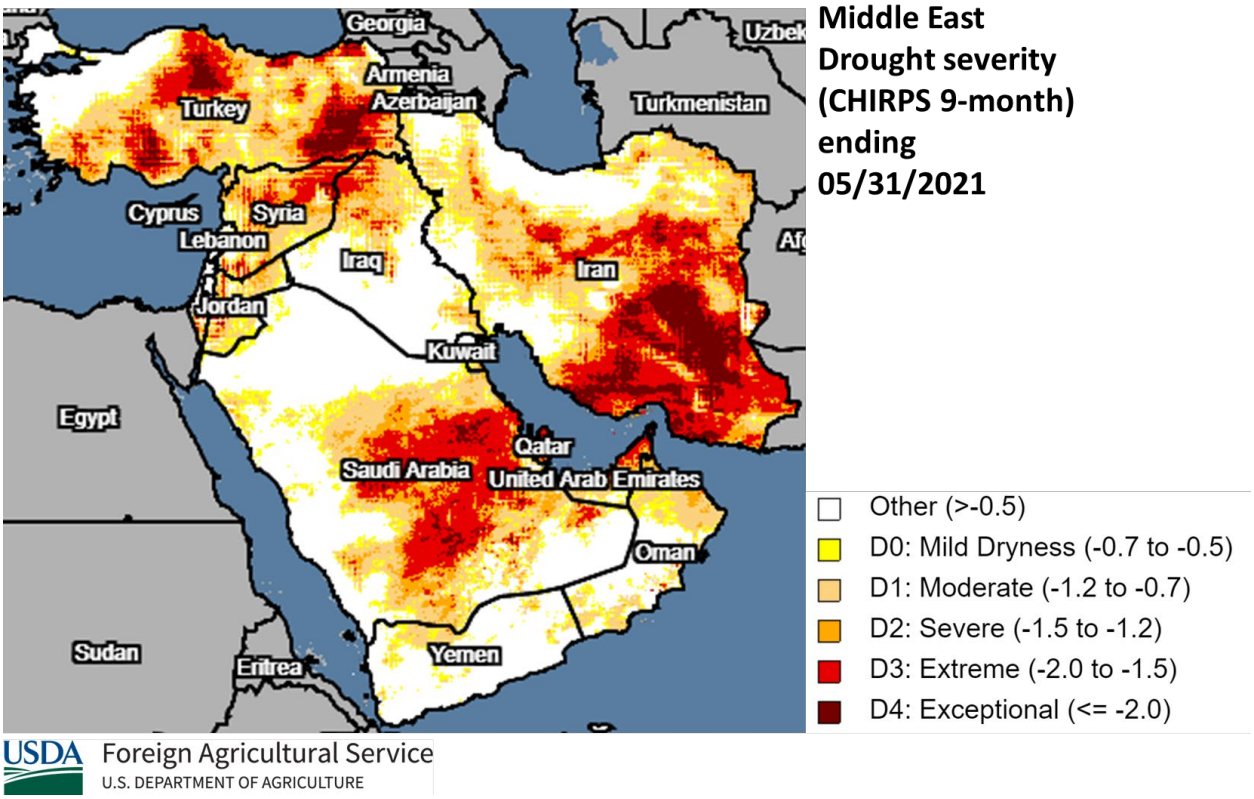

Figure 6. Middle East 9-month drought severity ending May 31, 2021. Most of the region experienced moderate to exceptional drought due to below average precipitation conditions that persisted during the entire 2020-2021 growing season. Source: University of California Santa Barbara, Climate Hazards Group, CHIRPS.

Commodity	Attribute	Country	2020/2021	2021/2022 (Sep)	Year Change (%)	Change Relative to the 5-year Average (%)
Barley	Area Harvested	Turkey	3,800	3,700	-3%	3%
Barley	Production	Turkey	8,100	5,000	-38%	-27%
Barley	Yield	Turkey	2.13	1.35	-37%	-29%
Barley	Area Harvested	Iran	1,700	1,700	0%	2%
Barley	Production	Iran	3,750	3,000	-20%	-12%
Barley	Yield	Iran	2.21	1.76	-20%	-14%
Barley	Area Harvested	Iraq	1,200	1,100	-8%	11%
Barley	Production	Iraq	1,550	1,300	-16%	1%
Barley	Yield	Iraq	1.29	1.18	-9%	-9%
Barley	Area Harvested	Syria	1,500	1,300	-13%	19%
Barley	Production	Syria	1,900	1,100	-42%	-5%
Barley	Yield	Syria	1.27	0.85	-33%	-13%

Commodity	Attribute	Country	2020/2021	2021/2022 (Sep)	Year Change (%)	Change Relative to the 5-year Average (%)
Wheat	Area Harvested	Turkey	7,100	7,000	-1%	-6%
Wheat	Production	Turkey	18,250	16,500	-10%	-11%
Wheat	Yield	Turkey	2.57	2.36	-8%	-5%
Wheat	Area Harvested	Iran	6,700	6,700	0%	0%
Wheat	Production	Iran	16,750	15,000	-10%	-2%
Wheat	Yield	Iran	2.5	2.24	-10%	-2%
Wheat	Area Harvested	Iraq	2,400	2,500	4%	13%
Wheat	Production	Iraq	4,635	4,500	-3%	9%
Wheat	Yield	Iraq	1.93	1.8	-7%	-3%
Wheat	Area Harvested	Syria	1,600	1,400	-13%	8%
Wheat	Production	Syria	4,500	2,800	-38%	-12%
Wheat	Yield	Syria	2.81	2	-29%	-15%

Table 1. Area, production, yield summary table for barley and wheat for the region's major producing countries, Turkey, Iran, Iraq, and Syria. Source: USDA PSD Online.

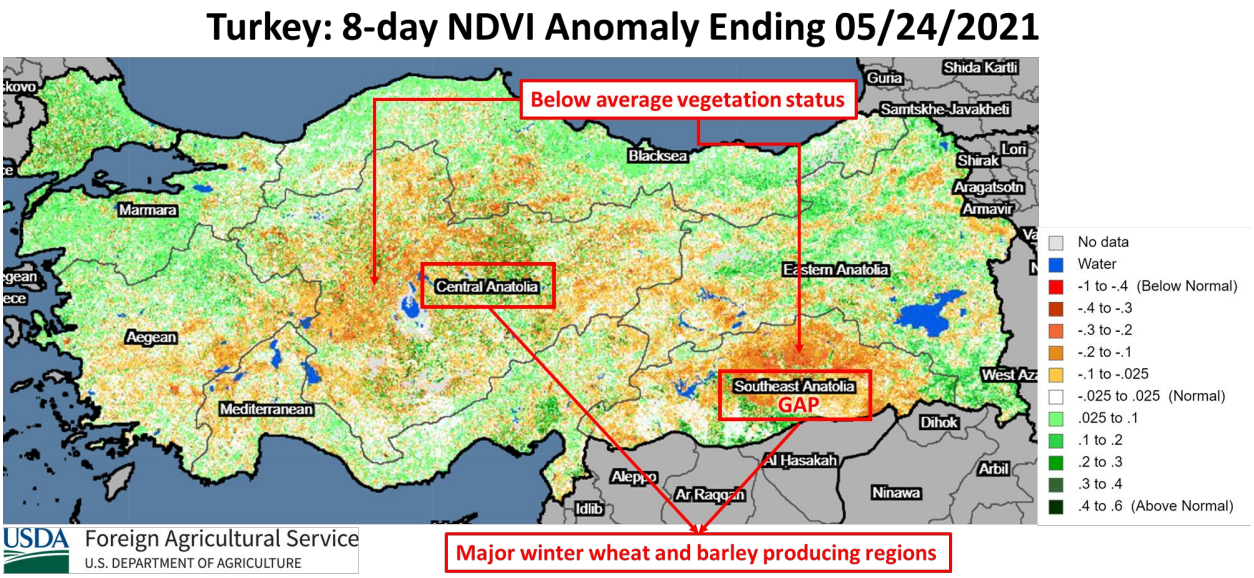

Figure 7. Turkey 8-day Normalized Difference Vegetation Index (NDVI) anomaly map ending May 24, 2021. Source USDA/NASA NDVI Anomaly, Global Agricultural Monitoring (GLAM) System.

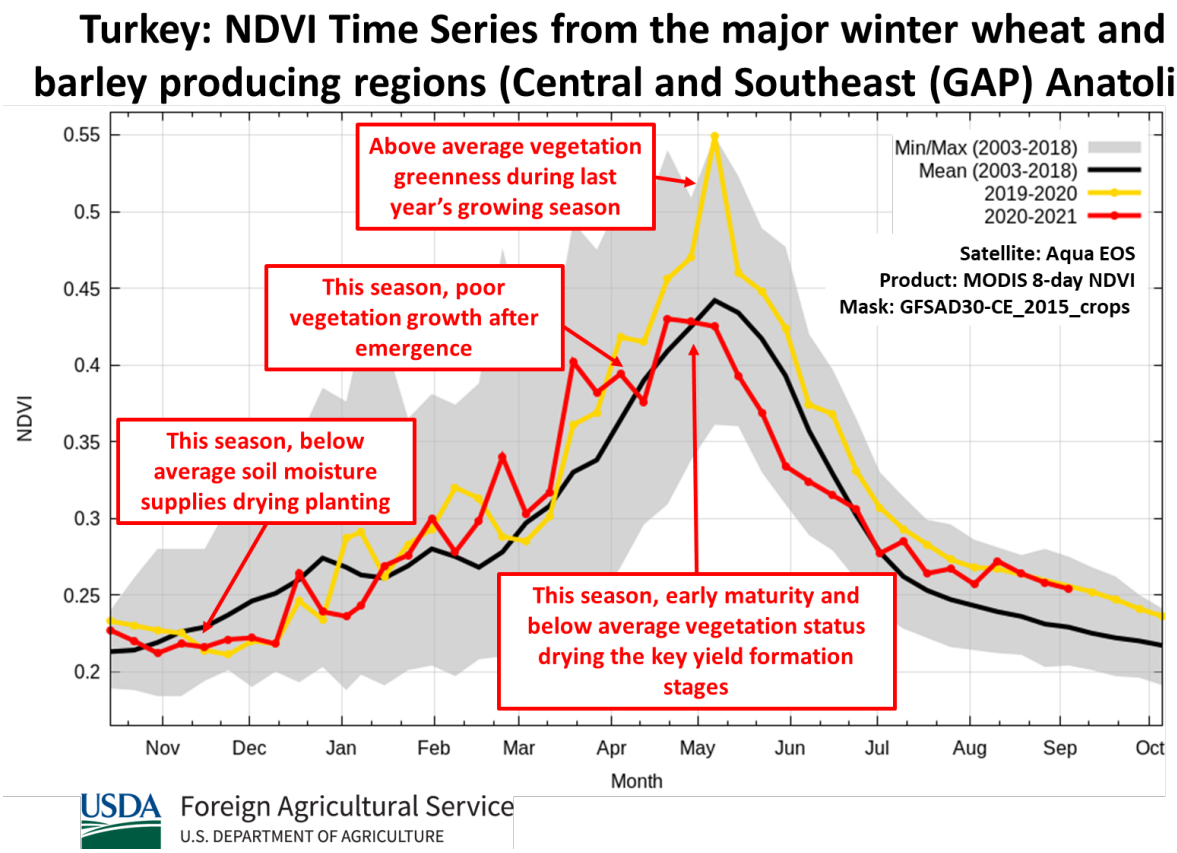

Figure 8. Turkey Normalized Difference Vegetation Index (NDVI) time series for this season (red line) and last season (yellow line) from the major winter wheat and barley producing regions. Source: USDA/NASA Global Agricultural Monitoring (GLAM) MODIS Aqua 8-day NDVI.

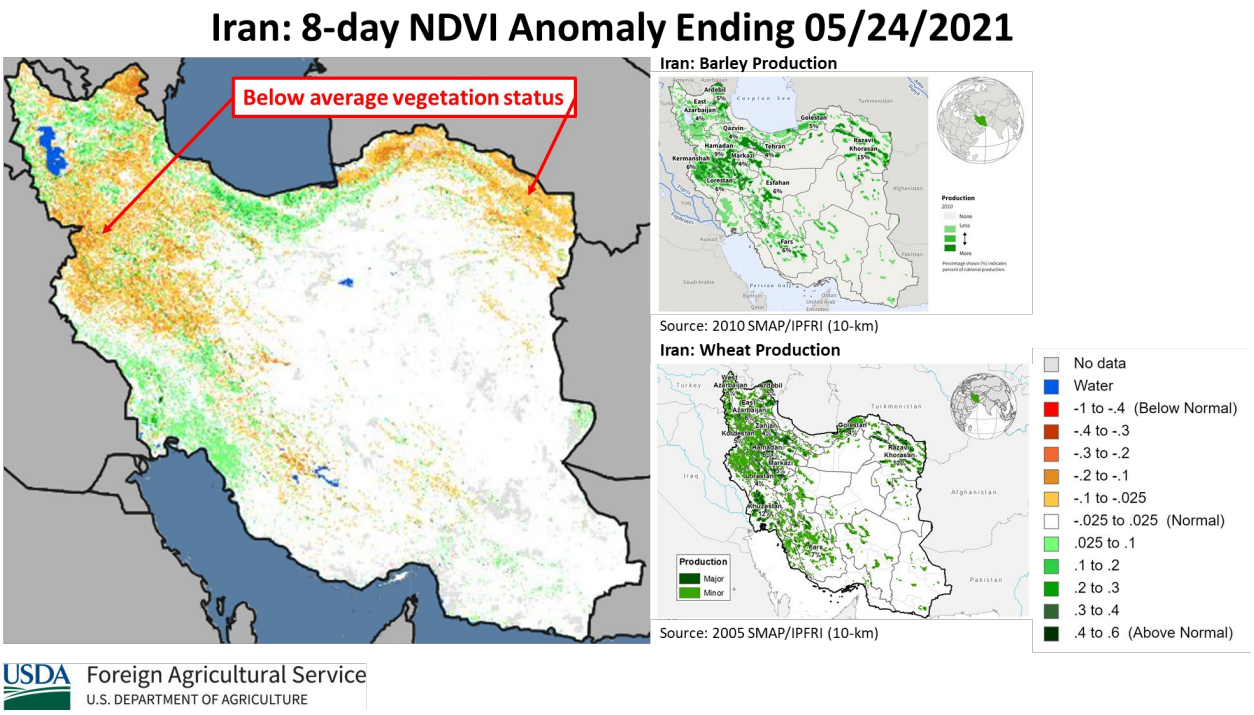

Figure 9. Iran 8-day Normalized Difference Vegetation Index (NDVI) anomaly map ending May 24, 2021. Source: USDA/NASA NDVI Anomaly, Global Agricultural Monitoring (GLAM) System.

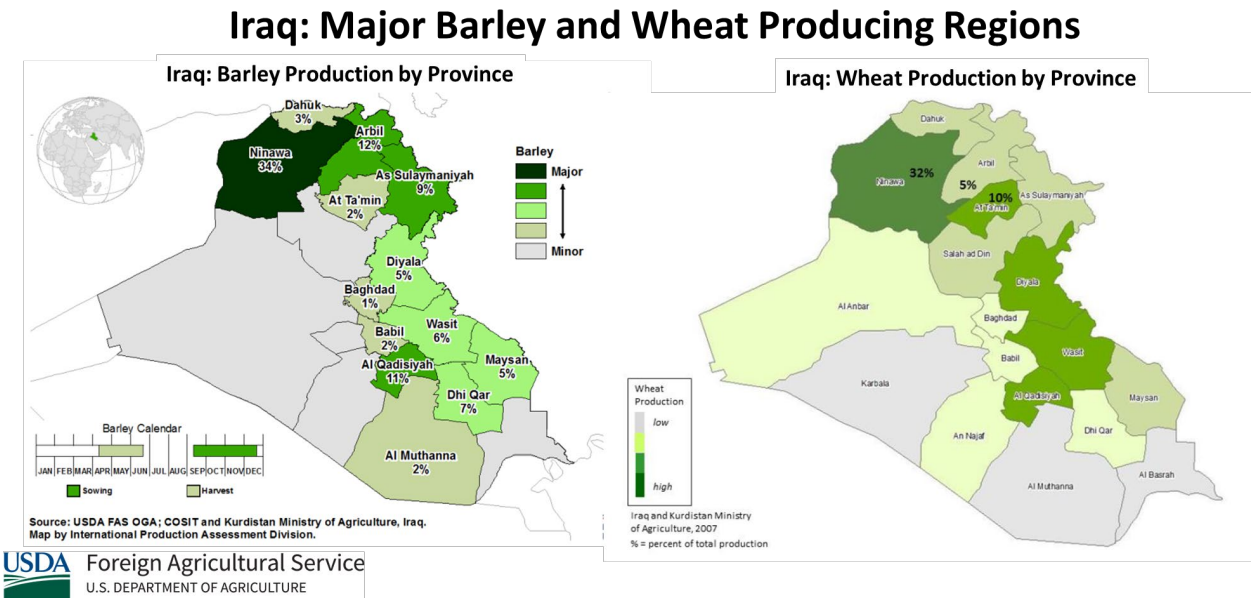

Figure 10. Iraq major barley and wheat producing regions. Source: USDA Crop Explorer.

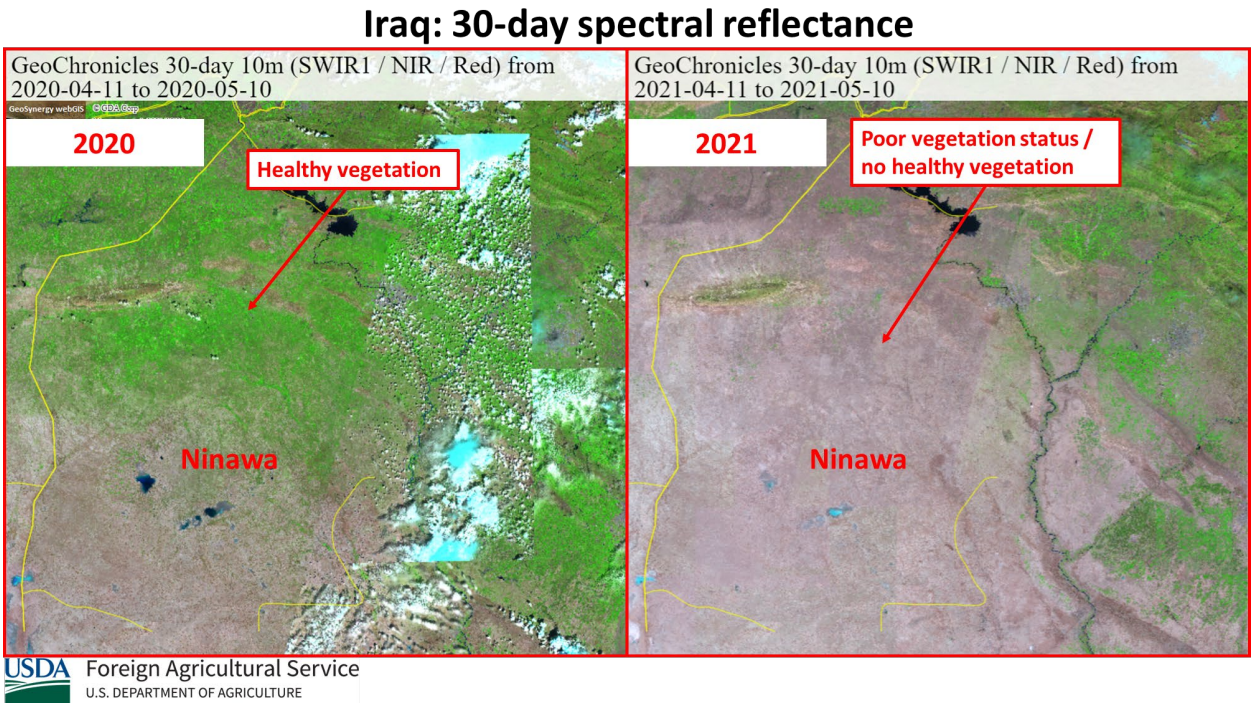

Figure 11. Composite satellite imagery year-to-year comparison of Ninawa, Iraq. Source: GDA Corp, Sentinel-2/Landsat-8 (10m) 10-day composite imagery.

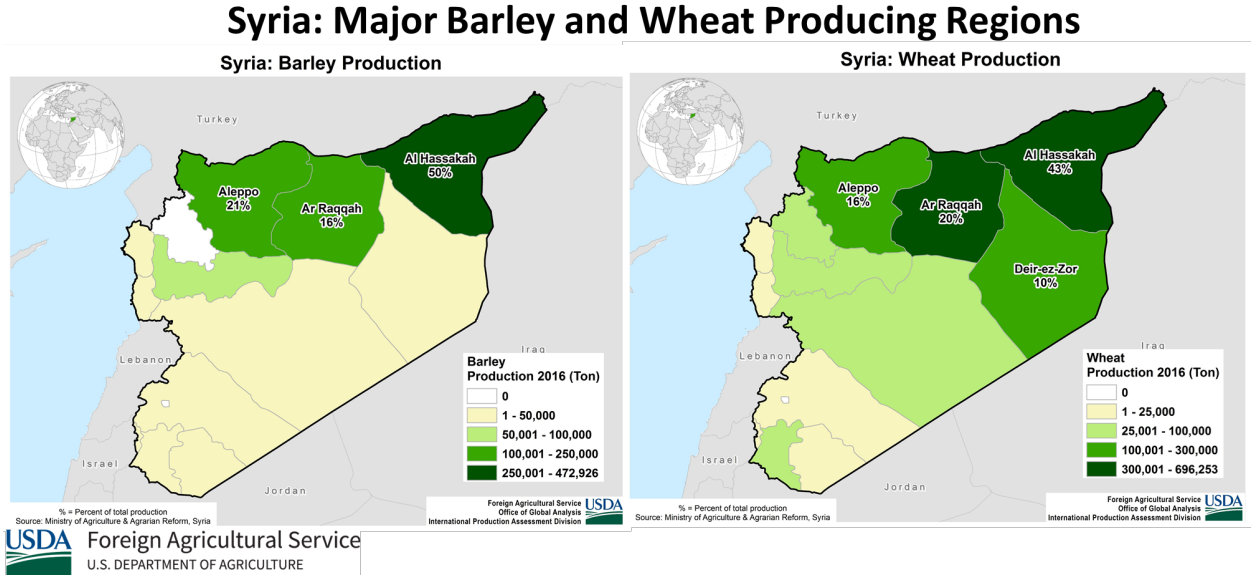

Figure 12. Syria major barley and wheat producing regions. Source: USDA Crop Explorer.

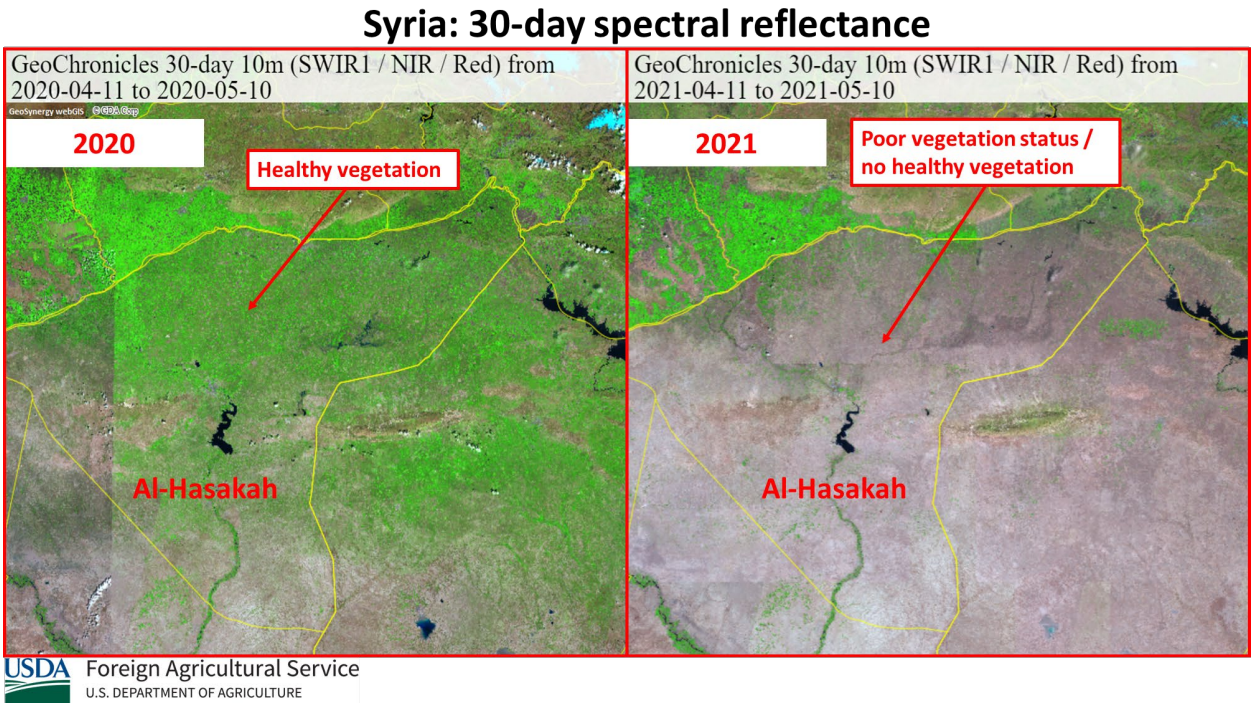

Figure 13. Composite satellite imagery year-to-year comparison of Al-Hasakah, Syria. Source: GDA Corp, Sentinel-2/Landsat-8 (10m) 10-day composite imagery.

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